

US EPA ARCHIVE DOCUMENT

9-8-94

DP Barcode : D194698
PC Code No : 038901
EEB Out : / /

To: Kathryn Davis
Product Manager 52
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 # : 038901
Chemical Name : Endothall
Type Product : herbicide
Product Name :
Company Name :
Purpose : Review oyster shell deposition study.

Action Code: 627
Reviewer: Dennis McLane

Date Due: 12/31/93

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)	42895201	Y	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 not satisfied)
N=Unacceptable (Study was rejected)/Nonconcur

DP BARCODE: D194698

REREG CASE # 2245

CASE: 818815
SUBMISSION: S447183

DATA PACKAGE RECORD
BEAN SHEET

DATE: 09/02/93
Page 1 of 1

* * * CASE/SUBMISSION INFORMATION * * *

CASE TYPE: REREGISTRATION ACTION: 627 GENERIC DATA SUBMISSION
CHEMICALS: 038901 Endothall

ID#: 038901-
COMPANY:

PRODUCT MANAGER: 52 KATHRYN DAVIS 703-308-8156 ROOM: CS1 3F3
PM TEAM REVIEWER: ERNESTINE DOBBINS 703-308-8071 ROOM: CS1 3N1
RECEIVED DATE: 08/24/93 DUE OUT DATE: 12/22/93

* * * DATA PACKAGE INFORMATION * * *

DP BARCODE: 194698 EXPEDITE: N DATE SENT: 09/02/93 DATE RET.: / /
CHEMICAL: 038901 Endothall
DP TYPE: 999 Miscellaneous Data Package

CSF: N LABEL: N
ASSIGNED TO DATE IN DATE OUT ADMIN DUE DATE: 12/31/93
DIV : EFED 09 10 1993 / / NEGOT DATE: 12/31/93
BRAN: EEB 9 10 1993 / / PROJ DATE: / /
SECT: / / / /
REVR : / / / /
CONTR: / / / /

* * * DATA REVIEW INSTRUCTIONS * * *

PLEASE REVIEW MRID 42895201 FOR GUIDELINE 72-3^(b) ENDOTHALL
THECHNICAL-ACUTE TOXICITY TO EASTERN OYSTER UNDER
FLOW-THROUGH CONDITIONS. PLEASE REVIEW TO DETERMINE IF
GUIDELINE IS SATISFIED. THANKS.

* * * 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

2

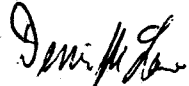
MRID No.: 42895201

DATA EVALUATION RECORD


1. CHEMICAL: Endothall Technical
2. TEST MATERIAL: 91.21% TGAI, tan powder
3. STUDY TYPE: S72-3(b)
4. CITATION:

Author: Emily Dionne
Title: Endothall technical - acute toxicity to Eastern Oyster (*Crassostrea virginica*) under flow-through conditions.
Date: August 9, 1993
Laboratory Report #: 93-4-4715
Any Other Study #: 12442.0591.6125.504
Sponsor: Atochem North America
Sponsor #: N/A
Laboratory: Springborn Laboratories, Inc.
MRID No.: 42895201

5. REVIEWED BY:

Dennis J. McLane, Wildlife Biologist Signature: 
Ecological Effects Branch
Environmental Fate and Effects Division (7507 C) Date: 9-8-94

6. APPROVED BY:

Les Touart, Chief, Section 1 Signature: 
Ecological Effects Branch
Environmental Fate and Effects Division (7507C) Date: 9-8-94

7. CONCLUSION

This study fulfills the guideline requirements for an acute toxicity test using the Eastern oyster. Under the conditions of the test, the 96-hour EC₅₀ was 43 (39.6-47.8) mg a.i./L which classifies endothall technical as slightly toxic to Eastern oysters.

8. RECOMMENDATIONS N/A

9. BACKGROUND

"The following study is submitted in support of endothall acid as required in the Reregistration DCI.

