Results of Toxicity Studies Conducted on *Ceriodaphnia dubia* and *Daphnia ambigua*, in Support of an Alternate Species Demonstration, January - June 2000

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1.0 INTRODUCTION

In 1997, the Savannah River Site (SRS) completed toxicity testing studies on an alternate species, *Daphnia ambigua,* that we have proposed for use as a toxicity testing organism at SRS. We demonstrated that this species could be cultured in the laboratory and that it was at least as sensitive as *Ceriodaphnia dubia* to a broad range of toxicants (Specht and Harmon, 1997; Harmon, 1998; Harmon and Specht, 1998; Harmon, Specht and Chandler, 1999). However, it performed better that *C. dubia* in very soft water, which is representative of many SRS effluents and receiving waters.

In January 2000, representatives from SRS met with representatives from U.S. EPA Region 4 and SCDHEC to discuss data needs related to EPA's consideration of SRS's request to use the alternate species (*D. ambigua*) for routine toxicity testing at SRS. SRS contends that the very low water hardness of some of its effluents are responsible for toxicity failures because the species recommended by the EPA (*C. dubia*) does not reproduce well in waters that have very low hardness. During this meeting, it was agreed that the following tasks be completed and that the data be provided to the EPA:

Select a Synthetic Culture/Dilution Water
D. ambigua can be readily cultured in an SRS surface water, Fire Pond, but attempts by a subcontract laboratory (ETT Environmental) to culture this species in synthetic laboratory waters resulted in unacceptable mortality and/or inconsistent levels of reproduction. It was agreed that the following synthetic waters would be tried: very soft water, very soft water with added chloride, soft water with added chloride, and simulated Fire Pond water.

Perform Reference Toxicant Tests
After a suitable synthetic water has been chosen, four rounds of chronic definitive toxicity tests will be conducted on *C. dubia* and *D. ambigua* using sodium chloride as the reference toxicant to determine if the alternate species is at least as sensitive to the reference toxicant as *C. dubia*.

Perform Effluent Toxicant Tests
Upon completion of the reference toxicant tests, four rounds of chronic definitive toxicity tests will be conducted on effluent from the A-01 and A-11 NPDES outfalls. A-01 is known to contain toxic concentrations of copper, and steps are being taken to remove copper from the outfall. This outfall was chosen to determine if *D. ambigua* will detect toxicity when toxicity is present. A-11 is comprised primarily of groundwater and has very low hardness. A-11 has a history of marginally failing toxicity tests, but no toxicants have been identified as present in the effluent. SRS contends that the failures are due to low hardness and not to the presence of a toxicant. This effluent was selected because of its low hardness and marginal failures of toxicity tests.

Perform Toxicity Tests in Upper Three Runs Water
Upper Three Runs is a very high quality SRS stream that contains a remarkably diverse aquatic insect fauna. Earlier toxicity studies conducted by SRS indicated that water from Upper Three Runs is usually chronically toxic and sometimes acutely toxic to *C. dubia*, but not to *D. ambigua*. The toxicity is believed to be related to the very low hardness of Upper Three Runs, and possibly to the presence of naturally occurring humic and fulvic acids. Four rounds of chronic definitive toxicity tests will be performed on both species using four batches of water collected from Upper Three Runs in successive weeks.

This report summarizes the results of the culturing in synthetic waters, reference toxicant tests, and effluent toxicity tests, and Upper Three Runs toxicity tests. ETT Environmental (Greenville SC, SCDHEC Certification # 23104001) performed all of the toxicity tests conducted in support of this study.

2.0 RESULTS

Table 1 compares the ionic composition of moderately hard synthetic water (MHSF) with Fire Pond and A-11 effluent. Fire Pond is a small unimpacted impoundment at SRS that is far-removed from SRS facilities. It receives no effluents and is maintained by runoff from the wooded watershed that surrounds the pond. *D. ambigua* has been successfully cultured in water from Fire Pond by both SRS scientists and ETT Environmental. MHSF has a hardness of 100 mg/l as compared to 10 mg/l or less in Fire Pond and A-11 effluent. With the exception of chloride, the concentrations of major ions in Fire Pond and A-11 are generally 5 to 10% of the concentrations in MHSF. Both Fire Pond and A-11 contain slightly higher concentrations of chloride than MHSF, which suggests that chloride is a dominant anion in SRS surface waters. These data indicate that the ionic composition of SRS waters differs markedly from MHSF.

Table 1. Ionic Composition of MHSF, as Compared to Fire Pond and A-11

Parameter (mg/l)	MHSF	Fire Pond	A-11
Hardness	100	6.0	<10
Alkalinity	70	3.6	-
Conductivity	400	40	-
Calcium	13.9	<1	1.7
Magnesium	12.1	0.29	0.75
Sodium	26.3	1.5	5.2
Potassium	2.1	0.17	0.6
Chloride	1.9	2.1	2.2
Sulfate	81	<1	-

2.1 Synthetic Culture/Dilution Water

Based on the ionic composition data from Table 1, four synthetic waters were selected for culturing *Daphnia ambigua*: very soft water, very soft water with added chloride, soft water with added chloride, and simulated Fire Pond water. The ion balances of these waters are listed in Table 2. The EPA formulation for very soft water was chosen because it was the EPA formula that most closely matched SRS surface waters. Very soft with added chloride was chosen because it more closely approximated the ionic balance of SRS surface waters than very soft water alone. Soft water with added chloride was chosen with the hope that it would be an acceptable culture water for both species, which would be an advantage when comparing the sensitivities of the two species to a reference toxicant whose toxicity is influenced by water hardness. Simulated Fire Pond was chosen since it most closely matched the ionic composition of an SRS surface water that is known to be an acceptable culture water for *Daphnia ambigua*.

Table 3 summarizes survival and reproduction data for *Daphnia ambigua* in the four synthetic waters and water from Fire Pond. The results indicate that reproduction was highest in Simulated Fire Pond water (29.5) and lowest in soft water with added chloride

Table 2. Ionic Composition of Synthetic Waters Used as Culture Water for *Daphnia ambigua*

Parameter (mg/l)	Soft	Soft + Chloride	Very Soft	Very Soft + Chloride	Simulated Fire Pond
Hardness	38.4	38.4	9.6	9.6	5.8
Calcium	7	7	1.7	1.7	1.9
Magnesium	6.1	6.1	1.5	1.5	0.3
Sodium	13.1	13.9	3.3	4.5	1.5
Potassium	1	1	0.3	0.3	0.17
Chloride	1	2.1	0.2	2.1	2.1
Sulfate	40.6	40.6	10.2	10.2	1.2

(25.8), as compared to 28.6 in Fire Pond water. However, reproduction was acceptable in all four synthetic waters. Percent mortality averaged 10.5 percent in very soft water and 0 to 4% in the remaining synthetic waters and Fire Pond. Culturing in very soft water was discontinued after Week 4 because the mortality rate was considered to be unacceptable. The other three synthetic waters all had acceptable rates of mortality, but soft water with added chloride was lowest (0.0%). Based on these results, soft water with added chloride was selected as the culture/dilution water to be used for the remaining testing. It was chosen in part because it produced no mortality, but primarily because it was possible that the hardness of this water would be high enough to also be used by *Ceriodaphnia dubia*, which would reduce the number of variables that could affect the toxicity results.

Table 3. Mortality and Reproduction of *Daphnia ambigua* in 4 Synthetic Waters and Fire Pond, January - March 2000

Reproduction

	Week of					Mean
	01/27/00	02/05/00	02/16/00	02/28/00	03/10/00	
Soft water w/ Cl	31.4	27.1	20.4	25.3	25.0	25.8
Very soft water	26.3	23.5	27.8	31.8	discontinued	27.4
Very soft water w/ Cl	24.8	28.5	24.8	30.6	30.9	27.9
Sim. Fire Pond	25.2	32.5	27.1	33.0	29.7	29.5
Fire Pond	29.8	26.7	29.4	29.1	28.1	28.6

Percent Mortality

	Week of					
	01/27/00	02/05/00	02/16/00	02/28/00	03/10/00	
Soft water w/ Cl	0	0	0	0	0	0.0
Very soft water	0	20	11	11	discontinued	10.5
Very soft water w/ Cl	20	0	0	0	0	4.0
Sim. Fire Pond	0	0	0	0	10	2.0
Fire Pond	0	0	0	0	0	0.0

2.2 Reference Toxicant Tests

Reference toxicant tests were performed on both species using sodium chloride as the reference toxicant (Table 4). In MHSF, the Chronic IC25 for *C. dubia* was 591 mg/l,

while *D. ambigua* was somewhat more sensitive, with an IC25 of 447.5 mg/l. In soft water with added chloride, *C. dubia* was obviously stressed, as evidenced by the low IC25 of 274 mg/l. The IC25 for *D. ambigua* in soft water with added chloride was 425 mg/l, which was slightly lower than its IC25 in MHSF, and approximately 25% lower than the IC25 for *C. dubia* in its preferred water. The toxicity of sodium chloride is inversely related to water hardness (R.W. Kelley, 1999), which explains at least part of the difference in sensitivity to sodium chloride by the two species in their preferred waters. These results indicate that *D. ambigua* would be expected to be more sensitive to cationic metals, such as copper, than *C. dubia*. Therefore, the use of *D. ambigua* for effluent toxicity testing should be at least as protective of the receiving streams as *C. dubia*, and probably more protective. However, the results also indicate that *C. dubia* is physiologically stressed in soft water, as evidenced by the low IC25 in soft water with added chloride. These results suggest that *C. dubia* is an inappropriate species to use for toxicity testing of effluents that have low hardness.

