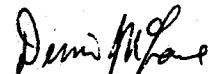MRID No:43212703

DATA EVALUATION RECORD

1. <u>CHEMICAL</u>: Triphenyltin Hydroxide (TPTH)

2. <u>TEST MATERIAL</u>: 97.23 TGAI, white powder, Lot # RFRAM909K

3. <u>STUDY TYPE</u>: §72-3 (b) Acute Estuarine/Marine Toxicity Mollusk

4. <u>CITATION</u>:

Author:	Emily Dionne
Title:	Triphenyltin Hydroxide (TPTH) - Acute Toxicity to Eastern Oyster (*Crassostrea virginica*) under Flow-through Conditions.
Date:	November 4, 1994
Laboratory Report #:	93-11-5057
Any Other Study #:	11117.0593.6104.504
Sponsor:	Griffin Corp.
Sponsor #:	N/A
Laboratory:	Springborn Laboratories, Inc.
MRID No.:	43212703

5. <u>REVIEWED BY</u>:

Dennis J. McLane, Wildlife Biologist   <u>Signature:</u>
Ecological Effects Branch
Environmental Fate and Effects Division (7507 C)   <u>Date:</u> 9-12-94

6. <u>APPROVED BY</u>:

Les Touart, Chief, Section 1   <u>Signature:</u>
Ecological Effects Branch
Environmental Fate and Effects Division (7507C)   <u>Date:</u> 9-12-94

7. <u>CONCLUSION</u>: This test is scientifically sound but the control oysters did not grow the minimum 2 mm of shell necessary to demonstrate acceptable test conditions. Better performance of the controls would result in a more definitive EC_{50}. Based on this, the study does not fulfill the guideline requirements for an acute toxicity test using the eastern oyster. Under the conditions of the test, the 96-hour EC_{50} was 0.36 $\mu g/L$ which classifies TPTH as very highly toxic (<100 $\mu g/L$) to eastern oysters.

8. <u>RECOMMENDATIONS</u> Provide another study.

9. <u>BACKGROUND</u> Submitted in response to the list A process.

A. Test Organisms: Eastern Oysters

Guideline Criteria	Reported Information
Species (Scientific Name)	*Crassostrea virginica*
Mean valve height (25 - 50 mm -- the long axis)	33±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)	similar age
Other Comments	

B. Source/Acclimation

Guideline Criteria	Reported Information
Acclimation Period (minimum 10 days)	28 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 parasites, determined to be reproductively mature, and checked for mortality
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 Isochrysis galbana Parke, clone T-ISO and Tetraselmis maculata.

<3% mortality 48 hours prior to testing (% mortality, if any)	yes; <1% mortality

   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?	31-32% ppt
Water Temperature (between 15°C and 30°C -- but must be consistent)	21-22°C
pH	7.5-7.8
Dissolved Oxygen (Static 1st 48 hrs 40%; 2nd 48 hrs 60%; Flow-through 60%) (% of lowest conc. & hour)	72 hour 0.36 μg/L Replicate A D.O.dropped to 51%; Replicate B was 65%; and the 96 hour 0.36 μg/L D.O. levels were 68 and 64%, respectively. All other levels were also adequate. (see attached Table 1)
Total Organic Carbon	3.0 mg/L
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.)	1. glass 2. 11 L 3. 39.5 X 20.5 X 26 cm 13.5 standpipe maintaining a volume of 11 L
Type of Dilution System (Reproducible supply of toxicant)	A constant-flow serial diluter (Benoit *et al.* 1982)

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)	0.5 ml/L acetone
Other Comments	

D. <u>Test Design</u>:

Guideline Criteria	Reported Information
<u>Range Finding Test</u> (LC_{50} >100 mg/L with 30 shrimp, no definitive test required.)	tested nominal concentrations of 0.41 to 50 µg/L. After 96-hours growth reduction of 37-87% was observed in oysters in 0.13 and 1.0 µg ai/L.
<u>Definitive Test</u>	
Nominal Concentrations (control+5 treatment levels; dosage should be 60% of the next highest concentration; concentrations should be geometric series)	0.13, 0.22, 0.36, 0.60, 1.0 µg 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)	15 oysters in each test aquarium (30 per treatment level)
All organisms must be randomly assigned to test vessels. (yes or no, describe if no)	"impartially selected"