MRID No. : 42895201

10. MATERIALS AND METHODS

A. Test Organisms: Eastern Oysters

Guideline Criteria	Reported Information
Species (Scientific Name)	<i>Crassostrea virginica</i>
Mean valve height (25 - 50 mm -- the long axis)	31 (\pm 4)mm
Supplier	P. Cummins Oyster Company, Pasadena, MD
All oysters from same source (yes or no)	yes
All oysters from the same year class (yes or no)	yes
Other Comments	

B. Source/Acclimation

Guideline Criteria	Reported Information
Acclimation Period (minimum 10 days)	10 days
Wild caught 7 day quarantine (yes or no)	no
Check for signs of disease or injury (yes or no, if yes describe)	yes, checked for parasites; 0.8% mortality in the test population 7 days prior to test initiation.
If diseased it can be treated in 48-hr pretest no sign of the disease remains (Report hours prior to test in which no sign of disease or N/A)	N/A
Was peripheral shell growth removed prior to testing? If so how much.	yes, 3-5 mm
Feeding during the acclimation	Fed a supplemental algal diet of <i>Isochrysis galbana</i> Parke, clone T-ISO and <i>Tetraselmis</i> <i>maculata</i> .

MRID No.: 42895201

<3% mortality 48 hours prior to testing (% mortality, if any)	yes
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C. Test System:

Guideline Criteria	Reported Information
Describe source of dilution water (natural unfiltered seawater)	Natural unfiltered seawater from Cape Cod Canal, Bourne, MA
Does water support test animals without observable signs of stress?	yes
What was the salinity of the test water?	31 ‰
Water Temperature (between 15°C and 30°C -- but must be consistent)	20 ± 2°C
pH	7.0-7.8
Dissolved Oxygen (Static 1 st 48 hrs 40%; 2 nd 48 hrs 60%; Flow-through 60%) (% of lowest conc. & hour)	92-107% See Table 1
Total Organic Carbon	no
Test Aquaria 1. Material (glass or stainless steel) 2. a. Static volume (18.9 L (5 gal or 19000 cc) with 15 L solution) b. Static or flow-through volume (300x600x300 = 54000 cc.)	glass 18 L 49.5 X 25.5 X 29 cm
Type of Dilution System (Reproducible supply of toxicant)	Harvard Apparatus peristaltic pump was calibrated to deliver 1.67 ml/min of the 26.9 mg ai/ml stock solution.

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Flow rate Consistent flow rate-meter systems calibrated before study and checked 2*24 hours - 5 to 10 vol/24 hours	6 solution volume replacements per 24 hours
Biomass Loading Rate (all oysters should be able to sit on the bottom with water flowing freely around them)	yes
Photoperiod (16 L & 8 D)	16 hours light and 8 hours dark
Solvents (Do not exceed 0.5 ml/L for flow-through)	none
Other Comments	

D. Test Design:

Guideline Criteria	Reported Information
<u>Range Finding Test</u> (LC ₅₀ >100 mg/L with 30 shrimp, no definitive test required.)	After 48 hours the 200 & 100 mg a.i./L resulted in 100 & 99% reduction, respectively. 50, 25, & 13 mg a.i./L grew only 38, 31, & 14% compared to the controls
<u>Definitive Test</u>	
Nominal Concentrations (control+5 treatment levels; dosage should be 60% of the next highest concentration; concentrations should be geometric series)	16, 26, 43, 72, & 120 mg ai/L
Controls (Minimum control mortality; static 10%; flow-through 5%)	no mortality observed
Number of Test Organisms; (Minimum 10/level can be divided among containers)	20 oysters in each test aquarium (40 per treatment level)
All organisms must be randomly assigned to test vessels. (yes or no, describe if no)	"...impartially selecting and placing 29 oysters in each aquarium."