Table 4. Results of Reference Toxicant Tests conducted with Sodium Chloride on *Ceriodaphnia dubia* and *Daphnia ambigua*

Sensitivity to NaCl in MHSF	**7 day LC50 (mg/l)**	**Chronic IC25 (mg/l)**
Ceriodaphnia dubia		
Round 1 (10 reps)	1860	
Round 2 (20 reps)	2120	488
Round 3 (20 reps)	1460	590
Round 4 (20 reps)	1920	722
Round 5 (20 reps)	1140	560
Mean (Rounds 2-5)	**1660**	**591**
Daphnia ambigua		
Round 1 (10 reps)	595	
Round 2 (20 reps)	723	411
Round 3 (20 reps)	1029	555
Round 4 (20 reps)	860	443
Round 5 (20 reps)	1029	381
Mean (Rounds 2-5)	**910.3**	**447.5**
Sensitivity to NaCl in Soft Synthetic Water with Added Chloride		
Ceriodaphnia dubia		
Round 1 (10 reps)	195	
Round 2 (20 reps)	500	<50
Round 3 (20 reps)	833	245
Round 4 (20 reps)	>800	342
Round 5 (20 reps)	690	458
Mean (Rounds 2-5)	**706.0**	**274**
Daphnia ambigua		
Round 1 (10 reps)	800	
Round 2 (20 reps)	565	352
Round 3 (20 reps)	598	414
Round 4 (20 reps)	780	346
Round 5 (20 reps)	1070	588
Mean (Rounds 2-5)	**753.0**	**425**

2.3 Effluent Toxicant Tests

Four rounds of toxicity tests were conducted on effluent collected from NPDES Outfalls A-01 and A-11 (Table 5, Figures 1 and 2). A-01 is known to contain potentially toxic concentrations of copper. SRS has not been able to identify a toxicant in A-11 and contends that the toxicity is due to low hardness resulting from large inputs of well water to the outfall, rather than the presence of a toxicant. The results for A-01 were somewhat variable. During the first week of testing, NOEC's were identical for the two species. In Week 2, A-01 effluent was quite toxic to *C. dubia*, but was not toxic to *D. ambigua*. In Weeks 3 and 4, *D. ambigua* was somewhat more sensitive than *C. dubia*. There is no ready explanation for the variations in sensitivity during the four weeks of testing.

The results for A-11 indicate that A-11 was toxic to *C. dubia* at the in-stream waste concentration (IWC) in 3 out of 4 tests, but was not toxic to *D. ambigua* in any of the four rounds of testing. These results suggest that the toxicity at A-11 is due to low hardness, which produces osmotic stress in *C. dubia*, but not in *D. ambigua*, which thrives in very soft water.

Table 5. Results of Toxicity Tests Conducted on NPDES Outfalls A-01 and A-11

	NOEC		Chronic Value		IC25	
Outfall A-01	*C. dubia*	*D. ambigua*	*C. dubia*	*D. ambigua*	*C. dubia*	*D. ambigua*
Week 1	75%	75%	83.7%	83.7%		
Week 2	25%	>100%	35.4%	>100%	51.6%	>100%
Week 3	75%	50%	61.2%	61.2%	78.2%	67%
Week 4	50%	25%	61.2%	35.4%	86.2%	31.2%

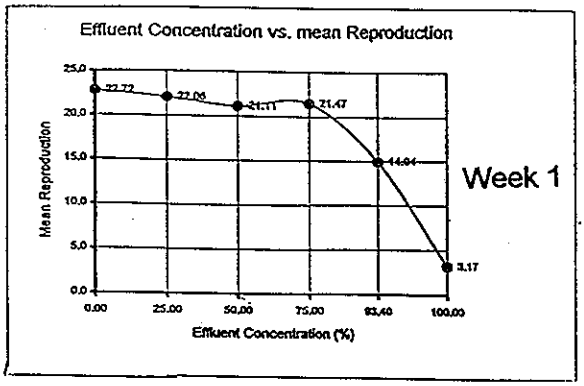
Outfall A-11	*C. dubia*	*D. ambigua*	*C. dubia*	*D. ambigua*	*C. dubia*	*D. ambigua*
Week 1	75%	>100%	85.8%	>100%		>100%
Week 2	75%	>100%	85.8%	>100%	81%	>100%
Week 3	98.1%	>100%	99%	>100%	>100%	>100%
Week 4	75%	>100%	85.8%	>100%	100%	>100%

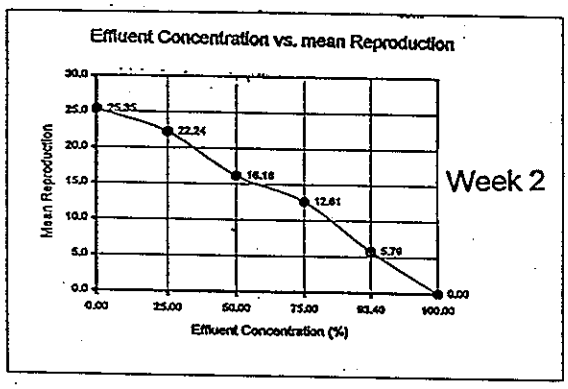
2.4 Toxicity Tests in Upper Three Runs Water

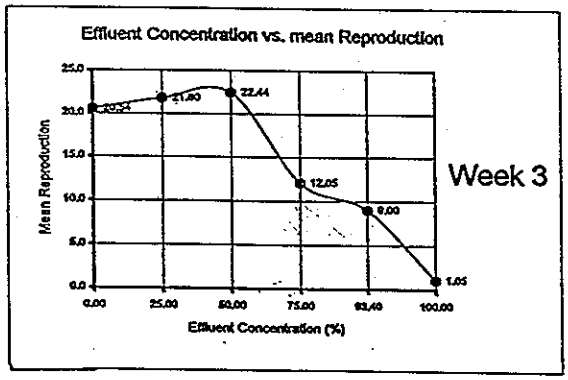
Four rounds of toxicity testing were conducted on both species in water collected from Upper Three Runs (Table 6). The results indicate that Upper Three Runs water was always chronically toxic to *C. dubia*. Reproduction of *C. dubia* in Upper Three Runs averaged 5.1 young/female, as compared to 23.9 in MHSF. Reproduction of *D. ambigua* was impaired in two of the four tests. Reproduction of *D. ambigua* in Upper Three Runs averaged 11.3, as compared to 20.4 in soft water with added chloride. The second batch of Upper Three Runs was very toxic to *D. ambigua*, resulting in 95% mortality. The results for the last two weeks were similar to the results that SRS found in earlier testing. In these two tests, reproduction of *D. ambigua* was very similar in culture water and Upper Three Runs water. These results indicate that reproduction and survival were variable. Based on the data that was collected previously, we believed that toxicity in Upper Three Runs was solely related to water hardness. However, these results

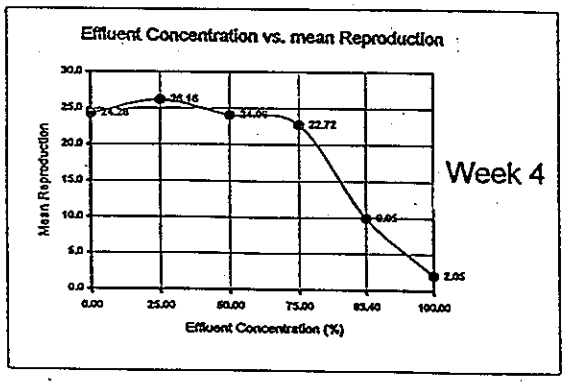
Figure 1. A-01 Effluent Concentration vs. Reproduction for *C. dubia* and *D. ambigua*