4

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.	21-22°C See Table 1 See Table 1
Chemical Analysis (needed if aeration, volatile, insoluble, precipitate, not steel or glass, known to adsorb, and flow-through) (yes or no)	No precipitate observed
Other Comments	

11. REPORTED RESULTS:

Guideline Criteria	Reported Information
Mean Measured Concentrations (report conc.)	0.14, 0.24, 0.30, 0.46, and 0.77 μg ai/L
Recovery of Chemical (% recovery)	0.14 - 110%, 0.24-110%, 0.30 - 83%, 0.46-76%, and 0.77-77% μg ai/L
Mortality & Observations (Describe observations & Minimum shell growth is 2 mm.)	No mortality at any treatment level; "The growth of dilution water control organisms during this study fell below this minimum:" 2 mm is the minimum and they achieve only 1.3.
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 mollusks to toxicant)	See Table 4

EC$_{50}$ = reduced shell deposition by 50% compared to the controls	EC$_{50}$ = μg/L
Author's Comments	

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

Based on the test data, the 96-hour EC$_{50}$ was calculated by linear regression to be μg ai/L (95% CI of to μg ai/L). Based on these results and criteria established be the U.S. Environmental Protection Agency (1985), TPTH Technical would be classified as moderately toxic to *Crassostrea virginica*.

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.

13. <u>REVIEWER'S DISCUSSION AND INTERPRETATION</u>

A. <u>Test Procedure</u>:

The following items did not meet the guideline criteria:

1. The controls failed to meet the minimum required growth of 2 mm.
2. The study did not report the goodness of fit information for their statistical analysis.

B. <u>Statistical Analysis</u>

Guideline Criteria	Reported Information
Binomial (yes, no, or not reported)	N/A
Moving Average Angle (yes, no, or not reported)	N/A
Probit (yes, no, or not reported)	yes, 0.32 (0.11-0.92) μg a.i./L
Williams Test	no

Comments:	The EEB's probit method(EC_{50} .34 (0.27-0.44) and EC_{10} 0.062 $\mu g/L$) (toxanal) and Farrar's method (EC_{50} .025 (0.14-0.43) $\mu g/L$ and EC_{10} 0.018 $\mu g/L$) did not meet the goodness of fit criteria. Therefore, the moving average angle is more appropriate. The moving average angle EC_{50} is 0.36 (0.34-.38)$\mu g/L$ and. The submitted EC_{50} 0.32 (0.11-0.92) $\mu g/L$ and the EC_{10} is 0.64. However the report did not provide the goodness of fit information for their analysis.

C. Discussion/Results:

The control oysters did not grow the minimum 2 mm of shell. Poor performance of the controls may have resulted in a higher EEC. Based on this, the study does not fulfills the guideline requirements for an acute toxicity test using the eastern oyster. Under the conditions of the test, the 96-hour EC_{50} was 0.36 $\mu g/L$ which classifies TPTH as very highly toxic (<100 $\mu g/L$) to eastern oysters.

D. Adequacy of the Study:

1. Classification: Supplemental

2. Rational: The control oyster failed to grow 2 mm which is considered necessary to demonstrate acceptable test conditions.