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Biological Observations (yes or no)	yes, every 24 hours
Water Parameter Measurements 1. Temperature - record every 6 hrs; >1°C. 2. D.O. beginning, 48 hrs, end for control high, medium, and low dose. 3. pH beginning, 48 hrs, end for control, high, medium, and low dose.	continuous every 24 hours in each aquarium every 24 hours in each aquarium
Chemical Analysis (needed if aeration, volatile, insoluble, precipitate, not steel or glass, known to adsorb, and flow-through) (yes or no)	"... undissolved test material was observed on the surface of the 110 mg a.i./L test solution."
Other Comments	

11. REPORTED RESULTS:

Guideline Criteria	Reported Information
Mean Measured Concentrations (report conc.)	16, 25, 38, 66, and 110 mg ai/L
Recovery of Chemical (% recovery)	16-100%, 26-96.1%, 43-88.37%, 72-91.6%, 120-91.7%
Mortality & Observations (Describe observations & attach mortality tables)	No mortality at any treatment level; however reduced feeding and reduced fecal and pseudofecal production were observed at 110 mg a.i./L
Measurements of shell increments per control and test concentration.	See Table 3
Ratio of mean growth of test concentration to mean growth of controls. (provides percentage index of the response of the molluscs to toxicant)	See Table 4

EC ₅₀ = reduced shell deposition by 50% compared to the controls	the mean measured concentrations EC ₅₀ = 54 mg a.i./L (30-80) mg a.i./L
Author's Comments	

12. STUDY AUTHOR'S CONCLUSIONS / QUALITY ASSURANCE MEASURES:

Based on mean measured concentrations and the observed biological response (growth), the 96-hour EC₅₀ (95% confidence interval) for Eastern oysters exposed to Endothall Technical was calculated by linear regression analysis to be 54 mg a.i./L (corresponding 95% confidence interval 30-80 mg a.i./L). The No-Observed-Effect Concentration (NOEC) established during this exposure was determined to be 16 mg a.i./L, the lowest mean measured concentration tested. Based on these results and criteria established by the U.S. Environmental Protection Agency (1985), Endothall Technical would be classified as slightly toxic to Eastern oysters. Quality assurance and good laboratory practice statements were included in the report, indicating that the study was conducted in accordance with U.S. EPA Good Laboratory Practices Regulations set forth in FIFRA 40 CFR Part 160 with these exceptions water samples for contaminate screening were not conducted using USEPA procedures, samples of water taken for total organic carbon analyses were not collected in accordance with Good Laboratory Practice Procedures.

13. REVIEWER'S DISCUSSION AND INTERPRETATION

A. Test Procedure:

The study fulfilled the guideline requirements.

B. Statistical Analysis

Guideline Criteria	Reported Information
Binomial (yes, no, or not reported)	
Moving Average Angle (yes, no, or not reported)	EEB found the moving average value of 43 (39.6-47.8)mg a.i./L met the guidelines
Probit (yes, no, or not reported)	The probit failed the goodness of fit criteria with a probability of 0.001 (see attached printout)

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Williams Test	EEB results show all test levels are different from the control. The laboratories test indicated that the 16 mg a.i./L was the NOEC.
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C. Discussion/Results:

This study is scientifically sound and fulfills the guideline requirements for an acute toxicity test using the Eastern oyster. Under the conditions of the test, the 96-hour EC₅₀ was 43 (39.6-47.8) mg a.i./L, based on EEB's toxanal's moving average angle results. No NOEC was determined. EEB's Williams test (TOXSTAT) did not confirm the results of the laboratory.

D. Adequacy of the Study:

1. Classification: Core
2. Rational: Fulfills the guideline requirements.
3. Reparability: N/A

14. COMPLETION DATE OF ONE-LINER FOR STUDY: 9/2/94

Page _____ is not included in this copy.

Pages 10 through 13 are not included.

