US EPA ARCHIVE DOCUMENT

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DATA EVALUATION RECORD
ESTUARINE FISH EARLY LIFE-STAGE TEST
GUIDELINE 72-4(A)

1. **CHEMICAL:** Linuron PC Code No.: 035506

2. **TEST MATERIAL:** DPX-Z326-198 (Linuron) Purity: 97.6 - 98.4%

3. **CITATION:**

Authors: R.L. Boeri, J.P. Magazu, and T.J. Ward
Title: Early Life Stage Toxicity of DPX-Z326-198 (Linuron) to the Sheepshead Minnow, *Cyprinodon variegatus*
Study Completion Date: April 16, 1996
Laboratory: T.R. Wilbury Laboratories, Inc., Marblehead, Massachusetts
Laboratory Report ID: 815-DU
Sponsor: E.I. du Pont de Nemours and Company, Newark, Delaware
MRID No.: 439965-02
DP Barcode: D226341

4. **REVIEWED BY:**
Andrew C. Bryceland, Fishery Biologist
ERB II

Signature: [signature] **Date:** 2/16/99

5. **PEER REVIEWED BY:**
F. Nicolas Mastrota, PhD., Terrestrial Biologist
ERB II

Signature: F. Nicholas Mastrota **Date:** 2/16/99

6. **CONCLUSIONS:** This study is scientifically sound, but does not fulfill the guideline requirements for an estuarine fish early life-stage test. This is because there are two replicates per concentration and not four replicates per concentration. According to the Pesticide Reregistration Rejection Rate Analysis: Ecological Effects (EPA 738-R-94-035), "The Agency requires four replicates for embryo exposure. However if industry can provide scientifically

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valid reasons for using two rather than four replicates, the Agency will, on a case-by-case basis, judge whether a study should or should not be rejected." If the registrant does not provide scientifically valid reasons for using two rather than four replicates this study must be repeated in order to fulfill the guideline requirement. Based on mean measured concentrations, the NOEC and LOEC for sheepshead minnow exposed to DPX-Z326-198 were 0.357 and 0.766 ppm, respectively. The geometric mean MATC was 0.523 ppm.

7. **ADEQUACY OF THE STUDY:**

A. **Classification:** Supplemental.

B. **Rationale:** There are two replicates per concentration and not four replicates per concentration.

C. **Reparability:** Yes, provide scientifically valid reasons for using two rather than four replicates.

8. **MAJOR GUIDELINE DEVIATIONS:**

1. The test consisted of only two replicates; four replicates are required.

9. **MATERIALS AND METHODS:**

A. **Biological System:**

Guideline Criteria	Reported Information
Species: An estuarine fish species, preferably a silversides species or sheepshead minnow (*Cyprinodon variegatus*).	*Cyprinodon variegatus*
Source	Aquatic BioSystems, Inc., Fort Collins, Colorado

Guideline Criteria	Reported Information
Age at beginning of test: Embryos 2 to 24 hours old.	<24 hours old
Replicates: Minimum of 20 embryos per replicate cup, 4 replicates per concentration. Minimum of 30 fish per treatment for post-hatch exposure.	20 embryos per cage; 2 cages per replicate vessel; 2 replicate vessels per treatment. Post hatch exposure: 15 fish per replicate vessel; 2 replicate vessels per treatment.
Post Hatch: % of embryos that produce live fry must be ≥50% in each control; % hatch in any control embryo cup must be no more than 1.6 times that in another control cup.	Dilution water control = 97.5% Solvent control = 95.0%
Feeding: Fish should be fed at least twice daily. Fish should not be fed for at least 24 hr prior to termination on day 32.	Fish were fed *Artemia salina* nauplii 2-3 times daily except during the 24 hours prior to test termination.
Counts: At a minimum, live fish should be counted 11, 18, 25, and 32 days after hatching.	Number of live fish were counted daily during the 32 days post-hatch.
Controls: Avg. survival at end of test must be ≥80%. Survival in any control chamber must not be <70%.	Dilution water control = 100% Solvent control = 96.7%
Controls: Negative control and carrier control (when applicable) are required.	Dilution water control and solvent control.

Comments: None.

