

*Green*

*See Aug 8, 1995 News*

*EEB's doc*

*57501*



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

DEC 2 1994

MEMORANDUM

OFFICE OF  
PREVENTION, PESTICIDES AND  
TOXIC SUBSTANCES

Subject: Upgrade of Parathion Mysid Life-cycle Study (MRID  
40874401); Action (D208498)

From: *af* Anthony F. Maciorowski, Chief  
Ecological Effects Branch  
Environmental Fate and Effects Division (7507C)

*Douglas J. Clark 12/1/94*

To: Richard Dumas, Product Manager 61  
Special Review and Reregistration Division (7508C)

The following are the conclusions to EEB's review of the raw data submitted for upgrade of the subject study.

CONCLUSIONS: Based on the submitted raw data, this study does not fulfill the guideline requirement for an estuarine life-cycle study with mysid shrimp. EEB's statistical analysis of the raw data (see attached printouts) did not support the MATC reported in the study. The lowest NOEC reported was <3.1 ng/L. When EEB used the Williams test (Toxstat), the lowest level (3.1 ng/L) tested was different from the solvent control for female weight.

EEB performed statistical analysis on four items male mysid weight, female weight, number of offspring per level, and survival. Each analysis used the solvent control and not pooled controls. The following table summarizes the EEB's results:

Parameter	Williams (ng/L)	Bonferroni (ng/L)
Male weight	>19 <36	NSD
Female weight	<3.1	6.3, & 13 ng/L are different from the solvent control, whereas, the 3.1 ng/L & 19 ng/L were different.
Number of offspring	>3.1 <5.2	>5.2 <12
Survival	Moving Average EC50 18 (16.3 - 20)ng/L	



2021279

NSD = No Statistical Differences

Attached is a copy of the DER addendum.

Please contact Dennis J. McLane (305-5096) if you have any further questions.

**Addendum to DATA EVALUATION RECORD  
ESTUARINE INVERTEBRATE LIFE CYCLE TEST  
GUIDELINE 72-4(B)y**

1. **CHEMICAL:** Parathion
2. **TEST MATERIAL:** Ethyl Parathion
- 3.a **CITATION:** (for original study)

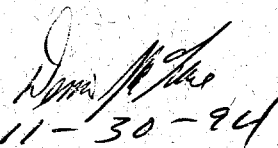
Author and Date: Hoberg, J.R. and Grandy, K.A., 1988  
Title: Chronic Toxicity of <sup>14</sup> C Ethyl Parathion to Mysid Shrimp (*Mysidopsis bahia*).  
Laboratory Report #: 88-4-2709  
Any Other Study #: 17704.0787.6104.530  
Sponsor: Cheminova Agro A/S  
Sponsor #: N/A  
Laboratory: Springborn Life Sciences, Inc.  
MRID No.: 40874401

- 3.b **CITATION:** (upgrade data)

Author and Date: D. C. Surprenant Sept. 30, 1994  
Title: Cheminova's Response to EPA's August 18, 1994, Review of the Ethyl Parathion Chronic Mysid Shrimp Study (MRID #40874401)  
Laboratory Report #: N/A  
Any Other Study #: N/A  
Sponsor: Cheminova Agro A/S  
Sponsor #: N/A  
Laboratory: Springborn Life Sciences, Inc.  
MRID No.: 43387101

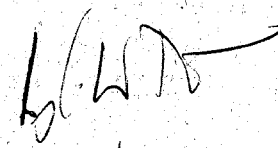
4. **REVIEWED BY:**

Dennis J/ McLane, Wildlife Biologist  
Ecological Effects Branch (7507C)  
U.S.E.P.A.

Signature:   
Date: 11-30-94

5. **APPROVED BY:**

Les W. Touart  
Section Head  
Ecological Effects Branch (7507C)  
U.S.E.P.A.

Signature:   
Date: 11-30-94

6. **CONCLUSIONS:** Based on the submitted raw data, this study does not fulfill the guideline requirement for a estuarine life-cycle study with mysid shrimp. EEB's statistical analysis of the raw data (see attached printouts) did not supported the MATC reported in the study. The lowest NOEC reported was <3.1 ng/L. When EEB used the Williams test (Toxstat), the

lowest level (3.1 ng/L) tested was different from the solvent control for female weight.