The material not included contains the following type of information:

- Identity of product inert ingredients.
 - Identity of product 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) _____.
 - The document is not responsive to the request.
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The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.

MCALNE ENDOTHALL ENDOTHALL SHELL DEPOSITION

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
110	100	97	97	0
66	100	56	56	0
38	100	34	34	0
25	100	33	33	0
16	100	13	13	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 56.86785

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
4	1.967552E-02		43.3926	39.55806

47.80622

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H
4	.5763881	8.108623

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 = 2.777191
 95 PERCENT CONFIDENCE LIMITS = .6687413 AND 4.88564

LC50 = 43.76892
 95 PERCENT CONFIDENCE LIMITS = 22.73349 AND 99.10688

LC10 = 15.27106
 95 PERCENT CONFIDENCE LIMITS = .5773982 AND 27.0557

TITLE: Endothall Technical Eastern oyster
FILE: c:\chem\endoshell
TRANSFORM: NO TRANSFORM

NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	7.2000	7.2000
1	Control	2	4.0000	4.0000
1	Control	3	4.3000	4.3000
1	Control	4	1.9000	1.9000
1	Control	5	3.3000	3.3000
1	Control	6	5.2000	5.2000
1	Control	7	5.0000	5.0000
1	Control	8	4.7000	4.7000
1	Control	9	4.4000	4.4000
1	Control	10	6.6000	6.6000
1	Control	11	5.9000	5.9000
1	Control	12	3.6000	3.6000
1	Control	13	5.2000	5.2000
1	Control	14	5.0000	5.0000
1	Control	15	4.0000	4.0000
1	Control	16	4.2000	4.2000
1	Control	17	5.1000	5.1000
1	Control	18	4.9000	4.9000
1	Control	19	6.2000	6.2000
1	Control	20	8.1000	8.1000
1	Control	21	3.1000	3.1000
1	Control	22	3.8000	3.8000
1	Control	23	1.8000	1.8000
1	Control	24	5.7000	5.7000
1	Control	25	3.1000	3.1000
1	Control	26	5.1000	5.1000
1	Control	27	5.9000	5.9000
1	Control	28	3.6000	3.6000
1	Control	29	3.3000	3.3000
1	Control	30	5.9000	5.9000
1	Control	31	4.1000	4.1000
1	Control	32	3.5000	3.5000
1	Control	33	5.5000	5.5000
1	Control	34	1.9000	1.9000
1	Control	35	0.5000	0.5000
1	Control	36	5.4000	5.4000
1	Control	37	5.0000	5.0000
1	Control	38	5.5000	5.5000
1	Control	39	3.2000	3.2000
1	Control	40	4.7000	4.7000
2	16	1	4.3000	4.3000
2	16	2	6.0000	6.0000
2	16	3	5.5000	5.5000
2	16	4	3.7000	3.7000
2	16	5	0.9000	0.9000
2	16	6	4.6000	4.6000
2	16	7	4.3000	4.3000
2	16	8	3.1000	3.1000
2	16	9	5.2000	5.2000

