DP Barcode : D201436
PC Code No : 083301
EEB Out :

To: Kathryn Davis
Product Manager 52
Special Review and Reregistration Division (7508W)

DEC 21 1994

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

Attached, please find the EEB review of...

Reg./File # : 083301
Chemical Name : Triazine
Type Product :
Product Name :
Company Name : Triazine Joint Venture
Purpose : Review acute daphnia and oyster shell growth studies

Action Code : 999 Date Due : 2/15/95
Reviewer : Renee Lamb

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)	431754-01	Y	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)	431754-02	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)			123-2		
72-1(A)			72-4(B)			123-2		
72-1(B)			72-5			123-2		
72-1(C)			72-6			123-2		
72-1(C)						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: D201436 REREG CASE # 3074

CASE: 819287 DATA PACKAGE RECORD DATE: 04/06/94
SUBMISSION: S462435 BEAN SHEET Page 1 of 1

* * * CASE/SUBMISSION INFORMATION * * *

CASE TYPE: REREGISTRATION ACTION: 627 CORE DATA
CHEMICALS: 083301 Hexahydro-1,3,5-tris(2-hydroxyethyl)-s-triazine 100.00 %

ID#: 083301
COMPANY:
PRODUCT MANAGER: 52 KATHRYN DAVIS 703-308-8156 ROOM: CS1 3F3
PM TEAM REVIEWER: BONNIE ADLER 703-308-8523 ROOM: CS1 4N4
RECEIVED DATE: 03/28/94 DUE OUT DATE: 06/26/94

* * * DATA PACKAGE INFORMATION * * *

DP BARCODE: 201436 EXPEDITE: N DATE SENT: 04/06/94 DATE RET.: / /
CHEMICAL: 083301 Hexahydro-1,3,5-tris(2-hydroxyethyl)-s-triazine
DP TYPE: 999 Miscellaneous Data Package
CSF: N LABEL: N

ASSIGNED TO	DATE IN	DATE OUT
DIV : EFED	04/11/94	/ /
BRAN: EEB	04/12/94	/ /
SECT:	/ /	/ /
REVR :	/ /	/ /
CONTR:	/ /	/ /

ADMIN DUE DATE: 07/05/94
NEGOT DATE: / /
PROJ DATE: 2/15/95

* * * DATA REVIEW INSTRUCTIONS * * *

Please review the following acute tox data for teh chemical grotan;

GDLN 72-2a Acute Toxicity to Daphnia Magna - Flow Through MRID 43175401
GDLN 72-3b Acute Effect on New Shell Growth of Eastern Oyster; MRID 43175402

* * * 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	I

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

DEC 21 1994

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM

Subject: Data review for Triazine (083301)

From: for Anthony F. Maciorowski, Chief
Ecological Effects Branch
Environmental Fate and Effects Division (7507C)
Douglas Urban 12/20/94

To: Kathryn Davis, PM 52
Special Review and Reregistration Division (7508W)

EEB has completed the review of the data submitted in support of reregistration of triazine, chemical number 083301. The following is a brief summary of the data reviewed:

1. CITATION: Davis, Jay W. 1994. Triazine: Acute toxicity to the water flea, *Daphnia magna*, under flow-through test conditions. Project No. J9306004d. Performed by Toxikon Environmental Sciences. Submitted by Triazine Joint Venture. EPA MRID No. 431754-01.

CONCLUSIONS: This test is scientifically sound and meets the guideline requirements for a flow-through acute toxicity test using *Daphnia magna*. Based on mean measured concentrations, the 48-hour EC_{50} value is 26.1 mg ai/L (95% C.I. = 19.7 - 34.5 mg ai/L). The NOEC is 7.49 mg ai/L based on mortality at the 13.2 mg ai/L test concentration. Therefore, triazine is classified as slightly toxic to aquatic invertebrates.

2. CITATION: Davis, Jay W. 1994. Triazine: Acute effect on new shell growth of the Eastern Oyster, *Crassostrea virginica*. Project No. J9306004h. Prepared by Toxikon Environmental Sciences. Submitted by Triazine Joint Venture. EPA MRID No. 431754-02.

CONCLUSIONS: This study is scientifically sound and meets the guideline requirements for an oyster shell deposition study. The 96-hour EC_{50} value is 2.3 mg ai/L (based on mean measured concentrations); the NOEC is 0.87 mg ai/L. Therefore, triazine is classified as moderately toxic to eastern oysters.