EEB performed statistical analysis on four items male mysid weight, female weight, number of offspring per level, and survival. Each analysis used the solvent control and not pooled controls. The following table summarizes the EEB's results:

Parameter	Williams (ng/L)	Bonferroni (ng/L)
Male weight	>19 <36	NSD
Female weight	<3.1	6.3, & 13 ng/L are different from the solvent control, whereas, the 3.1 ng/L & 19 ng/L were different.
Number of offspring	>3.1 <5.2	>5.2 <12
Survival	Moving Average EC50 18 (16.3 - 20)ng/L	

NSD = No Statistical Differences

**7. ADEQUACY OF THE STUDY:**

- A. Reclassification: Supplemental
- B. Rationale: Failed to provide an MATC
- C. Reparability: Only a new test with lower test levels would be expected to provide an MATC.

DP Barcode : D208498  
 PC Code No : 057501  
 EEB Out : / /

To: Richard Dumas  
 Product Manager 61  
 Special Review and Reregistration Division (7508W)

From: Anthony F. Maciorowski, Chief  
 Ecological Effects Branch/EFED (7507C)

Attached, please find the EEB review of...

Reg./File # : 057501  
 Chemical Name : Parathion  
 Type Product : insecticide  
 Product Name :  
 Company Name :  
 Purpose : Review raw data for mysid study.

Action Code: 606  
 Reviewer: Dennis McLane

Date Due: 11/18/94

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)	40874401	Y	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 not satisfied)  
 N=Unacceptable (Study was rejected)/Nonconcur

DP BARCODE: D208498

REREG CASE # 01

CASE: 818959  
SUBMISSION: S475501

DATA PACKAGE RECORD  
BEAN SHEET

DATE: 10/19/94  
Page 1 of 1

\* \* \* CASE/SUBMISSION INFORMATION \* \* \*

CASE TYPE: REREGISTRATION ACTION: 606 GENERIC DATA  
CHEMICALS: 057501 Parathion 100.00 %

ID#: 057501

COMPANY:

PRODUCT MANAGER: 61 RICHARD DUMAS 703-308-8015 ROOM: CS1 1H3  
PM TEAM REVIEWER: JOSHUA FIRST 703-308-8032 ROOM: CS1 2L1  
RECEIVED DATE: 09/30/94 DUE OUT DATE: 10/30/94

\* \* \* DATA PACKAGE INFORMATION \* \* \*

DP BARCODE: 208498 EXPEDITE: N DATE SENT: 10/19/94 DATE RET.: / /

CHEMICAL: 057501 Parathion

DP TYPE: 001 Submission Related Data Package

CSF: N LABEL: N

ASSIGNED TO	DATE IN	DATE OUT	ADMIN DUE DATE: 11/18/94
DIV : EFED	10/21/94	DEC / /	NEGOT DATE: / /
BRAN: EEB	10/16/1994	DEC / 2 1994	PROJ DATE: / /
SECT: IO	/ /	/ /	
REVR :	/ /	/ /	
CONTR:	/ /	/ /	

\* \* \* DATA REVIEW INSTRUCTIONS \* \* \*

Please review the attached raw data for a Mysid Shrimp study (74-2) MRID # 40874401. The MRID for this submission (the raw data) is 4338701. Josh First is the new CRM for ethyl parathion, so please direct all questions to him at 308-8032 or on cc:mail Thank you! -Josh

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

MCALNE PARATHION MYSID LIFE-CYCLE

```
*****
CONC.      NUMBER      NUMBER      PERCENT      BINOMIAL
           EXPOSED     DEAD        DEAD          PROB. (PERCENT)
36         52         46         88.4615      0
19         52         37         71.1538      0
12         52         3          5.7692      0
5.2        52         4          7.6923      0
3.1        52         7          13.4615     0
```

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

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 16.63552

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

```
SPAN      G          LC50      95 PERCENT CONFIDENCE LIMITS
2         4.020102E-02  18.07194  16.2977
19.88056
```

RESULTS CALCULATED USING THE PROBIT METHOD

```
ITERATIONS      G          H
GOODNESS OF FIT PROBABILITY
4              1.868336  14.33995
```

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 = 2.503402  
 95 PERCENT CONFIDENCE LIMITS = -.9184251 AND 5.925228

LC50 = 16.0701  
 95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 4.996995  
 95 PERCENT CONFIDENCE LIMITS = 0 AND 13.90008