B. **Physical System:**

Guideline Criteria	Reported Information
Test Water: 1) May be natural (sterilized and filtered) or a commercial mixture; 2) Natural seawater should have weekly range of salinity less than 6%, monthly pH range less than 0.8 pH units; 3) Salinity should be ≥15 ‰; 4) Water must be free of pollutants.	1) Filtered (particle and activated carbon), aerated, and U.V. sterilized, natural seawater with salinity adjusted with deionized water. 2) Weekly and Monthly ranges were not reported. 3) 15-17 ‰. 4) Contained 4 mg/L boron and 0.6 mg/L fluoride.
Test Temperature: Depends upon test species; should not deviate by more than 2°C from appropriate temperature. For sheepshead minnow, either 25°C or 30°C is recommended.	29.0-30.9°C
Photoperiod: Recommend 16L/8D.	16-hour light/8-hour dark
Dosing Apparatus: Intermittent flow proportional diluters or continuous flow serial diluters should be used. A minimum of 5 toxicant concentrations with a dilution factor not greater than 0.5 and controls should be used.	Intermittent flow proportional diluter Five toxicant concentrations with a dilution factor of 0.48-0.55.

Guideline Criteria	Reported Information
Toxicant Mixing: 1) Mixing chamber is recommended but not required; 2) Aeration should not be used for mixing; 3) It must be demonstrated that the test solution is completely mixed before intro. into the test system; 4) Flow splitting accuracy must be within 10%.	1. One mixing vessel/level. 2. No aeration. 3. Chemical analysis showed consistent concentrations, and no insoluble test material was observed in the test vessels. 4. Yes.
Test Vessels: All glass or glass with stainless steel frame.	Glass
Embryo Cups: 120 ml glass jars with bottoms replaced with 40 mesh stainless steel or nylon screen.	Glass cylinders (8 cm diameter, 8 cm high) with Nitex® screen bottoms.
Flow Rate: Flow rates to larval cups should provide 90% replacement in 8-12 hours. Flow rate must maintain DO at above 75% of saturation and maintain the toxicant level.	6.5 volume additions/24 hours
Aeration: Dilution water should be aerated to insure DO concentration at or near 100% saturation. Test tanks and embryo cups should not be aerated.	Dilution water was aerated prior to use. Test vessels were not aerated.

Comments: None.

C. **Chemical System:**

Guideline Criteria	Reported Information
Concentrations: 1) Minimum of 5 concentrations and a control, all replicated, plus solvent control if appropriate; 2) Toxicant conc. must be measured in one tank at each toxicant level every week; 3) One conc must adversely affect a life stage and one conc. must not affect any llife stage	1. Dilution water control; solvent control; and 0.20, 0.36, 0.75, 1.5, 3.0 ppm. 2. Measured in each test vessel at least weekly. 3. Both NOEC and LOEC were obtained.
Other Variables: 1) DO must be measured at each conc. at least once a week; 2) Natural seawater must maintain a constant salinity and not fluctuate more than 6% weekly; monthly pH range <0.8.	1. DO was measured daily in each test chamber. 2. Salinity and pH of the dilution water control were 15-17 ‰ and 7.9-8.5, respectively.
Solvents: Should not exceed 0.1 ml/L in a flow-through system. Acceptable solvents: dimethylformamide, triethylene glycol, methanol, acetone, ethanol.	0.1 ml/L DMF

Comments: Toxicant concentrations were maintained at 98-103% of nominal concentrations.

10. REPORTED RESULTS:

Guideline Criteria	Reported Information
Data Endpoints must include: - Number of embryos hatched; - Time to hatch; - Mortality of embryos, larvae, and juveniles; - Time to swim-up (if appro.); - Measurement of growth; - Incidence of pathological or histological effects; - Clinical observations	All data endpoints listed at left were reported.
Raw data included? (Y/N)	Yes

Effects Data:

Toxicant Conc. (ppm)		Percent Survival at Hatch		Time to Hatch (Day)		Survival at 36 days (32 days post-hatch)		Total Length (mm)		Wet weight (mg)	
Nom.	Mean Meas.	A	B	A	B	A	B	A	B	A	B
Ctrl	ND	97.5	97.5	3	3	100	100	25	24	301	266
Solv Ctrl	ND	97.5	92.5	3	3	93.3	100	25	25	314	284
0.20	0.206	97.5	100	3	3	100	100	26	26	263	280
0.36	0.357	97.5	92.5	3	3	93.3	100	24	25	259	268
0.75	0.766	95.0	92.5	3	3	26.7	40.0	13	18	49	150
1.5	1.55	80.0	90.0	3	3	0	0	-	-	-	-
3.0	2.93	12.5	7.5	>4	>4	0	0	-	-	-	-

ND = Not detected (detection limit = 0.050 ppm)

COMMENTS: The percentage survival at hatch was calculated by the reviewer as the maximum number of live fish at hatch from Day 1 to Day 4. These values differed slightly from those reported by the authors since the authors only considered number of live fish on Day 4.

Toxicity Observations: Several fish in the three highest concentrations were lying motionless on their sides or were observed to be smaller than the controls.

Statistical Results: Treatment data compared to pooled control data.

Statistical Method: Dunnett's or Bonferroni's "t" test

NOEC: 0.357 ppm LOEC: 0.766 ppm MATC: 0.523 ppm

Most sensitive endpoint: Juvenile survival and growth

11. **Reviewer's Statistical Results**: Treatment data compared to pooled control data.

Statistical Method: Tukey's Studentized Range (HSD) Test and Williams' Test

NOEC: 0.357 ppm LOEC: 0.766 ppm MATC: 0.523 ppm

Most sensitive endpoint: Juvenile survival and growth

Comments: This study is scientifically sound, but does not fulfill the guideline requirements for an estuarine fish early life-stage test. The NOEC and LOEC of DPX-Z326-198 (Linuron) for sheepshead minnow were 0.357 and 0.766 ppm, respectively. The MATC was 0.523 ppm. The study is classified as **Supplemental**.

Effects of DPX-Z326-198 (Linuron) to the ELS of Sheepshead Minnows
08:07 Wednesday, June 5, 1996

OBS	LEVEL	REP	LEN	WT
1	CONTROL	1	27.3	391
2	CONTROL	1	24.1	283
3	CONTROL	1	27.5	392
4	CONTROL	1	24.6	299
5	CONTROL	1	25.7	395
6	CONTROL	1	24.3	256
7	CONTROL	1	18.8	105
8	CONTROL	1	24.4	322
9	CONTROL	1	26.2	314
10	CONTROL	1	25.7	356
11	CONTROL	1	26.1	380
12	CONTROL	1	23.5	238
13	CONTROL	1	27.6	345
14	CONTROL	1	18.5	128
15	CONTROL	1	23.9	305
16	CONTROL	2	24.7	269
17	CONTROL	2	23.6	296
18	CONTROL	2	26.4	346
19	CONTROL	2	24.8	291
20	CONTROL	2	22.8	221
21	CONTROL	2	25.1	300
22	CONTROL	2	25.4	333
23	CONTROL	2	24.6	299
24	CONTROL	2	23.4	278
25	CONTROL	2	23.5	227
26	CONTROL	2	23.6	214
27	CONTROL	2	25.8	326
28	CONTROL	2	22.4	237
29	CONTROL	2	17.2	97
30	CONTROL	2	23.2	258
31	CONTROL	1	21.4	370
32	CONTROL	1	23.6	273
33	CONTROL	1	26.3	325
34	CONTROL	1	24.3	261
35	CONTROL	1	25.4	295
36	CONTROL	1	25.6	314
37	CONTROL	1	26.7	311
38	CONTROL	1	25.9	282
39	CONTROL	1	25.5	384
40	CONTROL	1	27.5	337

41	CONTROL	1	25.3	384
42	CONTROL	1	24.2	312
43	CONTROL	1	25.0	273
44	CONTROL	1	24.0	271
45	CONTROL	1	.	.
46	CONTROL	2	26.0	298
47	CONTROL	2	24.7	330
48	CONTROL	2	25.3	273
49	CONTROL	2	23.4	206
50	CONTROL	2	24.8	304
51	CONTROL	2	25.9	309
52	CONTROL	2	22.6	209
53	CONTROL	2	25.1	277
54	CONTROL	2	23.9	240
55	CONTROL	2	26.6	341
56	CONTROL	2	25.8	317
57	CONTROL	2	25.6	300
58	CONTROL	2	24.5	282
59	CONTROL	2	23.5	280
60	CONTROL	2	25.1	294
61	TRT1	1	28.0	297
62	TRT1	1	25.5	245
63	TRT1	1	25.1	254
64	TRT1	1	24.5	246