Ceriodaphnia dubia

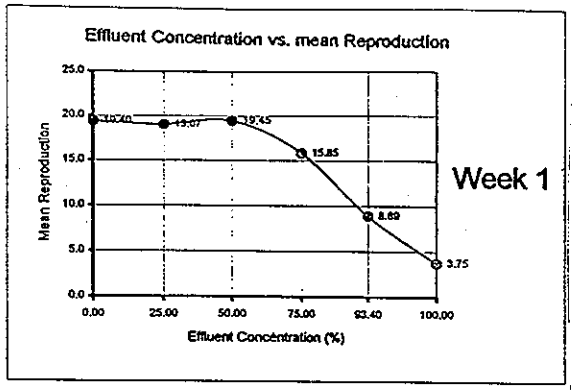


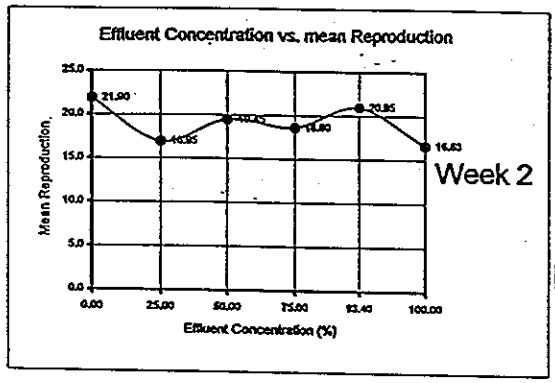


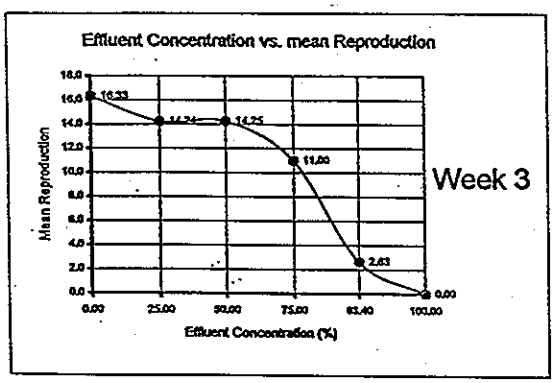




Daphnia ambigua







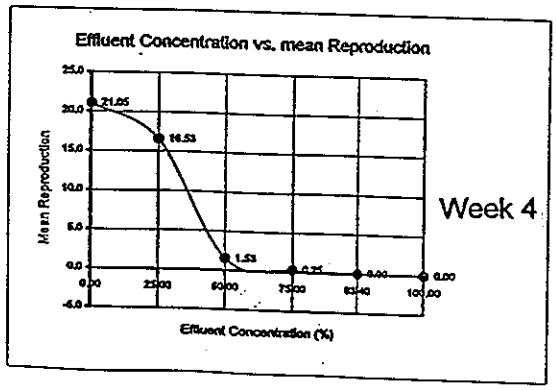
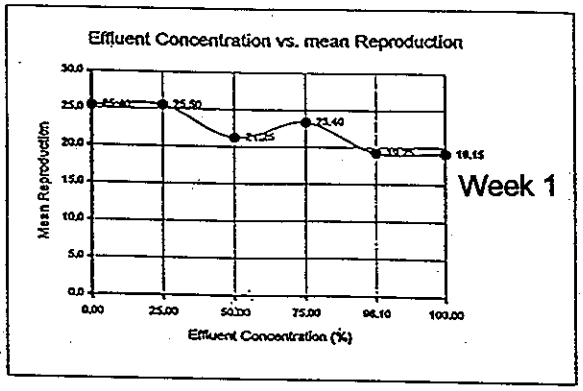
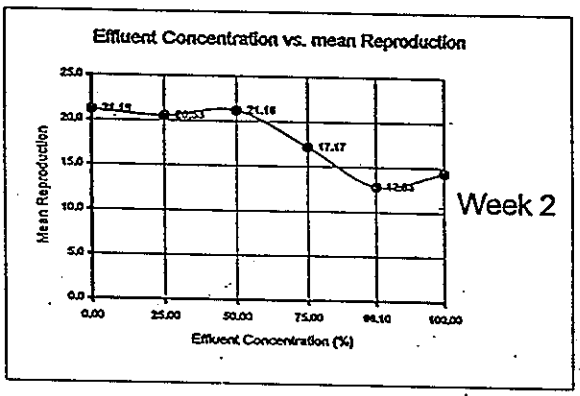
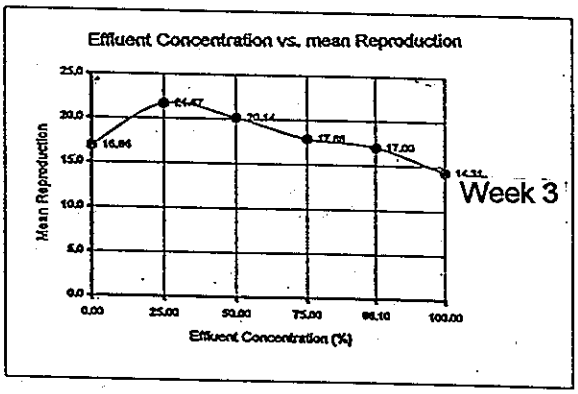


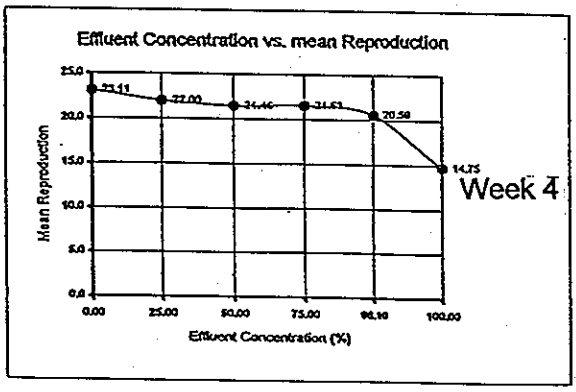
Figure 2. A-11 Effluent Concentration vs. Reproduction for *C. dubia* and *D. ambigua*

Ceriodaphnia dubia

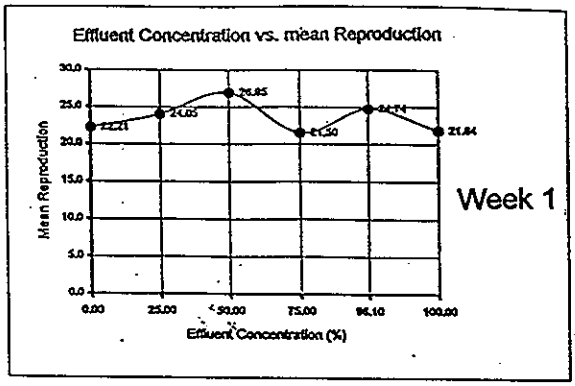


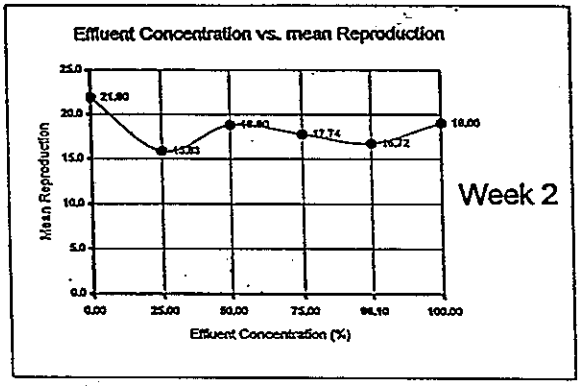


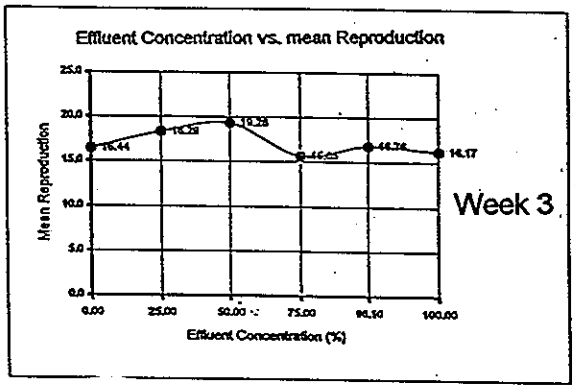




Daphnia ambigua







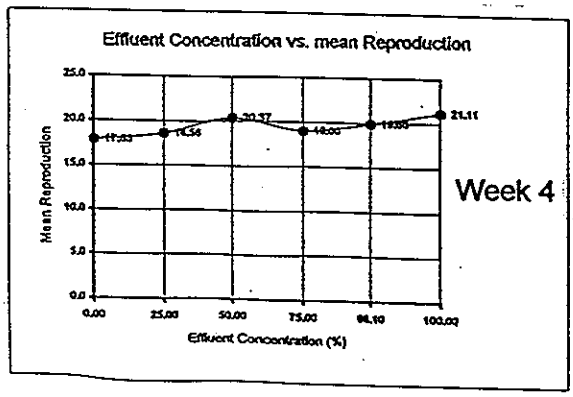


Table 6. Mortality and Reproduction in Upper Three Runs Water

		Mortality		Reproduction			
Test Date	Species	Control	UTR	Control	UTR	Pass/Fail	t value
5/22/00	*C. dubia*	0%	45%	25.4	1.1	Fail	35.1
5/22/00	*D. ambigua*	5%	25%	22.2	6.5	Fail	6.2
5/31/00	*C. dubia*	0%	35%	25.4	3.9	Fail	21.6
5/31/00	*D. ambigua*	0%	95%	21.9	0.0	Fail	39.0
6/5/00	*C. dubia*	0%	20%	20.5	5.1	Fail	9.25
6/5/00	*D. ambigua*	17%	10%	16.3	16.9	Pass	-0.22
6/12/00	*C. dubia*	0%	20%	24.3	10.3	Fail	7.8
6/12/00	*D. ambigua*	0%	15%	21.1	21.7	Pass	-0.30