3. Reparability: No

14. COMPLETION DATE OF ONE-LINER FOR STUDY: 8/25/94

Input file OYS-AVG.DAT
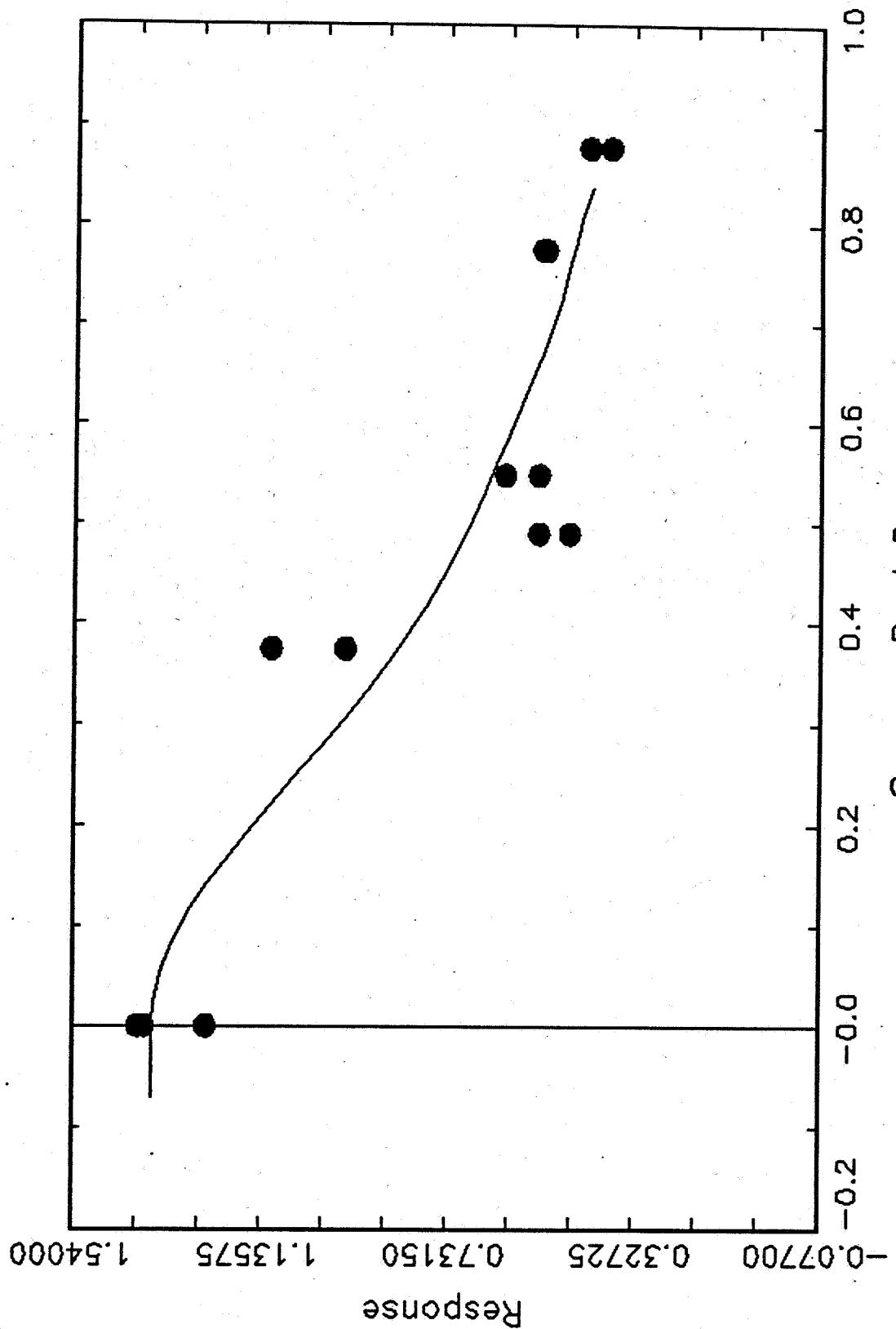
Input file OYS-AVG.DAT

Raw data:

0	1.25333333	1.40000000	1.40000000	1.38666667
0.14	1.11333333	0.95333333 . .		
0.24	0.53333333	0.46666667 . .		
0.3	0.53333333	0.60666667 . .		
0.6	0.52000000	0.52666667 . .		
0.77	0.38000000	0.42666667 . .		

```
-------------------------------------------------------------------------
                             Williams Test
-------------------------------------------------------------------------
[One-Sided Test for Decrease]

Dose          Isotone       T-bar P-value  Significance
              Means
-------------------------------------------------------------
0             1.36            .
0.14          1.03          5.777  <0.005        *
0.24          0.535        14.59   <0.005        *
0.3           0.535        14.59   <0.005        *
0.6           0.523         14.8   <0.005        *
0.77          0.403        16.92   <0.005        *

 "*"=Significant (p L/E  0.05 ) "N.S."=Not Sigificant.
```

```
-----------------------------------------------------------------------
                          Estimates of EC%
-----------------------------------------------------------------------
Parameter    Estimate      95% Bounds           Std.Err.  Lower Bound
                        Lower      Upper                   /Estimate
EC10          0.018     0.0029      0.11          0.36       0.16
EC25          0.063     0.019       0.20          0.23       0.31
EC50          0.25      0.14        0.43          0.11       0.57

          Slope =      1.13   Std.Err. =    0.287
-----------------------------------------------------------------------
              Observed vs. Predicted Treatment Group Means
-----------------------------------------------------------------------
    Dose      #Reps.      Obs.      Pred.      Obs.      Pred.      %Change
                          Mean      Mean      -Pred.    %Control

    0.00      4.00        1.36      1.37     -0.00865    100.       0.00
    0.140     2.00        1.03      0.837     0.197      61.1      38.9
    0.240     2.00        0.500     0.694    -0.194      50.7      49.3
    0.300     2.00        0.570     0.634    -0.0643     46.3      53.7
    0.600     2.00        0.523     0.455     0.0679     33.3      66.7
    0.770     2.00        0.403     0.396     0.00712    28.9      71.1

!!!Warning: EC10 not bracketed by doses evaluated.

!!!Warning: EC25 not bracketed by doses evaluated.
-----------------------------------------------------------------------
                  Analysis of Weighted Variance
-----------------------------------------------------------------------
Source                    SS          DF        MS

Residual                0.27147     11.000    0.024679
  Means Lack-of-Fit     0.23476      3.0000   0.078254
  Within Groups         0.036706     8.0000   0.0045883

!!!Poor fit: p < 0.001 based on DF=     3.0000      8.0000


-----------------------------------------------------------------------
        Directly-fitted parameters and Asymptotic Covariances
-----------------------------------------------------------------------
Parameter           Estimate    Std.Err.    Correlations

Control Mean    =    1.3687    0.091837    1.0000   -0.69560    0.22465
log10 EC50      =   -0.60391   0.10990    -0.69560   1.0000    -0.56061
Bruce&V. SIGMA  =    0.88382   0.22455     0.22465  -0.56061    1.0000

Starting Values      1.3600    -0.69999       1.1235
```

$(($

MCLANE   TPTH   SHELL DEPOSITION EC50
****

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
.77	1000	741	74.1	0
.46	1000	617	61.7	0
.3	1000	409	40.9	0
.24	1000	375	37.5	0
.14	1000	289	28.9	0

THE BINOMIAL TEST SHOWS THAT .3 AND .46 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 .3615492

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
3	1.353148E-02	.3772194	.3592427	.3416722

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H
GOODNESS OF FIT PROBABILITY		
2	.156681	8.045513
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   =   1.719909
95 PERCENT CONFIDENCE LIMITS = 1.039118   AND   2.4007

LC50 =   .3397097
95 PERCENT CONFIDENCE LIMITS = .2688117 AND .4364069

LC10 =   6.204358E-02
95 PERCENT CONFIDENCE LIMITS = 2.021041E-02 AND .1029348
****

12

```
TITLE:        TPTH shell deposition
FILE:         a:\tpth\toxshell
TRANSFORM: NO TRANSFORM                    NUMBER OF GROUPS: 7
------------------------------------------------------------------
```