If there are any questions contact Renée Costello at 305-5294.

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DATA EVALUATION RECORD

CHEMICAL: Triazine, Shaughnessey No. 083301

TEST MATERIAL: Technical grade triazine; CAS No. 4719-04-4, Lot No. 0952309, 83.8% active ingredient; a clear yellow viscous liquid.

STUDY TYPE: Freshwater Invertebrate Flow-Through Acute Toxicity Test. Species Tested: *Daphnia magna*.

CITATION: Davis, Jay W. 1994. Triazine: Acute toxicity to the water flea, *Daphnia magna*, under flow-through test conditions. Project No. J9306004d. Performed by Toxikon Environmental Sciences. Submitted by Triazine Joint Venture. EPA MRID No. 431754-01.

REVIEWED BY:

Renee Lamb
Biologist
EFED/EEB

Signature: Renee L

Date: 6/28/94

APPROVED BY:

for Ann Stavola
Supervisory biologist, Section 5
EFED/EEB

Signature: Allen W. Vaughan

Date: 12.19.94

CONCLUSIONS: This test is scientifically sound and meets the guideline requirements for a flow-through acute toxicity test using *Daphnia magna*. Based on mean measured concentrations, the 48-hour EC_{50} value is 26.1 mg ai/L (95% C.I. = 19.7 - 34.5 mg ai/L). The NOEC is 7.49 mg ai/L based on mortality at the 13.2 mg ai/L test concentration. Therefore, triazine is classified as slightly toxic to aquatic invertebrates.

MATERIALS AND METHODS:

Test Animals: The *Daphnia magna* (<24 hours old) used in the test were taken from in-house cultures.

Test System: The definitive test was conducted under flow-through conditions in a modified proportional diluter system constructed of glass, silicone adhesive and silicone tubing. A total volume of 53.9 µL of test substance was pumped into the chemical mixing chamber each diluter cycle providing a high nominal test concentration of 100 mg ai/L. The test solution was proportionally diluted to provide the 5 lower test concentrations. A dilution water control was also maintained.

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The test dilution water was a moderately hard fresh water with a mean hardness of 113 mg/L as $CaCO_3$, mean alkalinity os 32 mg/L, and a mean specific conductivity of 658 µmhos/cm.

Dosage: Six nominal test concentrations - 100, 60.0, 36.0, 21.6, 13.0, and 7.78 mg ai/L and a dilution water control were used.

Design: A test solution of ≈ 220 mL was delivered to each test chamber during every cycle; the total volume was split in halves via a splitter box. Test tanks were 11.3 L glass tanks positioned to provide a maximum depth of 6 cm. Retention chambers were used to prevent neonate floating. Each test container maintained a 450 mL volume of test solution; the diluter cycled at an average rate of 2.9 cycles/hour providing ≈ 17 volume additions every 24 hours.

Ten daphnids were impartially added to each chamber, two chambers per concentration. All test containers were randomly positioned in a single water bath maintained at a temperature of 20 ± 1° C. Fluorescent lighting provided a photoperiod of 16 hours light/8 hours dark, with a 15-minute transition period. The light intensity ranged between 308 and 375 lux.

Survival of daphnids was monitored daily and any dead removed. Abnormalities were also noted. Daphnids were not fed during the test. Test solutions remained clear throughout the study.

Test water quality was monitored daily. Water samples were collected from the controls and all six test concentrations at initiation, day 1, and termination to verify concentrations. Samples were analyzed using HPLC.

Statistics: The median effective concentrations (EC_{50}) and associated 95% confidence intervals (C.I.) were calculated using a computer program (moving average angle, probit, logit, and non-linear interpolation).

REPORTED RESULTS: The diluter functioned properly throughout the test. The mean measured concentrations ranged from 7.49 to 95.2 mg ai.L and from 91 to 102% of nominal. The mean measured concentrations were 7.49, 13.2, 19.7, 34.5, 59.0, and 95.2.

Mortality ranged from 0% at concentrations 7.49 and 19.7 to 100% at concentrations ≥ 34.5 mg ai/L. The slope of the concentration response curve could not be determined using the binomial probability method. The 48 hour EC_{50} is 26.1 mg ai/L with 95% confidence limits of 19.7 and 34.5 mg ai/L. The NOEC was 19.7 mg ai/L.