indicate that there may be an intermittent toxicant present in the stream. The headwaters of Upper Three Runs are on private property and contain substantial tracts of agricultural land. It is possible that pesticides are intermittently reaching the stream, which would explain the high mortality of *D. ambigua* in Week 2 of the testing. In earlier testing, we found that *D. ambigua* was more sensitive to an organophosphate insecticide (chlorpyrifos) than *C. dubia* (Specht and Harmon, 1997). Clearly, additional investigations must be conducted in Upper Three Runs to determine the source of the toxicity.

3.0 SUMMARY/CONCLUSIONS

We have determined that *D. ambigua* can be successfully cultured in a variety of soft to very soft synthetic waters. Soft water with added chloride was selected as the culture/dilution water for the remaining testing that is summarized in this report. The results of the reference toxicant testing indicates that *D. ambigua* is somewhat more sensitive to sodium chloride than *C. dubia*, with IC25's of 425 mg/l and 591 mg/l reported for the two species, respectively, in their preferred waters. At least part of the increased sensitivity for *D. ambigua* is believed to be related to differences in water hardness in the reference toxicant tests for the two species.

The results of the effluent toxicity tests for A-01 indicate some variability in results. One set of results indicates that the two species were equally sensitive to the effluent, two sets indicate that *D. ambigua* was more sensitive than *C. dubia*, and one set of tests indicates that *D. ambigua* did not respond to the toxicity of the effluent, but *C. dubia* did. The results of the A-11 testing indicate that A-11 was marginally toxic to *C. dubia* in three of the four tests, but was not toxic to *D. ambigua* in any of the four rounds of testing. These data suggest that the toxicity of A-11 is due to low hardness and not to the presence of a toxicant.

The results of the toxicity tests that were conducted in water collected from Upper Three Runs indicates that this water was always toxic to *C. dubia*. Results for *D. ambigua* were mixed. The first two tests resulted in acute toxicity (mortalities of 25% and 95%), while the last two tests resulted in no acute or chronic toxicity. These results indicate that there may be an intermittent source of toxicity in Upper Three Runs.

With one exception (Week 2, A-01) we have demonstrated that *D. ambigua* is at least as sensitive to a reference toxicant and A-01 effluent as *C. dubia*. We have also demonstrated that *D. ambigua* is not affected by A-11 effluent, which strongly suggests that the *C. dubia* impaired reproduction in A-11 is due to osmotic stress, and not to the presence of a chemical toxicant.

4.0 REFERENCES

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APPENDIX A

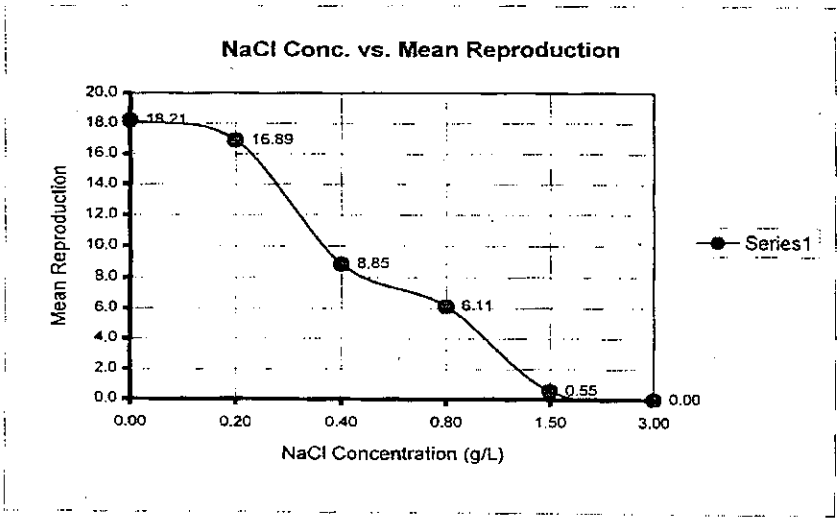
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	Reference Toxicant - Ceriodaphnia dubia	Start Date:	4/27/2000
Sample ID:	NaCl - MHSF	Lab ID:	0

Normality Test
Kolmogorov's Test: D*= 1.077 critical= 1.035
Data are not normal in distribution.

Heterogeneity of Variance Test
Bartlett's Test B= 40.77 critical= 13.28
Data are not homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 mg/L	0.0%	18.21	4.79			
200 mg/L	0.0%	16.89	5.61	347.00	294	Pass
400 mg/L	5.0%	8.85	8.39	278.50	294	Fail
800 mg/L	0.0%	6.11	6.50			Fail
1500 mg/L	0.0%	0.55	1.76			Fail
3000 mg/L	100.0%	0.00	0.00			Fail
			CV 26.3%			



Test Summary

Survival
No Observed Effect Concentration
NOEC= 800 mg/L
Lowest Observed Effect Concentration
LOEC= 1500 mg/L
7 Day LC50
LC50= 2120 mg/L

Reproduction
No Observed Effect Concentration
NOEC= 200 mg/L
Lowest Observed Effect Concentration
LOEC= 400 mg/L
Chronic Value
ChV= 283 mg/L
IC25= 488 mg/L

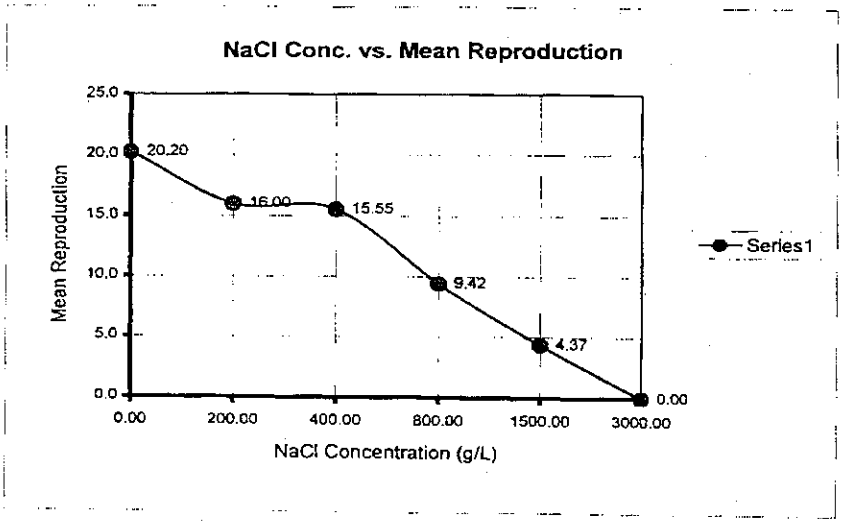
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	Reference Toxicant - Ceriodaphnia dubia	Start Date:	5/3/2000
Sample ID:	NaCl - MHSF	Lab ID:	none

Normality Test
Kolmogorov's Test: D*= 1.337 critical= 1.035
Data are not normal in distribution.