\*\*\*\*\*

Parathion Reproduction - Number of offspring per Level

File: c:\chem\parthion\my3rep.dat

Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

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GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Solvent Control	20	1.000	12.000	7.900
2	3.1 mg/L	20	0.000	13.000	7.250
3	6.3 mg/L	20	0.000	10.000	6.350
4	13 mg/L	19	0.000	5.000	2.368
5	25 mg/L	18	0.000	3.000	0.333

---

Parathion Reproduction - Number of offspring per Level

File: c:\chem\parthion\my3rep.dat

Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

---

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Solvent Control	8.832	2.972	0.665
2	3.1 mg/L	16.303	4.038	0.903
3	6.3 mg/L	7.082	2.661	0.595
4	13 mg/L	3.579	1.892	0.434
5	25 mg/L	0.941	0.970	0.229

---

Parathion Reproduction - Number of offspring per Level

File: c:\chem\parthion\my3rep.dat

Transform: NO TRANSFORMATION

ANOVA TABLE

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SOURCE	DF	SS	MS	F
Between	4	829.314	207.328	27.545
Within (Error)	92	692.521	7.527	
Total	96	1521.835		

---

Critical F value = 2.53 (0.05, 4, 60)

Since  $F > \text{Critical } F$  REJECT  $H_0$ : All groups equal

Parathion Reproduction - Number of offspring per Level

File: c:\chem\parthion\my3rep.dat

Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2

$H_0$ : Control < Treatment



GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Solvent Control	7.900	7.900		
2	3.1 mg/L	7.250	7.250	0.749	
3	6.3 mg/L	6.350	6.350	1.787	
4	13 mg/L	2.368	2.368	6.294	*
5	25 mg/L	0.333	0.333	8.489	*

Bonferroni T table value = 2.28 (1 Tailed Value, P=0.05, df=90,4)

Parathion Reproduction - Number of offspring per Level

File: c:\chem\parthion\my3rep.dat

Transform: NO TRANSFORMATION

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 Control	20			
2	3.1 mg/L	20	1.978	25.0	0.650
3	6.3 mg/L	20	1.978	25.0	1.550
4	13 mg/L	19	2.004	25.4	5.532
5	25 mg/L	18	2.032	25.7	7.567

Parathion Reproduction - Number of offspring per Level

File: c:\chem\parthion\my3rep.dat

Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model)

TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Solvent Control	20	7.900	7.900	7.900
2	3.1 mg/L	20	7.250	7.250	7.250
3	6.3 mg/L	20	6.350	6.350	6.350
4	13 mg/L	19	2.368	2.368	2.368
5	25 mg/L	18	0.333	0.333	0.333

Parathion Reproduction - Number of offspring per Level

File: c:\chem\parthion\my3rep.dat

Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model)

TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Solvent Control	7.900				
3.1 mg/L	7.250	0.749		1.67	k= 1, v=92
6.3 mg/L	6.350	1.787	*	1.75	k= 2, v=92
13 mg/L	2.368	6.293	*	1.77	k= 3, v=92

25 mg/L

0.333

8.489

\*

1.78

k= 4, v=92

---

s = 2.744

Note: df used for table values are approximate when  $v > 20$ .

Sol. Control	0.739				
3.1 ng/L	0.739	0.272	1.66	k= 1, v=121	
5.2 ng/L	0.739	0.275	1.73	k= 2, v=121	
12 ng/L	0.646	1.310	1.75	k= 3, v=121	
19 ng/L	0.614	1.379	1.77	k= 4, v=121	
36 ng/L	0.534	2.124	1.77	k= 5, v=121	

s = 0.222

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

Parathion - Male Mysid Weight

File: c:\chem\parthion\mymalwt

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Sol. Control	29	0.400	1.100	0.722
2	3.1 ng/L	24	0.410	1.170	0.739
3	5.2 ng/L	25	0.340	1.270	0.758
4	12 ng/L	30	0.260	1.080	0.646
5	19 ng/L	11	0.200	1.100	0.614
6	36 ng/L	8	0.150	0.950	0.534

Parathion - Male Mysid Weight

File: c:\chem\parthion\mymalwt

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Sol. Control	0.026	0.163	0.030
2	3.1 ng/L	0.042	0.204	0.042
3	5.2 ng/L	0.069	0.263	0.053
4	12 ng/L	0.051	0.225	0.041
5	19 ng/L	0.053	0.230	0.069
6	36 ng/L	0.086	0.293	0.104