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2	16	10	5.0000	5.0000
2	16	11	1.3000	1.3000
2	16	12	1.5000	1.5000
2	16	13	1.9000	1.9000
2	16	14	4.8000	4.8000
2	16	15	5.4000	5.4000
2	16	16	6.0000	6.0000
2	16	17	0.7000	0.7000
2	16	18	2.3000	2.3000
2	16	19	1.9000	1.9000
2	16	20	3.1000	3.1000
2	16	21	2.8000	2.8000
2	16	22	3.9000	3.9000
2	16	23	5.2000	5.2000
2	16	24	5.3000	5.3000
2	16	25	5.4000	5.4000
2	16	26	5.0000	5.0000
2	16	27	1.8000	1.8000
2	16	28	4.4000	4.4000
2	16	29	3.9000	3.9000
2	16	30	4.0000	4.0000
2	16	31	3.8000	3.8000
2	16	32	3.3000	3.3000
2	16	33	3.6000	3.6000
2	16	34	4.8000	4.8000
2	16	35	6.0000	6.0000
2	16	36	5.7000	5.7000
2	16	37	3.1000	3.1000
2	16	38	3.1000	3.1000
2	16	39	6.5000	6.5000
2	16	40	2.4000	2.4000
3	25	1	4.1000	4.1000
3	25	2	2.5000	2.5000
3	25	3	3.2000	3.2000
3	25	4	2.3000	2.3000
3	25	5	1.7000	1.7000
3	25	6	3.8000	3.8000
3	25	7	4.2000	4.2000
3	25	8	5.5000	5.5000
3	25	9	4.2000	4.2000
3	25	10	3.4000	3.4000
3	25	11	0.0000	0.0000
3	25	12	4.8000	4.8000
3	25	13	3.5000	3.5000
3	25	14	3.4000	3.4000
3	25	15	2.8000	2.8000
3	25	16	2.3000	2.3000
3	25	17	4.8000	4.8000
3	25	18	1.5000	1.5000
3	25	19	1.5000	1.5000
3	25	20	0.9000	0.9000
3	25	21	2.6000	2.6000
3	25	22	4.6000	4.6000
3	25	23	2.7000	2.7000
3	25	24	2.4000	2.4000
3	25	25	4.2000	4.2000
3	25	26	0.7000	0.7000
3	25	27	4.0000	4.0000
3	25	28	3.3000	3.3000
3	25	29	4.9000	4.9000

16

3	25	30	0.8000	0.8000
3	25	31	1.8000	1.8000
3	25	32	2.6000	2.6000
3	25	33	2.2000	2.2000
3	25	34	3.7000	3.7000
3	25	35	5.0000	5.0000
3	25	36	1.5000	1.5000
3	25	37	3.7000	3.7000
3	25	38	2.4000	2.4000
3	25	39	2.3000	2.3000
3	25	40	4.6000	4.6000
4	38	1	3.7000	3.7000
4	38	2	5.2000	5.2000
4	38	3	2.8000	2.8000
4	38	4	3.5000	3.5000
4	38	5	3.8000	3.8000
4	38	6	2.8000	2.8000
4	38	7	2.4000	2.4000
4	38	8	4.1000	4.1000
4	38	9	3.6000	3.6000
4	38	10	3.3000	3.3000
4	38	11	1.0000	1.0000
4	38	12	3.0000	3.0000
4	38	13	3.6000	3.6000
4	38	14	4.0000	4.0000
4	38	15	4.0000	4.0000
4	38	16	3.6000	3.6000
4	38	17	3.1000	3.1000
4	38	18	1.2000	1.2000
4	38	19	4.3000	4.3000
4	38	20	2.0000	2.0000
4	38	21	4.3000	4.3000
4	38	22	2.5000	2.5000
4	38	23	1.3000	1.3000
4	38	24	2.3000	2.3000
4	38	25	4.4000	4.4000
4	38	26	0.7000	0.7000
4	38	27	3.0000	3.0000
4	38	28	1.8000	1.8000
4	38	29	1.6000	1.6000
4	38	30	2.3000	2.3000
4	38	31	3.5000	3.5000
4	38	32	2.4000	2.4000
4	38	33	1.9000	1.9000
4	38	34	2.6000	2.6000
4	38	35	1.0000	1.0000
4	38	36	3.5000	3.5000
4	38	37	4.3000	4.3000
4	38	38	3.3000	3.3000
4	38	39	3.5000	3.5000
4	38	40	4.1000	4.1000
5	66	1	2.8000	2.8000
5	66	2	2.4000	2.4000
5	66	3	1.4000	1.4000
5	66	4	0.7000	0.7000
5	66	5	2.8000	2.8000
5	66	6	2.3000	2.3000
5	66	7	0.4000	0.4000
5	66	8	1.5000	1.5000
5	66	9	2.3000	2.3000