Heterogeneity of Variance Test
Bartlett's Test B= -4.62 critical= 9.21
Data are homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 mg/L	5.0%	20.20	6.22			
200 mg/L	16.7%	16.00	9.44	316.00	299	Pass
400 mg/L	20.0%	15.55	9.28	352.50	310	Pass
800 mg/L	36.8%	9.42	7.56	229.00	310	Fail
1500 mg/L	36.8%	4.37	4.94			
3000 mg/L	100.0%	0.00	0.00			
			CV 30.8%			



Test Summary

Survival
No Observed Effect Concentration
NOEC= 400 mg/L
Lowest Observed Effect Concentration
LOEC= 800 mg/L
7 Day LC50
LC50= 1460 mg/L

Reproduction
No Observed Effect Concentration
NOEC= 400 mg/L
Lowest Observed Effect Concentration
LOEC= 800 mg/L
Chronic Value
ChV= 565 mg/L
IC25= 594 mg/L

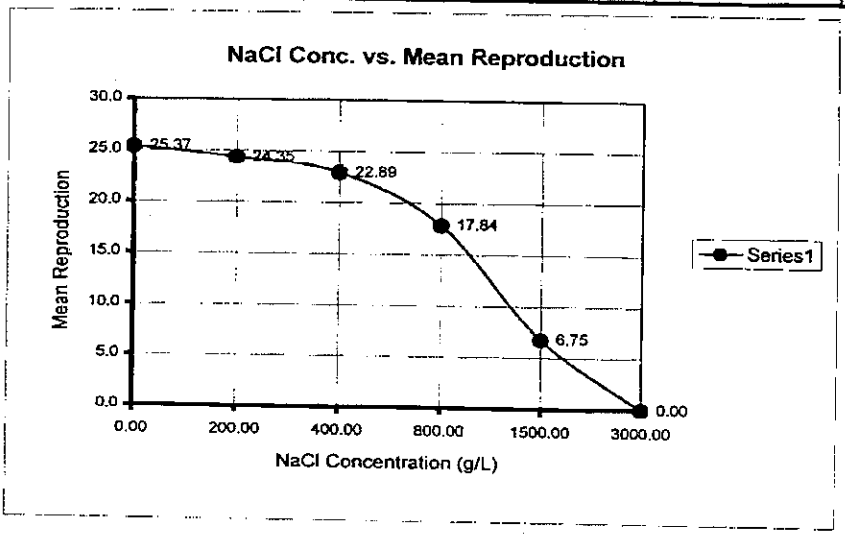
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	Reference Toxicant - Ceriodaphnia dubia	Start Date:	6/8/2000
Sample ID:	NaCl - MHSF	Lab ID:	none

Normality Test
Kolmogorov's Test: D*= 1.019 critical= 1.035
Data are normal in distribution.

Heterogeneity of Variance Test
Bartlett's Test B= 12.08 critical= 13.28
Data are homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	t Test calc. T	t Test Critical Value	Pass/Fail
0 mg/L	0.0%	25.37	4.92			
200 mg/L	0.0%	24.35	4.07	0.77	2.56	Pass
400 mg/L	0.0%	22.89	2.47	1.82	2.56	Pass
800 mg/L	5.3%	17.84	4.88	5.60	2.56	Fail
1500 mg/L	20.0%	6.75	3.84	14.02	2.56	Fail
3000 mg/L	100.0%	0.00	0.00			Fail
			CV 19.4%			



Test Summary

Survival
No Observed Effect Concentration
NOEC= 800 mg/L
Lowest Observed Effect Concentration
LOEC= 1500 mg/L
7 Day LC50
LC50= 1920 mg/L

Reproduction
No Observed Effect Concentration
NOEC= 400 mg/L
Lowest Observed Effect Concentration
LOEC= 800 mg/L
Chronic Value
ChV= 565 mg/L
IC25= 722 mg/L

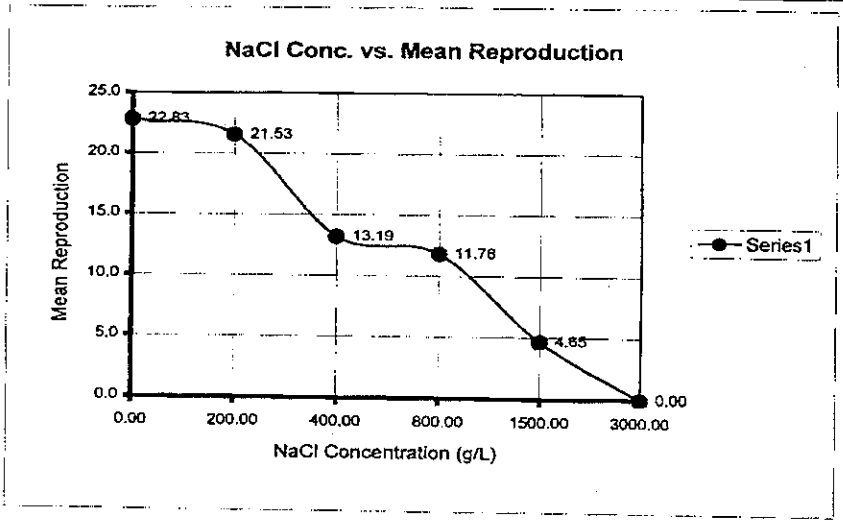
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	Reference Toxicant - Ceriodaphnia dubia	Start Date:	6/21/2000
Sample ID:	NaCl - MH5F	Lab ID:	0

Normality Test
Kolmogorov's Test: D*= 1.463 critical= 1.035
Data are not normal in distribution.

Heterogencity of Variance Test
Bartlett's Test B= 20.40 critical= 9.21
Data are not homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 mg/L	0.0%	22.83	3.01			
200 mg/L	5.9%	21.53	3.48	267.00	232	Pass
400 mg/L	18.8%	13.19	10.38	188.50	232	Fail
800 mg/L	27.8%	11.78	8.81			Fail
1500 mg/L	52.9%	4.65	4.72			Fail
3000 mg/L	100.0%	0.00	0.00			Fail
			CV 13.2%			



Test Summary

Survival
No Observed Effect Concentration
NOEC= 400 mg/L
Lowest Observed Effect Concentration
LOEC= 800 mg/L
7 Day LC50
LC50= 1140 mg/L

Reproduction
No Observed Effect Concentration
NOEC= 200 mg/L
Lowest Observed Effect Concentration
LOEC= 400 mg/L
Chronic Value
ChV= 283 mg/L
IC25= 560 mg/L

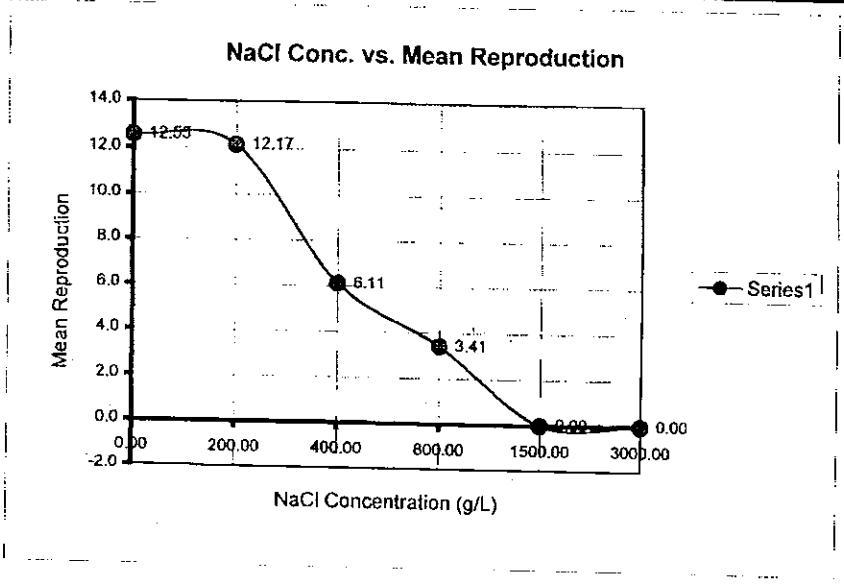
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	Reference Toxicant - Daphnia ambigua	Start Date:	4/27/2000
Sample ID:	NaCl - MHSF	Lab ID:	none

Normality Test
Kolmogorov's Test: D*= 0.742 critical= 1.035
Data are normal in distribution.

