7-29-92

****ADDENDUM****

DATA EVALUATION RECORD

1. **CHEMICAL:** Octhilinone.
   Shaughnessey No. 099901.

2. **TEST MATERIAL:** Octhilinone (RH-893 Technical); Lot No. 3192; 98.5% active ingredient; a viscous yellow liquid.

3. **STUDY TYPE:** Freshwater Fish, Early Life-Stage, Flow-Through Toxicity Test. Species Tested: Fathead Minnow (*Pimephales promelas*).

4. **CITATION:** Sousa, J.V. 1991. Octhilinone - Toxicity Test with Fathead Minnow (*Pimephales promelas*) Embryos and Larvae. Report No. 90-10-3525. Prepared by Springborn Laboratories, Inc., Wareham, MA. Submitted by Rohm and Haas Company, Springhouse, PA. EPA MRID No. 419093-01.

5. **ADDENDUM BY:**
   Dana Lateulere, Biologist
   Ecological Effects Branch
   Environmental Fate and
   Effects Division
   Signature: Dana Lateulere
   Date: 7/29/92

6. **APPROVED BY:**
   Ann Stavola, Section Head, 5
   Ecological Effects Branch
   Environmental Fate and
   Effects Division
   Signature: Ann Stavola
   Date: 7/29/92

7. **CONCLUSIONS:** This study does not meet the guideline requirements for a flow-through, early life-stage toxicity test for fathead minnows. The relative standard deviation for fish weight in one of the control replicates (53%) was unacceptable; however, when statistics were performed without utilizing the replicate in question, the MATC results were the same as those determined with the replicate. Under the conditions of the test, the MATC, based on the most sensitive biological parameters, larval length and weight, was >8.5 and <18 µg/l mean measured concentration (geometric mean MATC = 12 µg/l). The deviations, as noted in Section 14A, will classify this study as supplemental but will not render the data useless in a risk assessment.

****ADDENDUM****

/

Addendum Catenlee 7/29/92

TITLE: OCTHILINONE WEIGHT EFFECTS ON LARVAE, WITHOUT DIL.H20 B
FILE: ART
TRANSFORM: NO TRANSFORM NUMBER OF GROUPS: 7

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	0	1	218.0000	218.0000
1	0	2	192.1000	192.1000
2	0	1	208.9000	208.9000
2	0	2	208.9000	208.9000
3	2.7	1	195.2000	195.2000
3	2.7	2	195.3000	195.3000
4	4.4	1	221.1000	221.1000
4	4.4	2	210.5000	210.5000
5	8.5	1	165.7000	165.7000
5	8.5	2	202.7000	202.7000
6	18.0	1	132.2000	132.2000
6	18.0	2	143.0000	143.0000
7	40.0	1	167.3000	167.3000
7	40.0	2	160.8000	160.8000

OCTHILINONE WEIGHT EFFECTS ON LARVAE, WITHOUT DIL.H20 B
File: ART Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	9354.657	1559.110	9.445
Within (Error)	7	1155.535	165.076	
Total	13	10510.192		

Critical F value = 3.87 (0.05,6,7)
Since F > Critical F REJECT Ho:All groups equal

OCTHILINONE WEIGHT EFFECTS ON LARVAE, WITHOUT DIL.H20 B
File: ART Transform: NO TRANSFORM

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	0	205.050	205.050		
2	0	208.900	208.900	-0.300	
3	2.7	195.250	195.250	0.763	
4	4.4	215.800	215.800	-0.837	
5	8.5	184.200	184.200	1.623	

2

6	18.0	137.600	137.600	5.250 *
7	40.0	164.050	164.050	3.191 *

Dunnett table value = 2.82 (1 Tailed Value, P=0.05, df=7,6)

OCTHILINONE WEIGHT EFFECTS ON LARVAE, WITHOUT DIL.H20 B
File: ART Transform: NO TRANSFORM

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

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	0	2			
2	0	2	36.232	17.7	-3.850
3	2.7	2	36.232	17.7	9.800
4	4.4	2	36.232	17.7	-10.750
5	8.5	2	36.232	17.7	20.850
6	18.0	2	36.232	17.7	67.450
7	40.0	2	36.232	17.7	41.000