Parathion - Male Mysid Weight

File: c:\chem\parthion\mymalwt

Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.518	0.104	2.122

Within (Error)	121	5.963	0.049
Total	126	6.481	

Critical F value = 2.29 (0.05,5,120)  
 Since F < Critical F FAIL TO REJECT Ho:All groups equal

Parathion - Male Mysid Weight  
 File: c:\chem\parthion\mymalwt 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	Sol. Control	0.722	0.722		
2	3.1 ng/L	0.739	0.739	-0.273	
3	5.2 ng/L	0.758	0.758	-0.595	
4	12 ng/L	0.646	0.646	1.314	
5	19 ng/L	0.614	0.614	1.383	
6	36 ng/L	0.534	0.534	2.130	

Bonferroni T table value = 2.36 (1 Tailed Value, P=0.05, df=120,5)

Parathion - Male Mysid Weight  
 File: c:\chem\parthion\mymalwt 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	Sol. Control	29			
2	3.1 ng/L	24	0.144	19.9	-0.017
3	5.2 ng/L	25	0.142	19.7	-0.036
4	12 ng/L	30	0.136	18.8	0.076
5	19 ng/L	11	0.185	25.6	0.108
6	36 ng/L	8	0.208	28.9	0.188

Parathion - Male Mysid Weight  
 File: c:\chem\parthion\mymalwt Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Sol. Control	29	0.722	0.722	0.739
2	3.1 ng/L	24	0.739	0.739	0.739
3	5.2 ng/L	25	0.758	0.758	0.739
4	12 ng/L	30	0.646	0.646	0.646
5	19 ng/L	11	0.614	0.614	0.614

Parathion - Male Mysid Weight  
 File: c:\chem\parthion\mymalwt

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
Sol. Control	0.739				
3.1 ng/L	0.739	0.272		1.66	k= 1, v=121
5.2 ng/L	0.739	0.275		1.73	k= 2, v=121
12 ng/L	0.646	1.310		1.75	k= 3, v=121
19 ng/L	0.614	1.379		1.77	k= 4, v=121
36 ng/L	0.534	2.124	*	1.77	k= 5, v=121

s = 0.222

Note: df used for table values are approximate when  $v > 20$ .

Parathion Female dry weight  
File: c:\chem\parthion\myfemwt.dat

Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

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GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Solvent Control	24	0.590	1.290	0.977
2	3.1 mg/L	21	0.590	1.140	0.870
3	6.3 mg/L	23	0.450	1.630	0.831
4	13 mg/L	19	0.560	1.090	0.807
5	19 mg/L	4	0.660	0.950	0.750

---

Parathion Female dry weight  
File: c:\chem\parthion\myfemwt.dat

Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

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GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Solvent Control	0.039	0.198	0.040
2	3.1 mg/L	0.019	0.137	0.030
3	6.3 mg/L	0.094	0.306	0.064
4	13 mg/L	0.024	0.156	0.036
5	19 mg/L	0.018	0.135	0.067

---

Parathion Female dry weight  
File: c:\chem\parthion\myfemwt.dat

Transform: NO TRANSFORMATION

ANOVA TABLE

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SOURCE	DF	SS	MS	F
Between	4	0.443	0.111	2.467
Within (Error)	86	3.834	0.045	
Total	90	4.277		

---

Critical F value = 2.53 (0.05,4,60)

Since  $F < \text{Critical } F$  FAIL TO REJECT  $H_0$ : All groups equal

Parathion Female dry weight  
File: c:\chem\parthion\myfemwt.dat

Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2

$H_0$ : Control < Treatment

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GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Solvent Control	0.977	0.977		
2	3.1 mg/L	0.870	0.870	1.697	
3	6.3 mg/L	0.831	0.831	2.355	*
4	13 mg/L	0.807	0.807	2.613	*
5	19 mg/L	0.750	0.750	1.982	

Bonferroni T table value = 2.28 (1 Tailed Value, P=0.05, df=80,4)

Parathion Female dry weight

File: c:\chem\parthion\myfemwt.dat

Transform: NO TRANSFORMATION

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 Control	24			
2	3.1 mg/L	21	0.145	14.8	0.108
3	6.3 mg/L	23	0.141	14.5	0.146
4	13 mg/L	19	0.149	15.2	0.170
5	19 mg/L	4	0.262	26.8	0.227