Heterogeneity of Variance Test
Bartlett's Test B= -36.41 critical= 9.21
Data are homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	t Test t Value	t Test Critical Value	Pass/Fail
0 mg/L	25.0%	12.55	11.16			
200 mg/L	0.0%	12.17	6.92	0.18	2.56	Pass
400 mg/L	26.3%	6.11	6.96	3.14	2.56	Fail
800 mg/L	35.3%	3.41	3.99			Fail
1500 mg/L	100.0%	0.00	0.00			
3000 mg/L	100.0%	0.00	0.00			
			CV 88.9%			



Test Summary

Survival
No Observed Effect Concentration
NOEC= 800 mg/L
Lowest Observed Effect Concentration
LOEC= 1500 mg/L
7 Day LC50
LC50= 723 mg/L

Reproduction
No Observed Effect Concentration
NOEC= 200 mg/L
Lowest Observed Effect Concentration
LOEC= 400 mg/L
Chronic Value
ChV= 283 mg/L
IC25= 411 mg/L

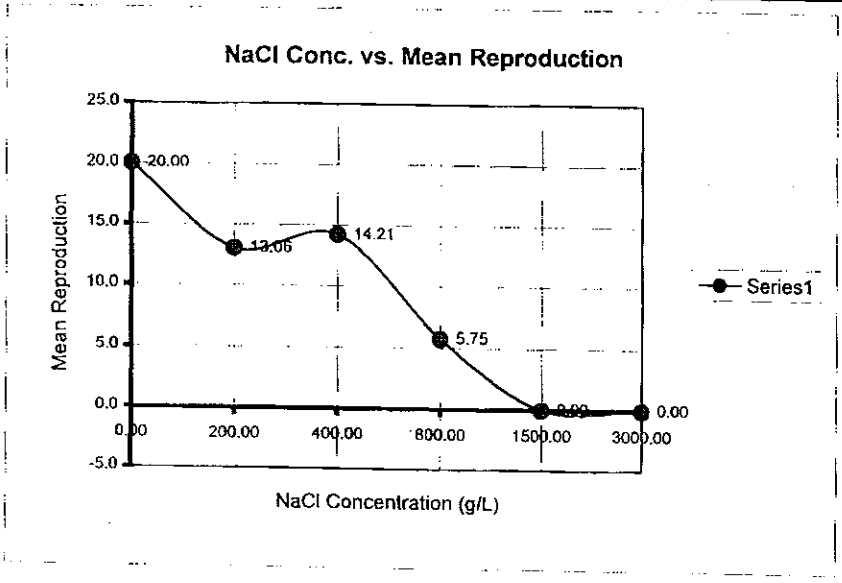
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	Reference Toxicant - Daphnia ambigua	Start Date:	5/3/2000
Sample ID:	NaCl - MHSF	Lab ID:	none

Normality Test
Kolmogorov's Test: D*= 1.466 critical= 1.035
Data are not normal in distribution.

Heterogeneity of Variance Test
Bartlett's Test B= -8.03 critical= 9.21
Data are homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 mg/L	15.8%	20.00	9.89			
200 mg/L	23.5%	13.06	10.29	237.50	267	Pass
400 mg/L	15.8%	14.21	8.43	284.50	299	Fail
800 mg/L	25.0%	5.75	6.06	269.00	310	Fail
1500 mg/L	80.0%	0.00	0.00			
3000 mg/L	100.0%	0.00	0.00			
			CV 49.4%			



Test Summary

Survival
No Observed Effect Concentration
NOEC= 800 mg/L
Lowest Observed Effect Concentration
LOEC= 1500 mg/L
7 Day LC50
LC50= 1029 mg/L

Reproduction
No Observed Effect Concentration
NOEC= <200 mg/L
Lowest Observed Effect Concentration
LOEC= 200 mg/L
Chronic Value
ChV= <200 mg/L
IC25= 555 mg/L

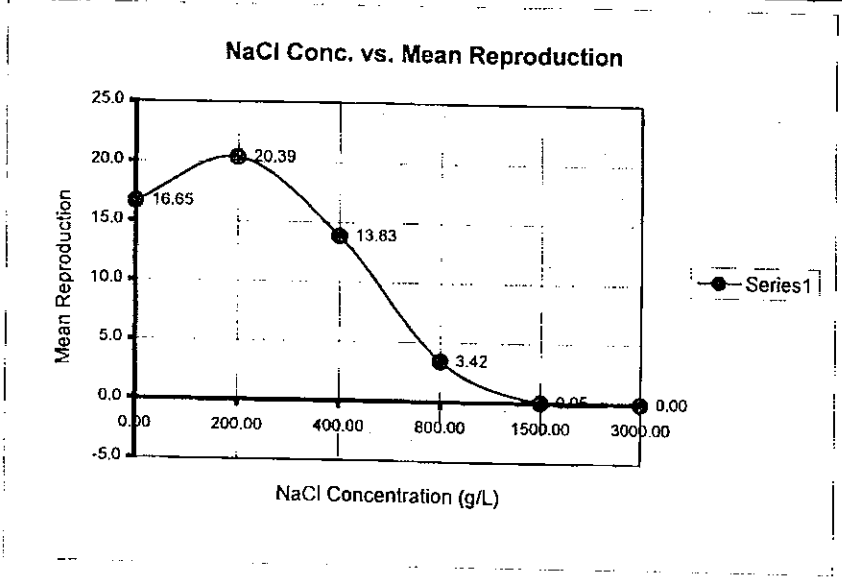
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	Reference Toxicant - Daphnia ambigua	Start Date:	5/10/2000
Sample ID:	NaCl - MHSF	Lab ID:	none

Normality Test
Kolmogorov's Test: D*= 1.409 critical= 1.035
Data are not normal in distribution.

Heterogeneity of Variance Test
Bartlett's Test B= -14.45 critical= 9.21
Data are homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 mg/L	15.0%	16.65	8.23			
200 mg/L	5.6%	20.39	6.39	405.50	282	Pass
400 mg/L	16.7%	13.83	7.81	298.50	315	Fail
800 mg/L	52.6%	3.42	3.36	236.00	315	Fail
1500 mg/L	85.0%	0.05	0.22			Fail
3000 mg/L	100.0%	0.00	0.00			Fail
			CV 49.4%			



Test Summary

Survival
No Observed Effect Concentration
NOEC= 400 mg/L
Lowest Observed Effect Concentration
LOEC= 800 mg/L
7 Day LC50
LC50= 860 mg/L

Reproduction
No Observed Effect Concentration
NOEC= 200 mg/L
Lowest Observed Effect Concentration
LOEC= 400 mg/L
Chronic Value
ChV= 283 mg/L
IC25= 443 mg/L

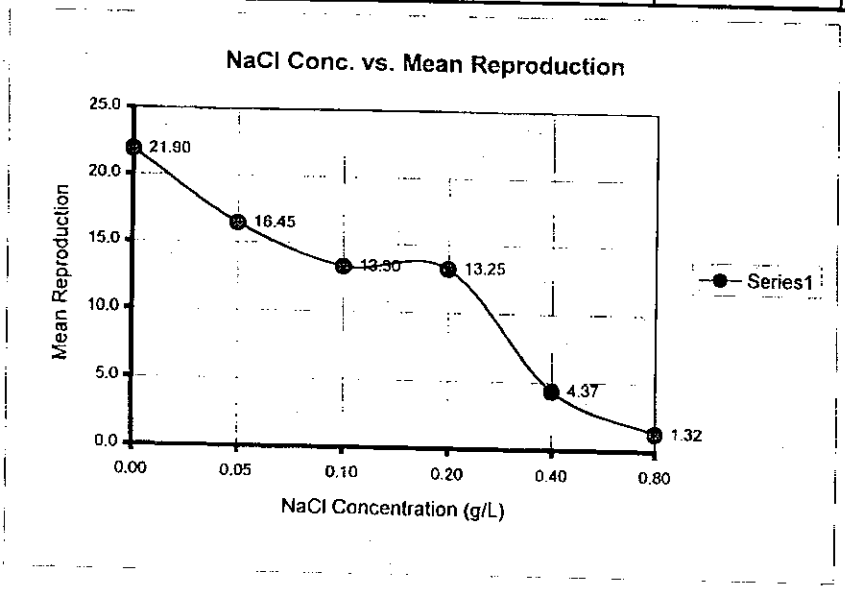
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	Reference Toxicant - Ceriodaphia dubia	Start Date:	4/27/2000
Sample ID:	NaCl - Soft Synthetic FW w/ Cl	Lab ID:	0

Normality Test
Kolmogorov's Test: D*= 1.423 critical= 1.035
Data are not normal in distribution.