Initial alkalinity, hardness and conductivity of the dilution water as measured in the control were 32 mg/L, 130 mg/L, and 828 µmhos/cm, respectively. At test termination, they were 32 mg/ L,

96 mg/L, and 488 μmhos/cm, respectively. During the test, DO remained ≥ 7.8 mg/L (≥ 88% saturation). The pH was affected by the presence of triazine with pH increasing with triazine concentration. The pH ranged from 7.7 to 7.8 in the control and from 8.5 to 9.6 in all test concentrations.

STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:
There were no conclusions by the author. A quality assurance statement was included.

REVIEWER'S DISCUSSION AND INTERPRETATION OF STUDY RESULTS:

Test Procedure: The study was generally in accordance with SEP and ASTM guidelines.

Statistical Analysis: The reviewer used EPA's Toxanal program to determine the 48-hour EC_{50} value as 26.1 mg ai/L (95% C.I. = 19.7 - 34.5 mg ai/L). The no-observed-effect concentration (NOEC) can be estimated as 7.49 mg ai/L, based on mortality at the 13.2 mg ai/L concentration The NOEC value is more conservative than the value reported by the study author - the NOEC was reported as 19.7 mg ai/L.

Discussion/Results: This test is scientifically sound and meets the guideline requirements for a flow-through acute toxicity test using *Daphnia magna*. Based on mean measured concentrations, the 48-hour EC_{50} value is 26.1 mg ai/L (95% C.I. = 19.7 - 34.5 mg ai/L). The NOEC is 7.49 mg ai/L based on mortality at the 13.2 mg ai/L test concentration.

Adequacy of the Study:

(1) Classification: Core.

(2) Rationale: N/A.

(3) Repairability: N/A.

COMPLETION OF ONE-LINER FOR STUDY: June 28, 1994.

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NOTE: THERE WAS CONTROL MORTALITY, BUT AT LEAST ONE
OF THE LOWER CONCENTRATIONS HAD ZERO MORTALITY.
THEREFORE, ABBOTT'S CORRECTION IS NOT APPLICABLE.

lamb traizine daphnia

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
95.2	20	20	100	9.536742E-05
59	20	20	100	9.536742E-05
34.5	20	20	100	9.536742E-05
19.7	20	0	0	9.536742E-05
13.2	20	1	5	2.002716E-03
7.49	20	0	0	9.536742E-05

THE BINOMIAL TEST SHOWS THAT 19.7 AND 34.5 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 26.0701

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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DATA EVALUATION RECORD

CHEMICAL: Triazine, Shaughnessey No. 083301

TEST MATERIAL: Technical grade triazine, 83.8% active ingredient; a clear yellow viscous liquid.

STUDY TYPE: Mollusc 96-Hour Flow-Through Shell Deposition Study. Species Tested: Eastern oyster (*Crassostrea virginica*).

CITATION: Davis, Jay W. 1994. Triazine: Acute effect on new shell growth of the Eastern Oyster, *Crassostrea virginica*. Project No. J9306004h. Prepared by Toxikon Environmental Sciences. Submitted by Triazine Joint Venture. EPA MRID No. 431754-02.

REVIEWED BY:

Renee Lamb
Biologist
EFED/EEB

Signature: Renee L

Date: 6/29/94

APPROVED BY:

for Ann Stavola
Chief, Section 5
EFED/EEB

Signature: Allen W. Vaughan

Date: 12.19.94

CONCLUSIONS: This study is scientifically sound and meets the guideline requirements for an oyster shell deposition study. The 96-hour EC_{50} value is 2.3 mg ai/L (based on mean measured concentrations); the NOEC is 0.87 mg ai/L. Therefore, triazine is classified as moderately toxic to eastern oysters.

Test Animals: Eastern oysters (*Crassostrea virginica*) were obtained from a commercial supplier. During holding, the temperature ranged from 19.0-24.9°C, the salinity ranged from 30-35 ppt. Prior to testing, ≈ 3 - 5 mm of shell growth was removed from the edge of each oyster with a high speed grinder. Actively growing oysters were selected for testing form this group of acclimated oysters and any new shell growth removed immediately before adding to the exposure system. The oysters had an average length of 25-38 mm (mean of 31 ± 3.1 mm) and wet tissue weight of 0.29 to 1.17 g (mean of 0.66 ± 0.29 g).

Oysters were supplementally fed 150 mL of algae per cycle (about 2.5 L per treatment per day).