OCTHILINONE WEIGHT EFFECTS ON LARVAE, WITHOUT DIL.H20 B
File: ART Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	9354.657	1559.110	9.445
Within (Error)	7	1155.535	165.076	
Total	13	10510.192		

Critical F value = 3.87 (0.05,6,7)
Since F > Critical F REJECT Ho:All groups equal

OCTHILINONE WEIGHT EFFECTS ON LARVAE, WITHOUT DIL.H20 B
File: ART 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	0	205.050	205.050		
2	0	208.900	208.900	-0.300	
3	2.7	195.250	195.250	0.763	
4	4.4	215.800	215.800	-0.837	
5	8.5	184.200	184.200	1.623	
6	18.0	137.600	137.600	5.250	*

7	40.0	164.050	164.050	3.191	*

Bonferroni T table value = 3.13 (1 Tailed Value, P=0.05, df=7,6)

OCTHILINONE WEIGHT EFFECTS ON LARVAE, WITHOUT DIL.H20 B
File: ART 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	0	2			
2	0	2	40.189	19.6	-3.850
3	2.7	2	40.189	19.6	9.800
4	4.4	2	40.189	19.6	-10.750
5	8.5	2	40.189	19.6	20.850
6	18.0	2	40.189	19.6	67.450
7	40.0	2	40.189	19.6	41.000

OCTHILINONE WEIGHT EFFECTS ON LARVAE, WITHOUT DIL.H20 B
File: ART Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	0	2	205.050	205.050	206.975
2	0	2	208.900	208.900	206.975
3	2.7	2	195.250	195.250	205.525
4	4.4	2	215.800	215.800	205.525
5	8.5	2	184.200	184.200	184.200
6	18.0	2	137.600	137.600	150.825
7	40.0	2	164.050	164.050	150.825

OCTHILINONE WEIGHT EFFECTS ON LARVAE, WITHOUT DIL.H20 B
File: ART 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
0	206.975				
0	206.975	0.150		1.89	k= 1, v= 7
2.7	205.525	0.037		2.00	k= 2, v= 7
4.4	205.525	0.037		2.04	k= 3, v= 7
8.5	184.200	1.623		2.06	k= 4, v= 7
18.0	150.825	4.220	*	2.07	k= 5, v= 7
40.0	150.825	4.220	*	2.08	k= 6, v= 7

DATA EVALUATION RECORD

1. **CHEMICAL:** Octhilinone.
Shaughnessey No. 099901.

2. **TEST MATERIAL:** Octhilinone (RH-893 Technical); Lot No. 3192; 98.5% active ingredient; a viscous yellow liquid.

3. **STUDY TYPE:** Freshwater Fish, Early Life-Stage, Flow-Through Toxicity Test. Species Tested: Fathead Minnow (*Pimephales promelas*).

4. **CITATION:** Sousa, J.V. 1991. Octhilinone - Toxicity Test with Fathead Minnow (*Pimephales promelas*) Embryos and Larvae. Report No. 90-10-3525. Prepared by Springborn Laboratories, Inc., Wareham, MA. Submitted by Rohm and Haas Company, Springhouse, PA. EPA MRID No. 419093-01.

5. **REVIEWED BY:**

Louis M. Rifici, M.S.
Associate Scientist
KBN Engineering and
Applied Sciences, Inc.

Signature: Louis M Rifici
Date: 12/11/91

6. **APPROVED BY:**

Pim Kosalwat, Ph.D.
Senior Scientist
KBN Engineering and
Applied Sciences, Inc.

Signature: P. Kosalwat
Date: 12/11/91

Henry T. Craven, M.S.
Supervisor, EEB/EFED
USEPA

Signature: Arm Stard
Date: 2/14/92

7. **CONCLUSIONS:** This study is not scientifically sound and does not meet the guideline requirements for a flow-through, early life-stage toxicity test for fathead minnows. The relative standard deviation for fish weight in one of the control replicates (53%) was unacceptable. Under the conditions of the test, the MATC, based on the most sensitive biological parameters, larval length and weight, was >8.5 and <18 µg/l mean measured concentration (geometric mean MATC = 12 µg/l).