Heterogeneity of Variance Test
Bartlett's Test B= 0.60 critical= 9.21
Data are homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 mg/L	10.0%	21.90	6.46			
50 mg/L	10.0%	16.45	7.21	338.00	299	Pass
100 mg/L	10.0%	13.30	7.73	288.50	299	Fail
200 mg/L	25.0%	13.25	9.80			Fail
400 mg/L	21.1%	4.37	4.72			Fail
800 mg/L	63.2%	1.32	2.08			Fail
			CV 29.5%			



Test Summary

Survival
No Observed Effect Concentration
NOEC= 400 mg/L
Lowest Observed Effect Concentration
LOEC= 800 mg/L
7 Day LC50
LC50= 500 mg/L

Reproduction
No Observed Effect Concentration
NOEC= 50 mg/L
Lowest Observed Effect Concentration
LOEC= 100 mg/L
Chronic Value
ChV= 71 mg/L
IC25= <50 mg/L

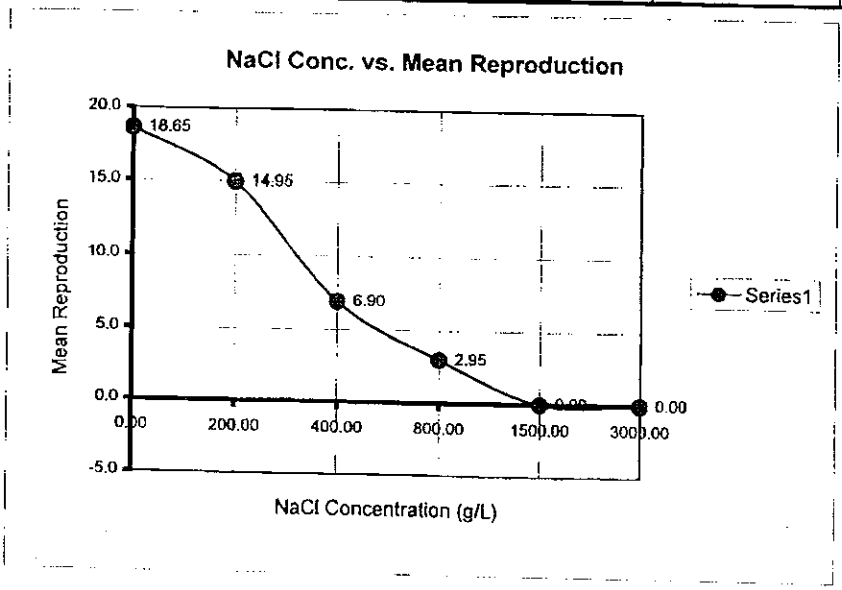
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	Reference Toxicant - Daphnia ambigua	Start Date:	5/16/2000
Sample ID:	NaCl - MHSF	Lab ID:	none

Normality Test
Kolmogorov's Test: D*= 1.087 critical= 1.035
Data are not normal in distribution.

Heterogeneity of Variance Test
Bartlett's Test B= 42.64 critical= 11.35
Data are not homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 mg/L	11.8%	18.65	7.78			
200 mg/L	5.0%	14.95	7.43	315.00	282	Pass
400 mg/L	5.0%	6.90	6.42	260.50	282	Fail
800 mg/L	5.3%	2.95	3.01			Fail
1500 mg/L	65.0%	0.00	0.00			Fail
3000 mg/L	100.0%	0.00	0.00			Fail
			CV 41.7%			



Test Summary

Survival
No Observed Effect Concentration
NOEC= 800 mg/L
Lowest Observed Effect Concentration
LOEC= 1500 mg/L
7 Day LC50
LC50= 1029 mg/L

Reproduction
No Observed Effect Concentration
NOEC= 200 mg/L
Lowest Observed Effect Concentration
LOEC= 400 mg/L
Chronic Value
ChV= 283 mg/L
IC25= 381 mg/L

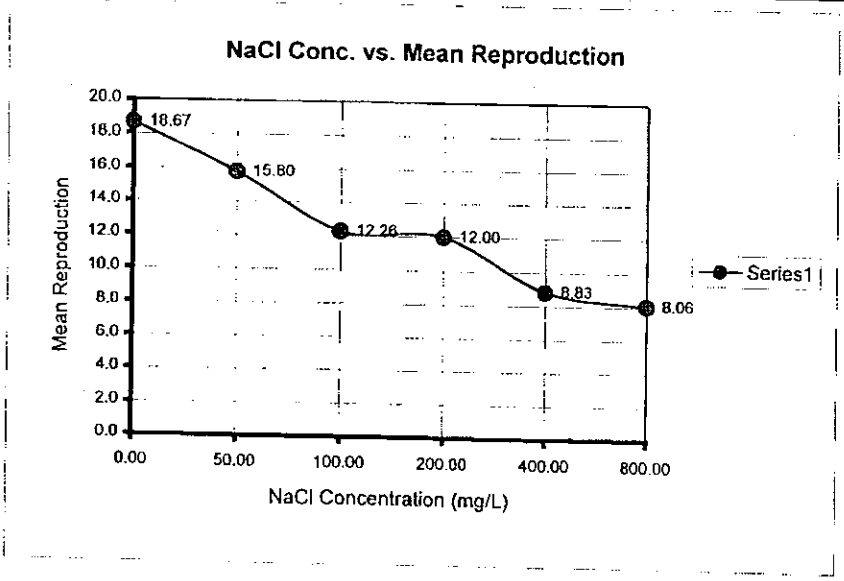
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	Reference Toxicant - Ceriodaphnia dubia	Start Date:	5/4/2000
Sample ID:	NaCl - Soft Synthetic w/ Cl	Lab ID:	none

Normality Test
Kolmogorov's Test: D*= 1.068 critical= 1.035
Data are not normal in distribution.

Heterogeneity of Variance Test
Bartlett's Test B= 29.80 critical= 13.28
Data are not homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 mg/L	0.0%	18.67	1.88			
50 mg/L	5.0%	15.80	5.89	259	252	Pass
100 mg/L	5.3%	12.26	5.97	251	252	Fail
200 mg/L	0.0%	12.00	4.83	198	252	Fail
400 mg/L	16.7%	8.83	4.85			
800 mg/L	22.2%	8.06	5.54			
			CV 10.1%			



Test Summary

Survival
No Observed Effect Concentration
NOEC= 400 mg/L
Lowest Observed Effect Concentration
LOEC= 800 mg/L
7 Day LC50
LC50= 833 mg/L

Reproduction
No Observed Effect Concentration
NOEC= 50 mg/L
Lowest Observed Effect Concentration
LOEC= 100 mg/L
Chronic Value
ChV= 70 mg/L
IC25= 245 mg/L

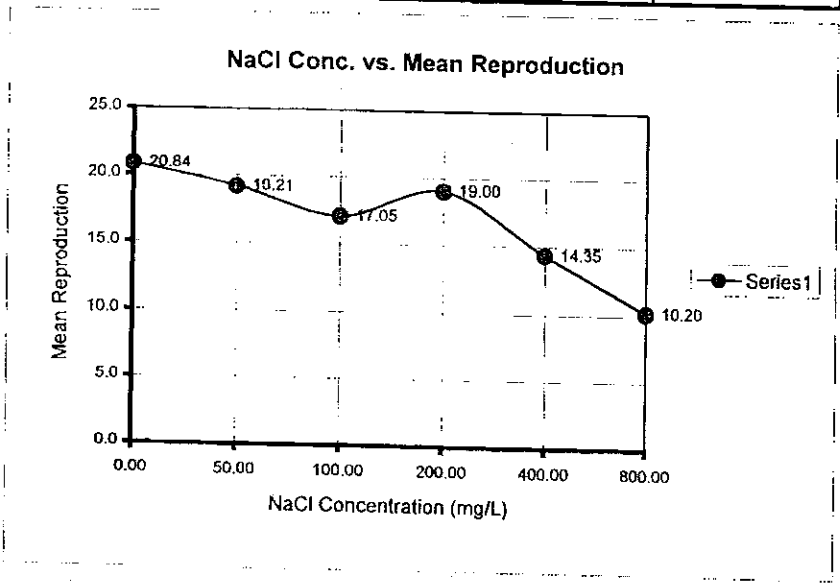
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	Reference Toxicant - Ceriodaphnia dubia	Start Date:	5/12/2000
Sample ID:	NaCl - Soft Synthetic w/ Cl	Lab ID:	none

Normality Test
Kolmogorov's Test: D*= 1.015 critical= 1.035
Data are normal in distribution.