Parathion Female dry weight

File: c:\chem\parthion\myfemwt.dat

Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Solvent Control	24	0.977	0.977	0.977
2	3.1 mg/L	21	0.870	0.870	0.870
3	6.3 mg/L	23	0.831	0.831	0.831
4	13 mg/L	19	0.807	0.807	0.807
5	19 mg/L	4	0.750	0.750	0.750

Parathion Female dry weight

File: c:\chem\parthion\myfemwt.dat

Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Solvent Control	0.977				
3.1 mg/L	0.870	1.705	*	1.67	k= 1, v=86
6.3 mg/L	0.831	2.366	*	1.75	k= 2, v=86
13 mg/L	0.807	2.626	*	1.77	k= 3, v=86
19 mg/L	0.750	1.991	*	1.78	k= 4, v=86

---

s = 0.211

Note: df used for table values are approximate when  $v > 20$ .



Parathion - Survival Mysid

File: c:\chem\parthion\my3sur.dat

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

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GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	4	0.000	2.000	1.000
2	Sol. Control	4	1.000	3.000	1.750
3	3.1	4	1.000	7.000	4.000
4	6.3	4	1.000	5.000	3.000
5	13	4	0.000	3.000	2.000
6	25	4	7.000	19.000	10.750
7	50	4	15.000	30.000	25.000

---

Parathion - Survival Mysid

File: c:\chem\parthion\my3sur.dat

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

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GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.667	0.816	0.408
2	Sol. Control	0.917	0.957	0.479
3	3.1	6.000	2.449	1.225
4	6.3	3.333	1.826	0.913
5	13	2.000	1.414	0.707
6	25	30.917	5.560	2.780
7	50	50.000	7.071	3.536

---

Parathion - Survival Mysid

File: c:\chem\parthion\my3sur.dat

Transform: NO TRANSFORM

ANOVA TABLE

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SOURCE	DF	SS	MS	F
Between	6	1805.214	300.869	22.445
Within (Error)	21	281.500	13.405	
Total	27	2086.714		

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Critical F value = 2.57 (0.05,6,21)

Since  $F > \text{Critical } F$  REJECT  $H_0$ : All groups equal

Parathion - Survival Mysid

File: c:\chem\parthion\my3sur.dat

Transform: NO TRANSFORM

## BONFERRONI T-TEST

TABLE 1 OF 2

Ho:Control&lt;Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	1.000	1.000		
2	Sol. Control	1.750	1.750	-0.290	
3	3.1	4.000	4.000	-1.159	
4	6.3	3.000	3.000	-0.773	
5	13	2.000	2.000	-0.386	
6	25	10.750	10.750	-3.766	
7	50	25.000	25.000	-9.270	

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

## Parathion - Survival Mysid

File: c:\chem\parthion\my3sur.dat

Transform: NO TRANSFORM

## BONFERRONI T-TEST

TABLE 2 OF 2

Ho:Control&lt;Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	Control	4			
2	Sol. Control	4	6.736	673.6	-0.750
3	3.1	4	6.736	673.6	-3.000
4	6.3	4	6.736	673.6	-2.000
5	13	4	6.736	673.6	-1.000
6	25	4	6.736	673.6	-9.750
7	50	4	6.736	673.6	-24.000

## Parathion - Survival Mysid

File: c:\chem\parthion\my3sur.dat

Transform: NO TRANSFORM

## WILLIAMS TEST (Isotonic regression model)

TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Control	4	1.000	1.000	1.000
2	Sol. Control	4	1.750	1.750	1.750
3	3.1	4	4.000	4.000	3.000
4	6.3	4	3.000	3.000	3.000
5	13	4	2.000	2.000	3.000
6	25	4	10.750	10.750	10.750
7	50	4	25.000	25.000	25.000

## Parathion - Survival Mysid

File: c:\chem\parthion\my3sur.dat

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
Control	1.000				
Sol. Control	1.750	0.290		1.72	k= 1, v=21
3.1	3.000	0.773		1.80	k= 2, v=21
6.3	3.000	0.773		1.83	k= 3, v=21
13	3.000	0.773		1.84	k= 4, v=21
25	10.750	3.766	*	1.85	k= 5, v=21
50	25.000	9.270	*	1.85	k= 6, v=21

s = 3.661

Note: df used for table values are approximate when v &gt; 20.