Effects of DPX-Z326-198 (Linuron) to the ELS of Sheepshead Minnows
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OBS	LEVEL	REP	LEN	WT
65	TRT1	1	25.6	253
66	TRT1	1	26.3	294
67	TRT1	1	25.2	263
68	TRT1	1	25.5	229
69	TRT1	1	25.9	276
70	TRT1	1	23.6	208
71	TRT1	1	26.3	300
72	TRT1	1	27.5	360
73	TRT1	1	24.6	232
74	TRT1	1	25.4	254
75	TRT1	1	24.3	234
76	TRT1	2	28.3	312
77	TRT1	2	26.5	273
78	TRT1	2	26.6	306
79	TRT1	2	26.1	310
80	TRT1	2	27.1	335

81	TRT1	2	23.5	267
82	TRT1	2	24.7	250
83	TRT1	2	22.5	166
84	TRT1	2	27.0	322
85	TRT1	2	24.6	251
86	TRT1	2	25.9	279
87	TRT1	2	24.1	210
88	TRT1	2	27.0	343
89	TRT1	2	26.7	365
90	TRT1	2	21.5	218
91	TRT2	1	21.5	163
92	TRT2	1	26.5	323
93	TRT2	1	24.4	283
94	TRT2	1	19.2	144
95	TRT2	1	24.7	265
96	TRT2	1	24.8	288
97	TRT2	1	25.5	260
98	TRT2	1	21.6	182
99	TRT2	1	28.6	419
100	TRT2	1	25.3	282
101	TRT2	1	26.2	308
102	TRT2	1	25.7	291
103	TRT2	1	21.4	151
104	TRT2	1	23.5	273
105	TRT2	1	.	.
106	TRT2	2	22.4	202
107	TRT2	2	20.7	149
108	TRT2	2	23.7	251
109	TRT2	2	23.6	247
110	TRT2	2	25.4	273
111	TRT2	2	27.9	399
112	TRT2	2	26.0	309
113	TRT2	2	26.7	322
114	TRT2	2	24.0	232
115	TRT2	2	23.6	241
116	TRT2	2	25.3	264
117	TRT2	2	25.9	349
118	TRT2	2	24.7	258
119	TRT2	2	24.9	312
120	TRT2	2	22.1	211
121	TRT3	1	14.1	48
122	TRT3	1	12.2	21
123	TRT3	1	15.9	91
124	TRT3	1	9.4	37
125	TRT3	2	15.4	81

126	TRT3	2	22.0	213
127	TRT3	2	23.3	235
128	TRT3	2	23.5	292

Effects of DPX-Z326-198 (Linuron) to the ELS of Sheepshead Minnows
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OBS	LEVEL	REP	LEN	WT
129	TRT3	2	14.8	59
130	TRT3	2	9.7	20

Effects of DPX-Z326-198 (Linuron) to the ELS of Sheepshead Minnows
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	LEVEL			
	CONTROL	TRT1	TRT2	TRT3
	MEAN	MEAN	MEAN	MEAN
LEN	24.55	25.51	24.34	16.03
WT	290.73	271.73	263.83	109.70

Effects of DPX-Z326-198 (Linuron) to the ELS of Sheepshead Minnows
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---------- LEVEL=CONTROL ----------

Variable	N	Mean	Std Dev	CV
REP	60	1.500	0.504	33.615
LEN	59	24.546	1.993	8.120
WT	59	290.729	62.879	21.628

---------- LEVEL=TRT1 ----------

Variable	N	Mean	Std Dev	CV
REP	30	1.500	0.509	33.903
LEN	30	25.513	1.557	6.102
WT	30	271.733	47.157	17.354

---------- LEVEL=TRT2 ----------

Variable	N	Mean	Std Dev	CV
REP	30	1.500	0.509	33.903
LEN	29	24.338	2.168	8.909
WT	29	263.828	68.341	25.903