5	66	10	1.8000	1.8000
5	66	11	2.1000	2.1000
5	66	12	0.0000	0.0000
5	66	13	2.7000	2.7000
5	66	14	4.4000	4.4000
5	66	15	1.3000	1.3000
5	66	16	4.6000	4.6000
5	66	17	1.8000	1.8000
5	66	18	2.0000	2.0000
5	66	19	2.0000	2.0000
5	66	20	3.4000	3.4000
5	66	21	4.3000	4.3000
5	66	22	1.6000	1.6000
5	66	23	3.7000	3.7000
5	66	24	0.8000	0.8000
5	66	25	2.4000	2.4000
5	66	26	2.0000	2.0000
5	66	27	1.0000	1.0000
5	66	28	2.3000	2.3000
5	66	29	2.0000	2.0000
5	66	30	1.6000	1.6000
5	66	31	1.7000	1.7000
5	66	32	1.5000	1.5000
5	66	33	1.1000	1.1000
5	66	34	0.3000	0.3000
5	66	35	1.8000	1.8000
5	66	36	4.3000	4.3000
5	66	37	0.9000	0.9000
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5	66	40	0.6000	0.6000
6	110	1	0.0000	0.0000
6	110	2	0.0000	0.0000
6	110	3	1.0000	1.0000
6	110	4	0.0000	0.0000
6	110	5	0.0000	0.0000
6	110	6	0.0000	0.0000
6	110	7	0.0000	0.0000
6	110	8	0.0000	0.0000
6	110	9	0.0000	0.0000
6	110	10	0.0000	0.0000
6	110	11	0.0000	0.0000
6	110	12	0.0000	0.0000
6	110	13	0.2000	0.2000
6	110	14	0.4000	0.4000
6	110	15	0.0000	0.0000
6	110	16	0.0000	0.0000
6	110	17	0.0000	0.0000
6	110	18	0.0000	0.0000
6	110	19	0.0000	0.0000
6	110	20	0.0000	0.0000
6	110	21	0.0000	0.0000
6	110	22	0.0000	0.0000
6	110	23	0.0000	0.0000
6	110	24	0.0000	0.0000
6	110	25	0.0000	0.0000
6	110	26	0.6000	0.6000
6	110	27	0.0000	0.0000
6	110	28	0.0000	0.0000
6	110	29	0.6000	0.6000

6	110	30	0.0000	0.0000
6	110	31	0.0000	0.0000
6	110	32	0.0000	0.0000
6	110	33	0.0000	0.0000
6	110	34	0.8000	0.8000
6	110	35	0.5000	0.5000
6	110	36	0.0000	0.0000
6	110	37	0.0000	0.0000
6	110	38	0.4000	0.4000
6	110	39	0.4000	0.4000
6	110	40	0.0000	0.0000

Endothall Technical Eastern oyster
File: c:\chem\endoshell Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	40	0.500	8.100	4.485
2	16	40	0.700	6.500	3.888
3	25	40	0.000	5.500	3.010
4	38	40	0.700	5.200	2.983
5	66	40	0.000	4.600	1.958
6	110	40	0.000	1.000	0.123

Endothall Technical Eastern oyster
File: c:\chem\endoshell Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	2.297	1.515	0.240
2	16	2.410	1.552	0.245
3	25	1.827	1.352	0.214
4	38	1.203	1.097	0.173
5	66	1.345	1.160	0.183
6	110	0.065	0.255	0.040

Endothall Technical Eastern oyster
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WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Control	40	4.485	4.485	4.485
2	16	40	3.888	3.888	3.888

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3	25	40	3.010	3.010	3.010
4	38	40	2.983	2.983	2.983
5	66	40	1.958	1.958	1.958
6	110	40	0.123	0.123	0.123