Parathion Reproduction - Number of offspring per Level  
File: c:\chem\parthion\my2repr.dat Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	19	0.000	13.000	8.053
2	Solvent Control	20	1.000	12.000	7.900
3	3.1 mg/L	20	0.000	13.000	7.250
4	6.3 mg/L	20	0.000	10.000	6.350
5	13 mg/L	19	0.000	5.000	2.368
6	25 mg/L	18	0.000	3.000	0.333

Parathion Reproduction - Number of offspring per Level  
File: c:\chem\parthion\my2repr.dat Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	9.053	3.009	0.690
2	Solvent Control	8.832	2.972	0.665
3	3.1 mg/L	16.303	4.038	0.903
4	6.3 mg/L	7.082	2.661	0.595
5	13 mg/L	3.579	1.892	0.434
6	25 mg/L	0.941	0.970	0.229

Parathion Reproduction - Number of offspring per Level  
File: c:\chem\parthion\my2repr.dat Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	981.394	196.279	25.238
Within (Error)	110	855.468	7.777	
Total	115	1836.862		

Critical F value = 2.37 (0.05,5,60)  
Since F > Critical F REJECT Ho:All groups equal

Parathion Reproduction - Number of offspring per Level  
File: c:\chem\parthion\my2repr.dat 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	Control	8.053	8.053		
2	Solvent Control	7.900	7.900	0.171	
3	3.1 mg/L	7.250	7.250	0.898	
4	6.3 mg/L	6.350	6.350	1.906	
5	13 mg/L	2.368	2.368	6.282	*
6	25 mg/L	0.333	0.333	8.416	*

Bonferroni T table value = 2.36 (1 Tailed Value, P=0.05, df=110,5)

Parathion Reproduction - Number of offspring per Level

File: c:\chem\parthion\my2repr.dat

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	Control	19			
2	Solvent Control	20	2.109	26.2	0.153
3	3.1 mg/L	20	2.109	26.2	0.803
4	6.3 mg/L	20	2.109	26.2	1.703
5	13 mg/L	19	2.136	26.5	5.684
6	25 mg/L	18	2.166	26.9	7.719

Parathion Reproduction - Number of offspring per Level

File: c:\chem\parthion\my2repr.dat

Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Control	19	8.053	8.053	8.053
2	Solvent Control	20	7.900	7.900	7.900
3	3.1 mg/L	20	7.250	7.250	7.250
4	6.3 mg/L	20	6.350	6.350	6.350
5	13 mg/L	19	2.368	2.368	2.368
6	25 mg/L	18	0.333	0.333	0.333

Parathion Reproduction - Number of offspring per Level

File: c:\chem\parthion\my2repr.dat

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
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Control	8.053				
Solvent Control	7.900	0.171		1.67	k= 1, v=110
3.1 mg/L	7.250	0.898		1.75	k= 2, v=110
6.3 mg/L	6.350	1.906	*	1.77	k= 3, v=110
13 mg/L	2.368	6.282	*	1.78	k= 4, v=110
25 mg/L	0.333	8.416	*	1.79	k= 5, v=110

s = 2.789

Note: df used for table values are approximate when  $v > 20$ .

Within (Error)	109	5.709	0.052
Total	114	6.330	

Critical F value = 2.37 (0.05,5,60)  
 Since F > Critical F REJECT Ho:All groups equal

Parathion Female dry weight  
 File: c:\chem\parthion\mywt.dat 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	Control	0.967	0.967		
2	Solvent Control	0.977	0.977	-0.158	
3	3.1 mg/L	0.870	0.870	1.426	
4	6.3 mg/L	0.831	0.831	2.034	
5	13 mg/L	0.807	0.807	2.282	
6	25 mg/L	0.750	0.750	1.759	

Bonferroni T table value = 2.37 (1 Tailed Value, P=0.05, df=100,5)

Parathion Female dry weight  
 File: c:\chem\parthion\mywt.dat 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	Control	24			
2	Solvent Control	24	0.156	16.1	-0.010
3	3.1 mg/L	21	0.161	16.7	0.097
4	6.3 mg/L	23	0.157	16.3	0.135
5	13 mg/L	19	0.166	17.1	0.160
6	25 mg/L	4	0.291	30.1	0.217

Parathion Female dry weight  
 File: c:\chem\parthion\mywt.dat Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Control	24	0.967	0.967	0.972
2	Solvent Control	24	0.977	0.977	0.972
3	3.1 mg/L	21	0.870	0.870	0.870
4	6.3 mg/L	23	0.831	0.831	0.831
5	13 mg/L	19	0.807	0.807	0.807