8. **RECOMMENDATIONS:** N/A.

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9. **BACKGROUND:**

10. **DISCUSSION OF INDIVIDUAL TESTS:** N/A.

11. **MATERIALS AND METHODS:**

A. **Test Animals:** Fertilized fathead minnow (*Pimephales promelas*) embryos were obtained from in-house cultures.

B. **Test System:** An intermittent-flow proportional diluter (after Mount and Brungs, 1967) with a dilution factor of 50% was used. A stock solution was prepared by dissolving the test material in triethylene glycol (TEG). The stock and TEG (for the solvent control solution) were delivered to the diluter using syringe pumps. The diluter delivered test solution to each replicate test aquarium at a rate of 6.8 volume replacements per day. The test aquaria were impartially positioned in a temperature-controlled water bath (25 ±1°C) and illuminated (20-80 ft-candles) with fluorescent tubes on a 16-hour light photoperiod. Each glass aquarium measured 39 x 20 x 25 cm with a 14.5-cm high standpipe (solution volume of 11 l). The diluter was allowed to equilibrate for three days prior to test initiation.

The egg incubation cups were glass jars (5 cm O.D., 8 cm high) with the bottoms replaced with 40-mesh Nitex® netting. Renewal of the solution in the egg cups was ensured using a rocker-arm apparatus which gently oscillated the cups.

Well water which was supplemented with Town of Wareham untreated well water was used as dilution water. The water was aerated and stored in an epoxy-coated concrete reservoir and had a hardness, alkalinity, pH and specific conductance of 28-30 mg/l as $CaCO_3$, 23-26 mg/l as $CaCO_3$, 7.0-7.4, and 100-140 µmhos/cm, respectively.

C. **Dosage:** Thirty-five-day flow-through test. Based on a preliminary test, five nominal concentrations (3.1, 6.3, 13, 25, and 50 µg a.i./l), a solvent control (17.5 µl TEG/l), and a dilution water control were used.

D. **Design:** Sixty fertilized embryos were impartially transferred to each of 14 unlabeled petri dishes. Each group of eggs was impartially transferred to one of 14 egg cups, one cup per aquarium. Two replicate aquaria

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were used per concentration, control, and solvent control.

Dead embryos were counted daily. The percent survival at hatch was determined based on the "number of live larvae and embryos per incubation cup after hatching was completed compared to the number of embryos per cup on test day 0." When no more than 6 unhatched, viable embryos remained in each cup, hatch was considered complete. On day 5, 40 live larvae were impartially selected from the cup and placed into their respective test aquaria.

Dead larvae were removed when observed. Larvae were offered brine shrimp nauplii three times daily on weekdays and twice daily on weekends. The aquaria were cleaned of excess food and fecal material regularly. The behavior and appearance of the larvae were recorded daily. Larval survival was assessed twice weekly. At the end of the test (30 days post-hatch), the percent survival was determined and the fish were weighed (wet) and measured (total length) individually.

Temperature, dissolved oxygen concentration (DO), and pH were measured daily in all test aquaria. Hardness, alkalinity, and conductivity were measured on day 0 and weekly thereafter in alternating replicates of the control, solvent control, lowest, and highest test levels. The temperature in replicate A of the control was also monitored continuously with a minimum/maximum thermometer.

Samples of the test solutions were taken on test days 0, 4, 6, 8, 12, 13, 19, 21, 26, 27, 33, 34, and 35 for determination of the concentration of octhilinone by HPLC.

E. **Statistics:** Embryo survival, post-hatch survival, total length, and wet weight data were analyzed. The arcsine square root transformation was used on the survival at hatch and survival at termination data. Homogeneity of variance in each data set was checked using Bartlett's test. Analysis of variance (ANOVA) with a subsequent comparison of means procedure (William's test) was used to determine any significant differences between the exposure groups and the pooled controls.

12. **REPORTED RESULTS:** The mean measured concentrations for the 35-day test were 2.7, 4.4, 8.5, 18, and 40 µg/l. These

values represent 87, 70, 65, 72, and 80% of nominal concentrations (Table 2, attached). Though the author reports that the concentration of the test material in the solutions was determined 13 times during the study, only the results obtained on days 0, 8, 13, 21, 27, and 35 were given in the report and used to determine mean measured concentrations. The author explains that the percent recoveries for the QC samples accompanying the samples on days 4, 6, 12, 19, 26, 33, and 34 were either outside of acceptable range or were rejected by the analyst. The results of the analyses were therefore excluded from means calculations.