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	control	1	1.8000	1.8000
1	control	2	0.9000	0.9000
1	control	3	1.7000	1.7000
1	control	4	1.1000	1.1000
1	control	5	1.5000	1.5000
1	control	6	0.6000	0.6000
1	control	7	0.6000	0.6000
1	control	8	2.1000	2.1000
1	control	9	1.5000	1.5000
1	control	10	1.2000	1.2000
1	control	11	0.6000	0.6000
1	control	12	0.9000	0.9000
1	control	13	2.9000	2.9000
1	control	14	0.6000	0.6000
1	control	15	0.8000	0.8000
1	control	16	1.5000	1.5000
1	control	17	3.1000	3.1000
1	control	18	1.0000	1.0000
1	control	19	1.7000	1.7000
1	control	20	1.8000	1.8000
1	control	21	1.0000	1.0000
1	control	22	1.1000	1.1000
1	control	23	2.2000	2.2000
1	control	24	0.6000	0.6000
1	control	25	0.9000	0.9000
1	control	26	1.0000	1.0000
1	control	27	1.8000	1.8000
1	control	28	0.4000	0.4000
1	control	29	0.8000	0.8000
1	control	30	2.1000	2.1000
2	S.control	1	2.7000	2.7000
2	S.control	2	1.1000	1.1000
2	S.control	3	1.3000	1.3000
2	S.control	4	0.3000	0.3000
2	S.control	5	2.0000	2.0000
2	S.control	6	0.5000	0.5000
2	S.control	7	1.9000	1.9000
2	S.control	8	0.9000	0.9000
2	S.control	9	1.4000	1.4000
2	S.control	10	0.9000	0.9000
2	S.control	11	1.1000	1.1000
2	S.control	12	0.3000	0.3000
2	S.control	13	1.5000	1.5000
2	S.control	14	3.8000	3.8000
2	S.control	15	1.3000	1.3000
2	S.control	16	0.2000	0.2000
2	S.control	17	0.9000	0.9000
2	S.control	18	1.9000	1.9000
2	S.control	19	2.1000	2.1000

13

2	S.control	20	1.6000	1.6000
2	S.control	21	1.6000	1.6000
2	S.control	22	0.8000	0.8000
2	S.control	23	1.5000	1.5000
2	S.control	24	1.4000	1.4000
2	S.control	25	1.8000	1.8000
2	S.control	26	0.4000	0.4000
2	S.control	27	2.0000	2.0000
2	S.control	28	0.4000	0.4000
2	S.control	29	0.3000	0.3000
2	S.control	30	3.9000	3.9000
3	.14	1	1.5000	1.5000
3	.14	2	1.1000	1.1000
3	.14	3	1.2000	1.2000
3	.14	4	1.4000	1.4000
3	.14	5	1.8000	1.8000
3	.14	6	0.6000	0.6000
3	.14	7	0.9000	0.9000
3	.14	8	1.1000	1.1000
3	.14	9	0.6000	0.6000
3	.14	10	1.3000	1.3000
3	.14	11	0.9000	0.9000
3	.14	12	1.4000	1.4000
3	.14	13	1.6000	1.6000
3	.14	14	1.0000	1.0000
3	.14	15	0.3000	0.3000
3	.14	16	1.5000	1.5000
3	.14	17	0.6000	0.6000
3	.14	18	0.8000	0.8000
3	.14	19	0.8000	0.8000
3	.14	20	0.4000	0.4000
3	.14	21	0.9000	0.9000
3	.14	22	1.6000	1.6000
3	.14	23	1.8000	1.8000
3	.14	24	1.0000	1.0000
3	.14	25	1.2000	1.2000
3	.14	26	1.0000	1.0000
3	.14	27	0.0000	0.0000
3	.14	28	0.5000	0.5000
3	.14	29	1.9000	1.9000
3	.14	30	0.3000	0.3000
4	.24	1	1.0000	1.0000
4	.24	2	1.1000	1.1000
4	.24	3	0.3000	0.3000
4	.24	4	1.2000	1.2000
4	.24	5	1.1000	1.1000
4	.24	6	2.4000	2.4000
4	.24	7	0.3000	0.3000
4	.24	8	1.6000	1.6000
4	.24	9	0.9000	0.9000
4	.24	10	0.0000	0.0000
4	.24	11	0.2000	0.2000
4	.24	12	0.0000	0.0000
4	.24	13	0.7000	0.7000
4	.24	14	0.5000	0.5000
4	.24	15	1.3000	1.3000
4	.24	16	2.0000	2.0000
4	.24	17	2.3000	2.3000
4	.24	18	0.3000	0.3000
4	.24	19	1.1000	1.1000