Parathion Female dry weight  
 File: c:\chem\parthion\mywt.dat                      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
Control	0.972				
Solvent Control	0.972	0.079		1.67	k= 1, v=109
3.1 mg/L	0.870	1.420		1.75	k= 2, v=109
6.3 mg/L	0.831	2.027	*	1.77	k= 3, v=109
13 mg/L	0.807	2.274	*	1.78	k= 4, v=109
25 mg/L	0.750	1.753		1.79	k= 5, v=109

---

s = 0.229

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



Parathion Female dry weight  
File: c:\chem\parthion\mywt.dat

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

---

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	24	0.600	1.820	0.967
2	Solvent Control	24	0.590	1.290	0.977
3	3.1 mg/L	21	0.590	1.140	0.870
4	6.3 mg/L	23	0.450	1.630	0.831
5	13 mg/L	19	0.560	1.090	0.807
6	25 mg/L	4	0.660	0.950	0.750

---

Parathion Female dry weight  
File: c:\chem\parthion\mywt.dat

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

---

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.082	0.286	0.058
2	Solvent Control	0.039	0.198	0.040
3	3.1 mg/L	0.019	0.137	0.030
4	6.3 mg/L	0.094	0.306	0.064
5	13 mg/L	0.024	0.156	0.036
6	25 mg/L	0.018	0.135	0.067

---

Parathion Female dry weight  
File: c:\chem\parthion\mywt.dat

Transform: NO TRANSFORM

ANOVA TABLE

---

SOURCE	DF	SS	MS	F
Between	5	0.621	0.124	2.385
Within (Error)	109	5.709	0.052	
Total	114	6.330		

---

Critical F value = 2.37 (0.05,5,60)  
Since F > Critical F REJECT Ho:All groups equal

Parathion Female dry weight  
File: c:\chem\parthion\mywt.dat

Transform: NO TRANSFORM

Parathion - Male Mysid Weight  
 File: c:\chem\parthion\my4malwt.dat

Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Control	30	0.781	0.781	0.781
2	Sol. Control	29	0.722	0.722	0.739
3	3.1	24	0.739	0.739	0.739
4	6.3	25	0.758	0.758	0.739
5	13	30	0.646	0.646	0.646
6	25	11	0.614	0.614	0.614
7	50	8	0.534	0.534	0.534

Parathion - Male Mysid Weight  
 File: c:\chem\parthion\my4malwt.dat

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
Control	0.781				
Sol. Control	0.739	0.775		1.66	k= 1, v=150
3.1	0.739	0.737		1.73	k= 2, v=150
6.3	0.739	0.745		1.75	k= 3, v=150
13	0.646	2.488	*	1.77	k= 4, v=150
25	0.614	2.265	*	1.77	k= 5, v=150
50	0.534	2.964	*	1.78	k= 6, v=150

s = 0.210

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

Parathion - Male Mysid Weight  
 File: c:\chem\parthion\my4malwt.dat

Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.705	0.118	2.682
Within (Error)	150	6.590	0.044	
Total	156	7.295		

Critical F value = 2.18 (0.05,6,120)  
 Since F > Critical F REJECT Ho:All groups equal

Parathion - Male Mysid Weight  
 File: c:\chem\parthion\my4malwt.dat

Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.705	0.118	2.682
Within (Error)	150	6.590	0.044	
Total	156	7.295		

Critical F value = 2.18 (0.05,6,120)  
 Since F > Critical F REJECT Ho:All groups equal

Parathion - Male Mysid Weight  
 File: c:\chem\parthion\my4malwt.dat

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	Control	0.781	0.781		
2	Sol. Control	0.722	0.722	1.079	
3	3.1	0.739	0.739	0.735	
4	6.3	0.758	0.758	0.405	
5	13	0.646	0.646	2.486	*
6	25	0.614	0.614	2.264	
7	50	0.534	0.534	2.962	*

Bonferroni T table value = 2.43 (1 Tailed Value, P=0.05, df=120,6)

Parathion - Male Mysid Weight  
 File: c:\chem\parthion\my4malwt.dat

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	Control	30			
2	Sol. Control	29	0.133	17.0	0.059
3	3.1	24	0.140	17.9	0.042
4	6.3	25	0.138	17.7	0.023
5	13	30	0.132	16.8	0.135
6	25	11	0.180	23.0	0.167
7	50	8	0.203	26.0	0.247