Hatch was complete in 5 days in all chambers. Embryo survival and fry survival data are summarized as percentages in Table 3 (attached). The number of embryos successfully hatched in the exposure concentrations was not significantly different from the pooled controls. However, the survival of larvae at the highest test concentration was significantly reduced compared to the pooled control. Since larval survival was adversely affected in the 40 µg/l treatment level, growth data for this treatment level was excluded from further statistical analysis. The mean lengths and weights of larvae exposed to 18 µg/l were significantly lower than the pooled control. No sublethal effects were reported for this test. The relative standard deviation of fish weights in replicate 2 of the dilution water control was 53%.

Based on significantly reduced larval growth, the maximum acceptable toxicant concentration (MATC) for fathead minnows was >8.5 µg/l and <18 µg/l. The geometric mean MATC was 12 µg/l.

Summarized water quality measurements are given in Table 1 (attached). Mean DO and pH ranged from 7.3 to 7.8 mg/l and 6.9 to 7.6, respectively. The mean temperature was 25 ±0.4°C.

13. **STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:**
The author made no conclusions.

Quality Assurance and Good Laboratory Practices Compliance Statements were included in the report, indicating that the study was conducted in accordance with FIFRA Good Laboratory Practice Standards set forth in 40 CFR Part 160.

14. **REVIEWER'S DISCUSSION AND INTERPRETATION OF STUDY RESULTS:**

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A. **Test Procedure:** The test procedures were generally in accordance with protocols recommended by the guidelines, but deviated from the SEP or ASTM (1987) as follows:

The relative standard deviation (RSD) for fish weight of replicate 2 of the dilution water control was 53%. The RSD for growth in any control replicate must be less than 40% for a test to be considered valid.

No raw water quality data were provided in the report. Sufficient data must be provided to assure the test conditions met the guideline requirements.

ASTM (1987) suggests that the embryonic stage at the beginning of the exposure be determined as precisely as possible. The precise embryonic stage was not determined in this study.

The SEP states that a minimum of 4 replicates with 20 embryos each should be used. ASTM allows a minimum of 2 replicates with 40 embryos each. This study followed the ASTM protocol and used 60 embryos per replicate.

Chemical analysis of a representative sample of brine shrimp cysts used as food in the test found measurable quantities of mercury (0.17 ppm) and arsenic (7.6 ppm).

Dry fish weights are preferable to wet weights. The wet weight of the fish was determined in this study.

The report did not indicate whether food was withheld from the fish during the last 24 hours of the test. The SEP recommends discontinuing feeding at least 24 hours prior to test termination.

The accuracy of the flow-splitting mechanism used to deliver the test solution to the replicate aquaria should be checked frequently during the exposure. The report does not state if the accuracy of the mechanism was checked.

B. **Statistical Analysis:** The reviewer used one-way ANOVA and an appropriate means comparison procedure (Toxstat Version 3.3) to compare embryo survival and larval survival in the exposure concentrations to those of the solvent control (see attached printouts 1-4). The results were the same as those of the author. The length and weight raw data were analyzed using two-way ANOVA and Bonferroni's test (Crunch Version 3). The

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growth of exposed larvae was compared to that of the solvent control. The results were the same as the author's (see attached printouts 5-8).

The author excluded growth data from the highest treatment level from the statistical analysis due to the adverse effect on larval survival at those levels. That data should have been included since they were parts of the test and would contribute to the overall experimental error.

C. **Discussion/Results:** The concentration of the test material in the test solutions was determined 13 times during the course of the study. Only 6 of the measurements were reported and used to compute mean measured concentrations. The author states that the additional measurements obtained were generally in agreement with the reported analytical results and confirmed that consistent exposure conditions were being maintained. These concentrations should have been given in the study report. They would have been used to determine the time-weighted average concentrations used to judge the stability of the test concentrations during the study.