14

4	.24	20	0.6000	0.6000
4	.24	21	0.5000	0.5000
4	.24	22	0.9000	0.9000
4	.24	23	0.4000	0.4000
4	.24	24	0.6000	0.6000
4	.24	25	0.4000	0.4000
4	.24	26	0.3000	0.3000
4	.24	27	1.9000	1.9000
4	.24	28	0.4000	0.4000
4	.24	29	0.2000	0.2000
4	.24	30	1.3000	1.3000
5	.3	1	0.9000	0.9000
5	.3	2	0.0000	0.0000
5	.3	3	0.0000	0.0000
5	.3	4	0.0000	0.0000
5	.3	5	1.2000	1.2000
5	.3	6	1.2000	1.2000
5	.3	7	0.9000	0.9000
5	.3	8	0.5000	0.5000
5	.3	9	0.4000	0.4000
5	.3	10	0.0000	0.0000
5	.3	11	0.0000	0.0000
5	.3	12	0.0000	0.0000
5	.3	13	1.4000	1.4000
5	.3	14	0.8000	0.8000
5	.3	15	0.7000	0.7000
5	.3	16	1.8000	1.8000
5	.3	17	0.6000	0.6000
5	.3	18	0.7000	0.7000
5	.3	19	0.0000	0.0000
5	.3	20	0.0000	0.0000
5	.3	21	0.6000	0.6000
5	.3	22	0.0000	0.0000
5	.3	23	0.3000	0.3000
5	.3	24	1.1000	1.1000
5	.3	25	0.0000	0.0000
5	.3	26	0.6000	0.6000
5	.3	27	1.2000	1.2000
5	.3	28	0.2000	0.2000
5	.3	29	0.4000	0.4000
5	.3	30	1.6000	1.6000
6	.46	1	0.4000	0.4000
6	.46	2	0.7000	0.7000
6	.46	3	1.0000	1.0000
6	.46	4	1.1000	1.1000
6	.46	5	1.0000	1.0000
6	.46	6	0.0000	0.0000
6	.46	7	0.9000	0.9000
6	.46	8	0.0000	0.0000
6	.46	9	0.6000	0.6000
6	.46	10	0.3000	0.3000
6	.46	11	1.0000	1.0000
6	.46	12	0.0000	0.0000
6	.46	13	0.0000	0.0000
6	.46	14	0.8000	0.8000
6	.46	15	0.0000	0.0000
6	.46	16	0.4000	0.4000
6	.46	17	0.7000	0.7000
6	.46	18	1.9000	1.9000
6	.46	19	0.2000	0.2000

15

6	.46	20	1.1000	1.1000
6	.46	21	0.0000	0.0000
6	.46	22	0.4000	0.4000
6	.46	23	0.6000	0.6000
6	.46	24	0.0000	0.0000
6	.46	25	0.0000	0.0000
6	.46	26	0.6000	0.6000
6	.46	27	0.8000	0.8000
6	.46	28	0.0000	0.0000
6	.46	29	0.7000	0.7000
6	.46	30	0.5000	0.5000
7	.77	1	0.1000	0.1000
7	.77	2	0.0000	0.0000
7	.77	3	0.7000	0.7000
7	.77	4	0.4000	0.4000
7	.77	5	0.0000	0.0000
7	.77	6	0.0000	0.0000
7	.77	7	0.5000	0.5000
7	.77	8	0.0000	0.0000
7	.77	9	0.7000	0.7000
7	.77	10	0.0000	0.0000
7	.77	11	0.5000	0.5000
7	.77	12	1.1000	1.1000
7	.77	13	0.6000	0.6000
7	.77	14	0.2000	0.2000
7	.77	15	0.9000	0.9000
7	.77	16	0.7000	0.7000
7	.77	17	0.0000	0.0000
7	.77	18	0.7000	0.7000
7	.77	19	0.5000	0.5000
7	.77	20	1.3000	1.3000
7	.77	21	0.3000	0.3000
7	.77	22	0.8000	0.8000
7	.77	23	0.8000	0.8000
7	.77	24	0.6000	0.6000
7	.77	25	0.3000	0.3000
7	.77	26	0.0000	0.0000
7	.77	27	0.0000	0.0000
7	.77	28	0.0000	0.0000
7	.77	29	0.0000	0.0000
7	.77	30	0.4000	0.4000