---------- LEVEL=TRT3 ----------

Variable	N	Mean	Std Dev	CV
REP	10	1.600	0.516	32.275
LEN	10	16.030	5.256	32.789
WT	10	109.700	99.081	90.320

Effects of DPX-Z326-198 (Linuron) to the ELS of Sheepshead Minnows
1. ANALYSIS OF Length - Treatments compared to Pooled Control Data
****
08:07 Wednesday, June 5, 1996

General Linear Models Procedure
Class Level Information

Class	Levels	Values
LEVEL	4	CONTROL TRT1 TRT2 TRT3

Number of observations in data set = 130

NOTE: Due to missing values, only 128 observations can be used in this analysis.

Effects of DPX-Z326-198 (Linuron) to the ELS of Sheepshead Minnows
1. ANALYSIS OF Length - Treatments compared to Pooled Control Data
****
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General Linear Models Procedure
Type I Estimable Functions for: LEVEL

Effect	Coefficients
INTERCEPT	0
LEVEL CONTROL	L2
TRT1	L3
TRT2	L4
TRT3	-L2-L3-L4

Effects of DPX-Z326-198 (Linuron) to the ELS of Sheepshead Minnows
1. ANALYSIS OF Length - Treatments compared to Pooled Control Data
****
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General Linear Models Procedure

Dependent Variable: LEN

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	724.33641	241.44547	43.97	0.0001
Error	124	680.97038	5.49170		
Corrected Total	127	1405.30680			

R-Square	C.V.	Root MSE	LEN Mean
0.515429	9.739907	2.3434	24.060

Source	DF	Type I SS	Mean Square	F Value	Pr > F
LEVEL	3	724.33641	241.44547	43.97	0.0001

Effects of DPX-Z326-198 (Linuron) to the ELS of Sheepshead Minnows
1. ANALYSIS OF Length - Treatments compared to Pooled Control Data
****
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General Linear Models Procedure
Least Squares Means

LEVEL	LEN LSMEAN	i/j	Pr > |T| H0: LSMEAN(i)=LSMEAN(j) 1	2	3	4
CONTROL	24.5457627	1	.	0.0680	0.6964	0.0001
TRT1	25.5133333	2	0.0680	.	0.0564	0.0001
TRT2	24.3379310	3	0.6964	0.0564	.	0.0001
TRT3	16.0300000	4	0.0001	0.0001	0.0001	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

Effects of DPX-Z326-198 (Linuron) to the ELS of Sheepshead Minnows
1. ANALYSIS OF Length - Treatments compared to Pooled Control Data
****
08:07 Wednesday, June 5, 1996

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: LEN

NOTE: This test controls the type I experimentwise error rate.

Alpha= 0.05 Confidence= 0.95 df= 124 MSE= 5.491697
Critical Value of Studentized Range= 3.683

Comparisons significant at the 0.05 level are indicated by '***'.

LEVEL Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
TRT1 - CONTROL	-0.4009	0.9676	2.3361	
TRT1 - TRT2	-0.4139	1.1754	2.7647	
TRT1 - TRT3	7.2549	9.4833	11.7118	***
CONTROL - TRT1	-2.3361	-0.9676	0.4009	
CONTROL - TRT2	-1.1762	0.2078	1.5919	
CONTROL - TRT3	6.4287	8.5158	10.6028	***
TRT2 - TRT1	-2.7647	-1.1754	0.4139	

TRT2	- CONTROL	-1.5919	-0.2078	1.1762	
TRT2	- TRT3	6.0699	8.3079	10.5460	***
TRT3	- TRT1	-11.7118	-9.4833	-7.2549	***
TRT3	- CONTROL	-10.6028	-8.5158	-6.4287	***
TRT3	- TRT2	-10.5460	-8.3079	-6.0699	***

Effects of DPX-Z326-198 (Linuron) to the ELS of Sheepshead Minnows
1. ANALYSIS OF Length - Treatments compared to Pooled Control Data
****

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General Linear Models Procedure

Dunnett's One-tailed T tests for variable: LEN

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 124 MSE= 5.491697
Critical Value of Dunnett's T= 2.123

Comparisons significant at the 0.05 level are indicated by '***'.