The raw DO and temperature data were not included in the report. This information must be provided for the reviewer to determine whether the study meets the guideline requirements. The author states that the DO was no lower than 67% of saturation during the test (which satisfies the guideline requirements), but only mean temperatures are given in the report.

The weights of dilution water control fish in replicate 2 had a RSD of 53%. This RSD is too high to consider the test acceptable and may indicate that unidentified stress was present in the spawning adults or during the test.

This study is not scientifically sound and does not meet the guideline requirements for a flow-through, early life-stage toxicity test for fathead minnows. The relative standard deviation for fish weight in one of the control replicates (53%) was unacceptable. Under the conditions of the test, the MATC, based on the most sensitive biological parameters, larval length and weight, was >8.5 and <18 µg/l mean measured concentration (geometric mean MATC = 12 µg/l).

D. **Adequacy of the Study:**

(1) **Classification:** Invalid.

(2) **Rationale:** The relative standard deviation for fish weight in one of the control replicates (53%) was unacceptable.

(3) **Repairability:** No.

15. **COMPLETION OF ONE-LINER FOR STUDY:** Yes, 12-03-91.

REFERENCES: ASTM. 1987. Proposed new standard guide for conducting early life-stage toxicity tests with fishes. Draft No. 12.

KATHON D99901

Page_____ is not included in this copy.

Pages 12 through 14 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.

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.

TITLE: 419093-01, FHM ELS, OCTHILINONE, SURVIVAL AT HATCH
FILE: A:41909301.DT1
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	SOLVENT CONTROL	1	0.9200	1.2840
1	SOLVENT CONTROL	2	0.9000	1.2490
2	2.7	1	0.9000	1.2490
2	2.7	2	0.9300	1.3030
3	4.4	1	0.8700	1.2019
3	4.4	2	0.9000	1.2490
4	8.5	1	0.9300	1.3030
4	8.5	2	0.9300	1.3030
5	18	1	0.9000	1.2490
5	18	2	0.9500	1.3453
6	40	1	0.8700	1.2019
6	40	2	0.8800	1.2171

Shapiro Wilks test for normality

D = 0.008
W = 0.992
Critical W (P = 0.05) (n = 12) = 0.859
Critical W (P = 0.01) (n = 12) = 0.805

Data PASS normality test at P=0.01 level. Continue analysis.

Hartley test for homogeneity of variance
Bartletts test for homogeneity of variance
These two tests can not be performed because at least one group has zero variance.
Data FAIL to meet homogeneity of variance assumption.
Additional transformations are useless.

419093-01, FHM ELS, OCTHILINONE, SURVIVAL AT HATCH
File: A:41909301.DT1 Transform: ARC SINE(SQUARE ROOT(Y))

KRUSKAL-WALLIS ANOVA BY RANKS - TABLE 1 OF 2 (p=0.05)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	RANK SUM
1	SOLVENT CONTROL	1.267	0.910	13.500
2	2.7	1.276	0.915	15.500
3	4.4	1.225	0.885	7.000
4	8.5	1.303	0.930	20.000
5	18	1.297	0.925	17.500
6	40	1.209	0.875	4.500

Calculated H Value = 7.469 Critical H Value Table = 11.070
Since Calc H < Crit H FAIL TO REJECT Ho:All groups are equal.

DUNNS MULTIPLE COMPARISON - KRUSKAL-WALLIS - TABLE 2 OF 2 (p=0.05)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	ORIGINAL MEAN	GROUP 0 0 0 0 0 0 6 3 1 2 5 4
6	40	1.209	0.875	\
3	4.4	1.225	0.885	. \
1	SOLVENT CONTROL	1.267	0.910	. . \
2	2.7	1.276	0.915	. . . \
5	18	1.297	0.925	. . . . \
4	8.5	1.303	0.930	. . . . . \

* = significant difference (p=0.05) . = no significant difference
Table q value (0.05,6) = 2.936 SE = 3.510