TPTH shell deposition
File: a:\tpth\toxshell   Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA   TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN	
1	control	30	0.400	3.100	1.327	1.3
2	S.control	30	0.200	3.900	1.393	1.4
3	.14	30	0.000	1.900	1.033	1.0
4	.24	30	0.000	2.400	0.860	0.9
5	.3	30	0.000	1.800	0.570	0.6
6	.46	30	0.000	1.900	0.523	0.5
7	.77	30	0.000	1.300	0.403	0.4

16

TPTH shell deposition
File: a:\tpth\toxshell   Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA   TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	control	0.471	0.686	0.125
2	S.control	0.857	0.926	0.169
3	.14	0.240	0.490	0.089
4	.24	0.439	0.663	0.121
5	.3	0.295	0.543	0.099
6	.46	0.218	0.467	0.085
7	.77	0.141	0.376	0.069

TPTH shell deposition
File: a:\tpth\toxshell   Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	28.113	4.685	12.329
Within (Error)	203	77.182	0.380	
Total	209	105.295		

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

TPTH shell deposition
File: a:\tpth\toxshell   Transform: NO TRANSFORM

TUKEY method of multiple comparisons

GROUP	IDENTIFICATION	TRANSFORMED MEAN	ORIGINAL MEAN	0 7	0 6	0 5	0 4	0 3	0 1	0 2
7	.77	0.403	0.403	\						
6	.46	0.523	0.523	.	\					
5	.3	0.570	0.570	.	.	\				
4	.24	0.860	0.860	.	.	.	\			
3	.14	1.033	1.033	*	*	.	.	\		
1	control	1.327	1.327	*	*	*	.	.	\	
2	S.control	1.393	1.393	*	*	*	*	.	.	\

----
* = significant difference (p=0.05)   . = no significant difference

Tukey value (7,203) =   4.24   s =   0.380

TPTH shell deposition
File: a:\tpth\toxshell   Transform: NO TRANSFORM

    WILLIAMS TEST   (Isotonic regression model)   TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	control	30	1.327	1.327	1.360
2	S.control	30	1.393	1.393	1.360
3	.14	30	1.033	1.033	1.033
4	.24	30	0.860	0.860	0.860
5	.3	30	0.570	0.570	0.570
6	.46	30	0.523	0.523	0.523
7	.77	30	0.403	0.403	0.403

TPTH shell deposition
File: a:\tpth\toxshell   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	1.360				
S.control	1.360	0.209		1.66	k= 1, v=203
.14	1.033	1.842	*	1.73	k= 2, v=203
.24	0.860	2.931	*	1.75	k= 3, v=203
.3	0.570	4.753	*	1.77	k= 4, v=203
.46	0.523	5.046	*	1.77	k= 5, v=203
.77	0.403	5.800	*	1.78	k= 6, v=203

s =   0.617
Note: df used for table values are approximate when v > 20.

18

TPTH

Page _____ is not included in this copy.

Pages _19_ through _22_ are not included in this copy.

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.

_X___ FIFRA registration data.

_____ The document is a duplicate of page(s) _____.

_____ The document is not responsive to the request.

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.