Test System: The dilution water was natural unfiltered seawater, from the Jupiter River with a salinity of 29 to 33 ppt and a pH of 7.8 to 8.1 during the test.

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The definitive test was conducted under flow-through conditions in a modified proportional diluter system constructed of glass, silicone adhesive and silicone tubing. A total volume of 8.41 µL of test substance was pumped into the chemical mixing chamber each diluter cycle providing a high nominal test concentration of 15.6 mg ai/L. The test solution was proportionally diluted to provide the 5 lower test concentrations. A dilution water control was also maintained.

Dosage: Six nominal concentrations (1.21, 2.02, 3.37, 5.62, 9.36 and 15.6 mg ai/L) and a dilution water control were used in the definitive test.

Design: A test solution of ≈ 220 mL was delivered to each test chamber during every cycle. Test tanks were 11.3 L glass tanks positioned to provide a maximum depth of 6 cm and a constant water volume of 5.4 L. The diluter cycled at an average rate of 5.5 cycles/hour providing ≈ 5.4 volume additions every 24 hours.

Twenty oysters were impartially selected and distributed to each aquarium for a total of 20 oysters per concentration. Oysters were placed equidistantly from one another and facing the incoming flow of water with cupped valves resting on the bottom. Loading was calculated to be ≈ 0.45 g of oyster tissue per liter of test solution passing through the test container every 24 hours. Gentle aeration was added to all test containers throughout the test. All tanks were cleaned daily. All test containers were positioned randomly in a single water bath to maintain target temperature of 21 ± 1°. Fluorescent lighting provided a photoperiod of 16 hours light/8 hours dark, with a 15-minute transition period. The light intensity ranged between 317 and 367 lux.

Observations of mortality were made daily. Test water quality were monitored daily during the test. Water samples were collected from the controls and all six test concentrations at initiation, day 1, day 3 and termination to verify concentrations. Samples were analyzed using HPLC.

Statistics: Differences in growth between exposed and control oysters were determined by ANOVA and Dunnett's. The 96-hour EC_{50} value and 95% confidence interval were determined by a computer program (moving average angle, probit, logit, and non-linear interpolation). The method selected for reporting the test results was determined by the characteristics of the data, ie, the presence or absence of 0% and 100% effect and the number of concentrations in which effects between 0 and 100% occurred.

REPORTED RESULTS: The diluter functioned properly throughout the test, except for day 2. The diluter malfunctioned due tot he unfiltered saltwater being diverted to another laboratory source. This diversion caused the diluter to malfunction of the fill

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phase of the cycle which also drained the supplementally fed algae source. The problem was corrected and the algae container refilled within 20 minutes of the malfunction.

Chemistry results varied during the test with the best recoveries after test chambers were cleaned; concentrations were lower prior to cleaning. This variability is attributed to indigenous microorganisms from the unfiltered saltwater. (Some biocides or their degradates serve as nutrients stimulating bacterial growth). Following cleaning of the tanks on day 3, chemical recoveries increased over day 1 results supporting this explanation.

DO levels in all treatment levels were higher on day 3 after cleaning on day 2 when the tanks were not cleaned indicating a microbial growth as well. The exception to this pattern was the highest nominal concentration in which DO levels progressively decreased during the test, with only slight differences between day 2 and day 3, indicating that microbial populations at this level may have grown to the extent that simple brushing and rinsing did not sufficiently reduce microbial populations.

Mean measured concentrations were 0.37, 0.87, 1.13, 1.81, 3.16, and 6.52 mg ai/L. These values represent 90 - 112% of nominal concentrations. To demonstrate that test solutions were delivered properly and to confirm that the lower measured concentrations detected in the test chambers during the test resulted from increased bacterial action, the highest test concentration was measured at each sampling time. The measured concentration in the highest test concentration was 10.0, 9.60, 10.1, and 10.7 mg ai/L on days 0, 1, 3, and 4, respectively. The mean measured concentration for this level as measured from the delivery tube was 65% of the nominal concentration. At test termination, the measured concentration for 9.36 mg ai/L was less than detection and the delivery tube volume was measured and determined to be 5.08 mg ai/L or 54% of nominal. It is apparent that degradation occurred rapidly in the test system and was responsible for the low measured concentrations.