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TITLE: 419093-01, FHM ELS, OCTHILINONE, LARVAL SURVIVAL
FILE: A:41909301.DT2
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	SOLVENT CONTROL	1	0.9000	1.2490
1	SOLVENT CONTROL	2	0.9800	1.4289
2	2.7	1	0.9800	1.4289
2	2.7	2	0.9000	1.2490
3	4.4	1	0.8500	1.1731
3	4.4	2	0.9300	1.3030
4	8.5	1	0.8800	1.2171
4	8.5	2	0.8500	1.1731
5	18	1	0.7300	1.0244
5	18	2	0.9000	1.2490
6	40	1	0.5800	0.8657
6	40	2	0.3800	0.6642

Shapiro Wilks test for normality

D = 0.087
W = 0.860
Critical W (P = 0.05) (n = 12) = 0.859
Critical W (P = 0.01) (n = 12) = 0.805

Data PASS normality test at P=0.01 level. Continue analysis.

Bartletts test for homogeneity of variance

Calculated B statistic = 1.56
Table Chi-square value = 15.09 (alpha = 0.01)
Table Chi-square value = 11.07 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 1.00
Used for Chi-square table value ==> df (#groups-1) = 5

Data PASS homogeneity test at 0.01 level. Continue analysis.

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.455	0.091	6.255
Within (Error)	6	0.087	0.015	
Total	11	0.542		

Critical F value = 4.39 (0.05,5,6)
Since F > Critical F REJECT Ho:All groups equal

419093-01, FHM ELS, OCTHILINONE, LARVAL SURVIVAL
File: A:41909301.DT2 Transform: ARC SINE(SQUARE ROOT(Y))

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	SOLVENT CONTROL	1.339	0.940		
2	2.7	1.339	0.940	0.000	
3	4.4	1.238	0.890	0.837	
4	8.5	1.195	0.865	1.193	
5	18	1.137	0.815	1.677	
6	40	0.765	0.480	4.759	*

Dunnett table value = 2.83 (1 Tailed Value, P=0.05, df=6,5)

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

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	SOLVENT CONTROL	2			
2	2.7	2	0.241	25.7	0.000
3	4.4	2	0.241	25.7	0.050
4	8.5	2	0.241	25.7	0.075
5	18	2	0.241	25.7	0.125
6	40	2	0.241	25.7	0.460

fish weight

Reintact 5

Analysis of Variance File: octhweig Date: 12-03-1991

FILTER: None

N's, means and standard deviations based on dependent variable: WEIGHT

* Indicates statistics are collapsed over this factor

RSD

Factors: C	R	N	Mean	S.D.	
*	*	460	186.3101	64.6497	
1	*	75	204.5947	58.8624	28.8
2	*	67	186.1776	78.0818	41.9
3	*	75	195.2587	65.1324	
4	*	71	215.5563	52.2958	
5	*	69	183.9290	63.4944	
6	*	65	138.2092	43.5702	
7	*	38	164.7526	51.5677	
*	1	231	189.5004	62.8328	
*	2	229	183.0921	66.4142	QA OK 12/03/91 LMR
1	1	36	218.0972	59.4137	27.2
1	2	39	192.1308	56.2471	29.3
2	1	35	208.8771	64.3071	30.8
2	2	32	161.3500	85.0092	52.9 *
3	1	39	195.2487	68.5663	
3	2	36	195.2695	62.1688	
4	1	34	221.0647	54.8787	
4	2	37	210.4946	50.0208	
5	1	35	165.6600	42.8635	
5	2	34	202.7353	75.4724	
6	1	29	132.2276	40.9961	
6	2	36	143.0278	45.5327	
7	1	23	167.3391	48.7373	
7	2	15	160.7867	57.1618	

Fmax for testing homogeneity of between subjects variances: 4.30
Number of variances= 14 df per variance= 30.

Analysis of Variance Dependent variable: WEIGHT

Source	df	SS (H)	MSS	F	P
Between Subjects	459	1918426.6200			
C (CONC)	6	260251.6720	43375.2770	12.245	0.0000
R (REP)	1	4462.6421	4462.6421	1.260	0.2623
CR	6	73868.3440	12311.3906	3.476	0.0023
Subj w Groups	446	1579844.0000	3542.2512		

fish weight Printout 6

Analysis of Variance File: octhweig Date: 12-03-1991

FILTER: None

Post-hoc tests for factor C (CONC)