Endothall Technical Eastern oyster
File: c:\chem\endoshell 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	4.485				
16	3.888	2.164	*	1.66	k= 1, v=234
25	3.010	5.343	*	1.73	k= 2, v=234
38	2.983	5.442	*	1.75	k= 3, v=234
66	1.958	9.155	*	1.77	k= 4, v=234
110	0.123	15.802	*	1.77	k= 5, v=234

s = 1.235

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

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a	7.2 b	4.3 c	4.1 d	3.7 e	2.8 f	0
a	4 b	6 c	2.5 d	5.2 e	2.4 f	0
a	4.3 b	5.5 c	3.2 d	2.8 e	1.4 f	1
a	1.9 b	3.7 c	2.3 d	3.5 e	0.7 f	0
a	3.3 b	0.9 c	1.7 d	3.8 e	2.8 f	0
a	5.2 b	4.6 c	3.8 d	2.8 e	2.3 f	0
a	5 b	4.3 c	4.2 d	2.4 e	0.4 f	0
a	4.7 b	3.1 c	5.5 d	4.1 e	1.5 f	0
a	4.4 b	5.2 c	4.2 d	3.6 e	2.3 f	0
a	6.6 b	5 c	3.4 d	3.3 e	1.8 f	0
a	5.9 b	1.3 c	0 d	1 e	2.1 f	0
a	3.6 b	1.5 c	4.8 d	3 e	0 f	0
a	5.2 b	1.9 c	3.5 d	3.6 e	2.7 f	0.2
a	5 b	4.8 c	3.4 d	4 e	4.4 f	0.4
a	4 b	5.4 c	2.8 d	4 e	1.3 f	0
a	4.2 b	6 c	2.3 d	3.6 e	4.6 f	0
a	5.1 b	0.7 c	4.8 d	3.1 e	1.8 f	0
a	4.9 b	2.3 c	1.5 d	1.2 e	2 f	0
a	6.2 b	1.9 c	1.5 d	4.3 e	2 f	0
a	8.1 b	3.1 c	0.9 d	2 e	3.4 f	0
a	3.1 b	2.8 c	2.6 d	4.3 e	4.3 f	0
a	3.8 b	3.9 c	4.6 d	2.5 e	1.6 f	0
a	1.8 b	5.2 c	2.7 d	1.3 e	3.7 f	0
a	5.7 b	5.3 c	2.4 d	2.3 e	0.8 f	0
a	3.1 b	5.4 c	4.2 d	4.4 e	2.4 f	0
a	5.1 b	5 c	0.7 d	0.7 e	2 f	0.6
a	5.9 b	1.8 c	4 d	3 e	1 f	0
a	3.6 b	4.4 c	3.3 d	1.8 e	2.3 f	0
a	3.3 b	3.9 c	4.9 d	1.6 e	2 f	0.6
a	5.9 b	4 c	0.8 d	2.3 e	1.6 f	0
a	4.1 b	3.8 c	1.8 d	3.5 e	1.7 f	0
a	3.5 b	3.3 c	2.6 d	2.4 e	1.5 f	0
a	5.5 b	3.6 c	2.2 d	1.9 e	1.1 f	0
a	1.9 b	4.8 c	3.7 d	2.6 e	0.3 f	0.8
a	0.5 b	6 c	5 d	1 e	1.8 f	0.5
a	5.4 b	5.7 c	1.5 d	3.5 e	4.3 f	0
a	5 b	3.1 c	3.7 d	4.3 e	0.9 f	0
a	5.5 b	3.1 c	2.4 d	3.3 e	0.6 f	0.4
a	3.2 b	6.5 c	2.3 d	3.5 e	1.1 f	0.4
a	4.7 b	2.4 c	4.6 d	4.1 e	0.6 f	0
	4.485	3.8875	3.01	2.9825	1.9575	0.1225

Treatment Percent of Control

16	13.32%
25	32.89%
38	33.50%
66	56.35%
110	97.27%

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