There were no mortalities during the test. After 96 hours of exposure to triazine, mean new shell growth ranged from 0.27 mm at 6.52 mg ai/L to 2.22 mm at 0.37 mg ai/L. Mean new shell growth in the control was 2.03 mm. The percentage decrease in new shell growth of triazine exposed oysters as compared to the control ranged from 22% at 3.16 mg ai/L to 87% at 6.52 mg ai/L; increases in new shell growth were measured at 0.37 and 0.87 mg ai/L. Growth was statistically reduced from that measured for the control oysters at 1.81 and 6.52 mg ai/L test concentrations.

The 96-hour EC^{50} was 2.31 mg ai/L with 95% confidence limits of 1.13 and 6.52 mg ai/L. The NOEC was 1.13 mg ai/L.

During the test, salinity was 29-33 ppt. The DO ranged from 6.9 to 7.4 mg/L (97 > 100% saturation) at test initiation and remained ≥ 5.2 mg/L (≥ 72% saturation) for all control and test solutions. The pH values were 7.8 to 8.1. The test temperature range was 20 to 22.4°C (mean of 21.7 ± 0.6).

STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:
There were no conclusions by the author. Good Laboratory Practice Compliance and Quality Assurance Statements were included in the report indicating compliance to with EPA Good Laboratory Practice Standards.

REVIEWER'S DISCUSSION AND INTERPRETATION OF STUDY RESULTS:

Test Procedure: The test procedures were generally in accordance with the SEP. The drop in DO and the low measured concentrations did not affect the results of the study.

Statistical Analysis: The reviewer used EPA's Toxanal program and shell deposition data to determine the 96-hour EC_{50} value as 2.3 mg ai/L mean measured concentration using the moving average method. The NOEC was determined to be 0.87 mg ai/L using the raw shell deposition data, and William's test. This NOEC is more conservative than the study author's value of 1.13 mg ai/L.

Discussion/Results: This study is scientifically sound and meets the guideline requirements for an oyster shell deposition study. The 96-hour EC_{50} value is 2.3 mg ai/L (based on mean measured concentrations); the NOEC is 0.87 mg ai/L. Therefore, triazine is classified as moderately toxic to eastern oysters.

Adequacy of the Study:

(1) **Classification:** Core.

(2) **Rationale:** N/A.

(3) **Repairability:** N/A.

Completion of one liner: June 28, 1994

lamb triazine oyster shell dep

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
6.52	100	87	87	0
3.16	100	22	22	0
1.81	100	58	58	0
1.13	100	23	23	0
.87	100	9	9	0
.37	100	9	9	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 2.305604

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
3	4.506425E-02	2.779284	2.42744	3.228436

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
3	1.16492	19.01423	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 = 1.800128

95 PERCENT CONFIDENCE LIMITS =-.1427764 AND 3.743033

LC50 = 2.868029

95 PERCENT CONFIDENCE LIMITS = .79747 AND +INFINITY

LC10 = .5650388

95 PERCENT CONFIDENCE LIMITS = 0 AND 1.439004

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new shell growth for individual oysters
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SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	control	20	1.100	3.200	2.025
2	0.37	20	0.000	3.800	2.220
3	0.87	20	0.000	3.700	2.205
4	1.13	20	0.000	3.600	1.560
5	1.81	20	0.000	2.500	0.855
6	3.16	20	0.000	2.700	1.580
7	6.52	20	0.000	1.500	0.265

new shell growth for individual oysters
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SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	control	0.321	0.566	0.127
2	0.37	0.984	0.992	0.222
3	0.87	0.917	0.958	0.214
4	1.13	1.156	1.075	0.240
5	1.81	0.763	0.873	0.195
6	3.16	0.540	0.735	0.164
7	6.52	0.240	0.490	0.110

new shell growth for individual oysters
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WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	control	20	2.025	2.025	2.150
2	0.37	20	2.220	2.220	2.150
3	0.87	20	2.205	2.205	2.150
4	1.13	20	1.560	1.560	1.560
5	1.81	20	0.855	0.855	1.218
6	3.16	20	1.580	1.580	1.218
7	6.52	20	0.265	0.265	0.265

new shell growth for individual oysters

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WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
control	2.150				
0.37	2.150	0.471		1.66	k= 1, v=133
0.87	2.150	0.471		1.73	k= 2, v=133
1.13	1.560	1.754	*	1.75	k= 3, v=133
1.81	1.218	3.046	*	1.77	k= 4, v=133
3.16	1.218	3.046	*	1.77	k= 5, v=133
6.52	0.265	6.638	*	1.78	k= 6, v=133

s = 0.838

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