Level	Mean	Level	Mean
1	204.595	6	138.209
2	186.178	7	164.753
3	195.259		
4	215.556		
5	183.929		

1 = Solvent control
2 = negative control
3 = 2.7 µg a.i./l
4 = 4.4
5 = 8.5
6 = 18
7 = 40

Comparison	Bon-ferroni	Dunnett
1 > 2		
1 > 3		
1 < 4		
1 > 5		
1 > 6	0.0000*	0.0100
1 > 7	0.0180*	0.0100
2 < 3		N.A.
2 < 4	0.0828	N.A.
2 > 5		N.A.
2 > 6	0.0000*	N.A.
2 > 7		N.A.
3 < 4		N.A.
3 > 5		N.A.
3 > 6	0.0000	N.A.
3 > 7		N.A.
4 > 5	0.0377	N.A.
4 > 6	0.0000	N.A.
4 > 7	0.0007	N.A.
5 > 6	0.0000	N.A.
5 > 7		N.A.
6 < 7		N.A.

For Dunnett's test only the P-values .05 and .01 are possible and only for comparisons with the control mean (level 1).

fish length

Printout 8

Analysis of Variance File: octhleng Date: 12-02-1991

FILTER: None

Post-hoc tests for factor C (CONC)

Level	Mean	Level	Mean
1	27.333	6	23.662
2	26.412	7	25.316
3	27.200		
4	27.831		
5	26.559		

Comparison	Bon-ferroni	Dunnett
1 > 2		
1 > 3		
1 < 4		
1 > 5		
1 > 6	0.0000*	0.0100
1 > 7	0.0109*	0.0100
2 < 3		N.A.
2 < 4	0.0843	N.A.
2 < 5		N.A.
2 > 6	0.0000*	N.A.
2 > 7		N.A.
3 < 4		N.A.
3 > 5		N.A.
3 > 6	0.0000	N.A.
3 > 7	0.0245	N.A.
4 > 5		N.A.
4 > 6	0.0000	N.A.
4 > 7	0.0005	N.A.
5 > 6	0.0000	N.A.
5 > 7		N.A.
6 < 7		N.A.

1 = Solvent control
2 = negative control
3 = 2.7 µg a.i./l
4 = 4.4
5 = 8.5
6 = 18
7 = 40

For Dunnett's test only the P-values .05 and .01 are possible and only for comparisons with the control mean (level 1).

fish length

Printout 7

Analysis of Variance File: octhleng Date: 12-02-1991

FILTER: None

N's, means and standard deviations based on dependent variable: LENGTH

* Indicates statistics are collapsed over this factor

Factors: C	R	N	Mean	S.D.
*	*	460	26.4522	3.1938
1	*	75	27.3333	2.6980
2	*	68	26.4118	3.7426
3	*	75	27.2000	2.8044
4	*	71	27.8310	2.2487
5	*	68	26.5588	3.1829
6	*	65	23.6615	2.8738
7	*	38	25.3158	2.7024
*	1	231	26.5108	3.0586
*	2	229	26.3930	3.3302
1	1	36	27.7500	2.4422
1	2	39	26.9487	2.8924
2	1	36	27.4722	2.9129
2	2	32	25.2188	4.2330
3	1	39	27.0513	2.9375
3	2	36	27.3611	2.6849
4	1	34	28.0000	2.4863
4	2	37	27.6757	2.0283
5	1	34	25.9412	2.3734
5	2	34	27.1765	3.7616
6	1	29	22.8621	2.7350
6	2	36	24.3056	2.8568
7	1	23	25.3913	2.3108
7	2	15	25.2000	3.2994

RSD

9.9
14.2

QA OK LMR 12/4/91

8.8
10.7
10.7
10.6
16.8

áá
Fmax for testing homogeneity of between subjects variances: 4.36
Number of variances= 14 df per variance= 30.
áá
Analysis of Variance Dependent variable: LENGTH

Source	df	SS (H)	MSS	F	P
Between Subjects	459	4681.9492			
C (CONC)	6	791.3096	131.8849	15.773	0.0000
R (REP)	1	0.9975	0.9975	0.119	0.7300
CR	6	160.4521	26.7420	3.198	0.0044
Subj w Groups	446	3729.1899	8.3614		