LEVEL Comparison		Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
TRT1	- CONTROL	-0.1481	0.9676	2.0832	
TRT2	- CONTROL	-1.3362	-0.2078	0.9205	
TRT3	- CONTROL	-10.2172	-8.5158	-6.8143	***

Effects of DPX-Z326-198 (Linuron) to the ELS of Sheepshead Minnows
2. ANALYSIS OF Weight - Treatments compared to Pooled Control Data
****

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General Linear Models Procedure
Class Level Information

Class Levels Values

LEVEL 4 CONTROL TRT1 TRT2 TRT3

Number of observations in data set = 130

NOTE: Due to missing values, only 128 observations can be used in this analysis.

Effects of DPX-Z326-198 (Linuron) to the ELS of Sheepshead Minnows
2. ANALYSIS OF Weight - Treatments compared to Pooled Control Data
****
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General Linear Models Procedure
Type I Estimable Functions for: LEVEL

Effect	Coefficients
INTERCEPT	0
LEVEL CONTROL	L2
TRT1	L3
TRT2	L4
TRT3	-L2-L3-L4

Effects of DPX-Z326-198 (Linuron) to the ELS of Sheepshead Minnows
2. ANALYSIS OF Weight - Treatments compared to Pooled Control Data
****
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General Linear Models Procedure

Dependent Variable: WT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	281499.04	93833.01	22.68	0.0001
Error	124	512933.77	4136.56		
Corrected Total	127	794432.80			

R-Square	C.V.	Root MSE	WT Mean

0.354340	24.17544	64.316	266.04

Source	DF	Type I SS	Mean Square	F Value	Pr > F
LEVEL	3	281499.04	93833.01	22.68	0.0001

Effects of DPX-Z326-198 (Linuron) to the ELS of Sheepshead Minnows
2. ANALYSIS OF Weight - Treatments compared to Pooled Control Data
****
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General Linear Models Procedure
Least Squares Means

LEVEL	WT LSMEAN	Pr > |T| H0: LSMEAN(i)=LSMEAN(j) i/j	1	2	3	4
CONTROL	290.728814	1	.	0.1902	0.0675	0.0001
TRT1	271.733333	2	0.1902	.	0.6377	0.0001
TRT2	263.827586	3	0.0675	0.6377	.	0.0001
TRT3	109.700000	4	0.0001	0.0001	0.0001	.

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

Effects of DPX-Z326-198 (Linuron) to the ELS of Sheepshead Minnows
2. ANALYSIS OF Weight - Treatments compared to Pooled Control Data
****
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General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: WT

NOTE: This test controls the type I experimentwise error rate.

Alpha= 0.05 Confidence= 0.95 df= 124 MSE= 4136.563
Critical Value of Studentized Range= 3.683

Comparisons significant at the 0.05 level are indicated by '***'.

LEVEL Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
CONTROL - TRT1	-18.56	19.00	56.55	
CONTROL - TRT2	-11.08	26.90	64.89	
CONTROL - TRT3	123.75	181.03	238.31	***
TRT1 - CONTROL	-56.55	-19.00	18.56	
TRT1 - TRT2	-35.71	7.91	51.52	
TRT1 - TRT3	100.87	162.03	223.19	***
TRT2 - CONTROL	-64.89	-26.90	11.08	
TRT2 - TRT1	-51.52	-7.91	35.71	
TRT2 - TRT3	92.70	154.13	215.55	***
TRT3 - CONTROL	-238.31	-181.03	-123.75	***
TRT3 - TRT1	-223.19	-162.03	-100.87	***
TRT3 - TRT2	-215.55	-154.13	-92.70	***

Effects of DPX-Z326-198 (Linuron) to the ELS of Sheepshead Minnows
2. ANALYSIS OF Weight - Treatments compared to Pooled Control Data
****

08:07 Wednesday, June 5, 1996

General Linear Models Procedure

Dunnett's One-tailed T tests for variable: WT

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 124 MSE= 4136.563
Critical Value of Dunnett's T= 2.123

Comparisons significant at the 0.05 level are indicated by '***'.

LEVEL Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit
TRT1 - CONTROL	-49.62	-19.00	11.62

TRT2	- CONTROL	-57.87	-26.90	4.07	
TRT3	- CONTROL	-227.73	-181.03	-134.33	***