Heterogeneity of Variance Test
Bartlett's Test B= 20.22 critical= 15.09
Data are not homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 mg/L	10.5%	20.84	6.79			
50 mg/L	5.3%	19.21	4.97			Pass
100 mg/L	15.0%	17.05	7.62			Pass
200 mg/L	0.0%	19.00	5.01	326	305	Pass
400 mg/L	5.0%	14.35	5.46	293	305	Fail
800 mg/L	20.0%	10.20	5.03	250	305	Fail
			CV 32.6%			



Test Summary

Survival
No Observed Effect Concentration
NOEC= >800 mg/L
Lowest Observed Effect Concentration
LOEC= >800 mg/L
7 Day LC50
LC50= >800 mg/L

Reproduction
No Observed Effect Concentration
NOEC= 200 mg/L
Lowest Observed Effect Concentration
LOEC= 400 mg/L
Chronic Value
ChV= 283 mg/L
IC25= 342 mg/L

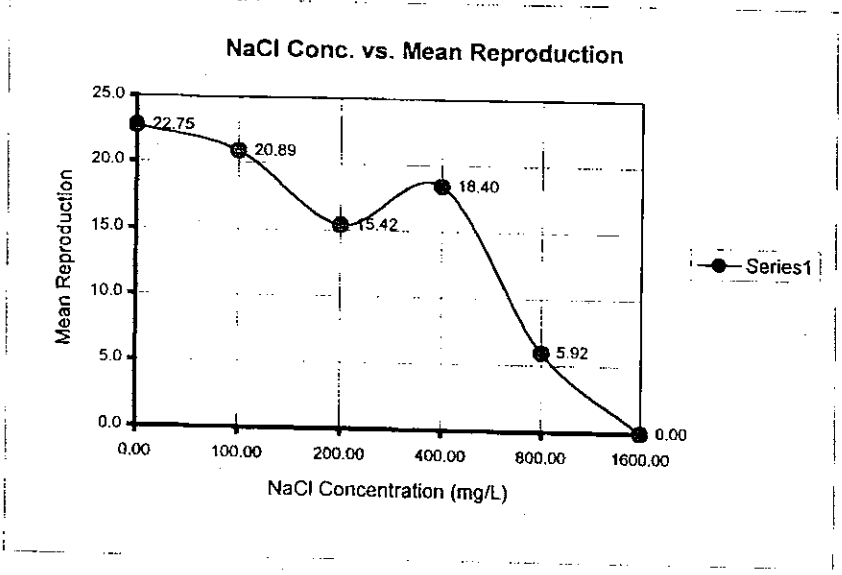
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	Reference Toxicant - Ceriodaphnia dubia	Start Date:	5/18/2000
Sample ID:	NaCl - Soft Synthetic w/ Cl	Lab ID:	none

Normality Test
Kolmogorov's Test: D*= 1.068 critical= 1.035
Data are not normal in distribution.

Heterogeneity of Variance Test
Bartlett's Test B= -11.49 critical= 11.35
Data are homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 mg/L	0.0%	22.75	4.14			
100 mg/L	0.0%	20.89	8.49	100	92	Pass
200 mg/L	16.7%	15.42	10.73	122	111	Pass
400 mg/L	0.0%	18.40	7.62	95	92	Pass
800 mg/L	53.8%	5.92	7.97	89.5	132	Fail
1600 mg/L	100.0%	0.00	0.00			Fail
			CV 18.2%			



Test Summary

Survival
No Observed Effect Concentration
NOEC= 400 mg/L
Lowest Observed Effect Concentration
LOEC= 800 mg/L
7 Day LC50
LC50= 690 mg/L

Reproduction
No Observed Effect Concentration
NOEC= 400 mg/L
Lowest Observed Effect Concentration
LOEC= 800 mg/L
Chronic Value
ChV= 565 mg/L
IC25= 458 mg/L

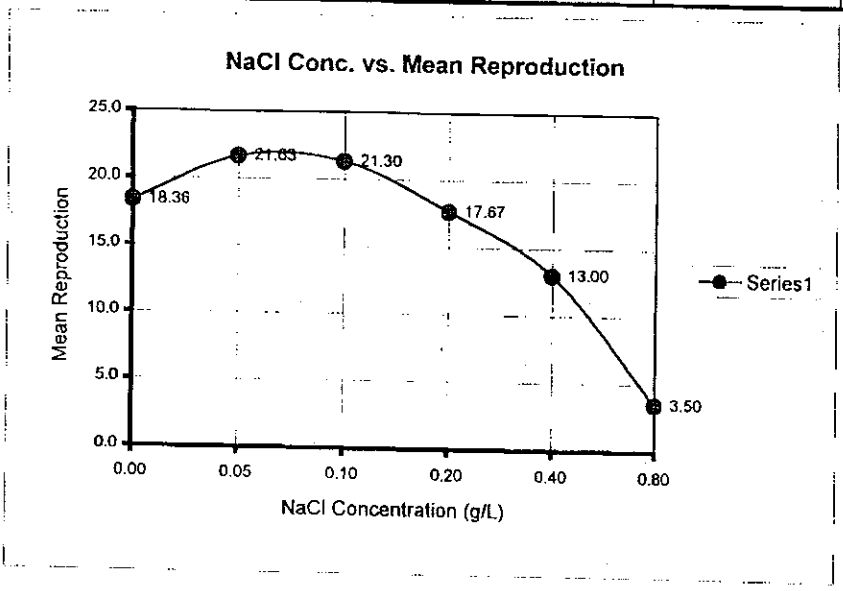
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	Reference Toxicant - Daphnia ambigua	Start Date:	4/26/2000
Sample ID:	NaCl - Soft Synthetic w/ Cl	Lab ID:	0

Normality Test
Kolmogorov's Test: D*= 1.004 critical= 1.035
Data are normal in distribution.

Heterogeneity of Variance Test
Bartlett's Test B= 65.72 critical= 11.35
Data are not homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 mg/L	7.1%	18.36	8.03			
50 mg/L	5.3%	21.63	6.55			Pass
100 mg/L	0.0%	21.30	4.44			Pass
200 mg/L	5.6%	17.67	9.54			Pass
400 mg/L	22.2%	13.00	8.30	220.50	188	Pass
800 mg/L	70.0%	3.50	5.61			Fail
			CV 43.7%			



Test Summary

Survival
No Observed Effect Concentration
NOEC= 400 mg/L
Lowest Observed Effect Concentration
LOEC= 800 mg/L
7 Day LC50
LC50= 565 mg/L

Reproduction
No Observed Effect Concentration
NOEC= 400 mg/L
Lowest Observed Effect Concentration
LOEC= 800 mg/L
Chronic Value
ChV= 565 mg/L
IC25= 352 mg/L

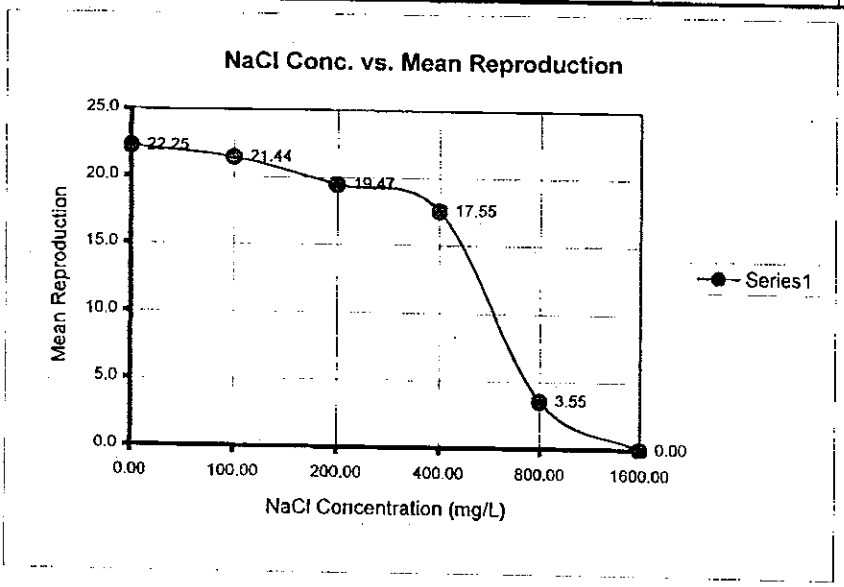
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	Reference Toxicant - Daphnia ambigua	Start Date:	5/4/2000
Sample ID:	NaCl - Soft Synthetic w/ Cl	Lab ID:	none

Normality Test
Kolmogorov's Test: D*= 1.019 critical= 1.035
Data are normal in distribution.

Heterogeneity of Variance Test
Bartlett's Test B= 4.44 critical= 11.35
Data are homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	t Test calc. T	t Test Critical Value	Pass/Fail
0 mg/L	5.0%	22.25	4.48			
100 mg/L	11.1%	21.44	8.58	0.33	2.56	Pass
200 mg/L	15.8%	19.47	9.86	1.14	2.56	Pass
400 mg/L	5.0%	17.55	4.96	1.95	2.56	Pass
800 mg/L	50.0%	3.55	4.49	7.77	2.56	Fail
1600 mg/L	100.0%	0.00	0.00			
			CV 20.1%			



Test Summary

Survival
No Observed Effect Concentration
NOEC= 400 mg/L
Lowest Observed Effect Concentration
LOEC= 800 mg/L
7 Day LC50
LC50= 598 mg/L

Reproduction
No Observed Effect Concentration
NOEC= 400 mg/L
Lowest Observed Effect Concentration
LOEC= 800 mg/L
Chronic Value
ChV= 565 mg/L
IC25= 414 mg/L

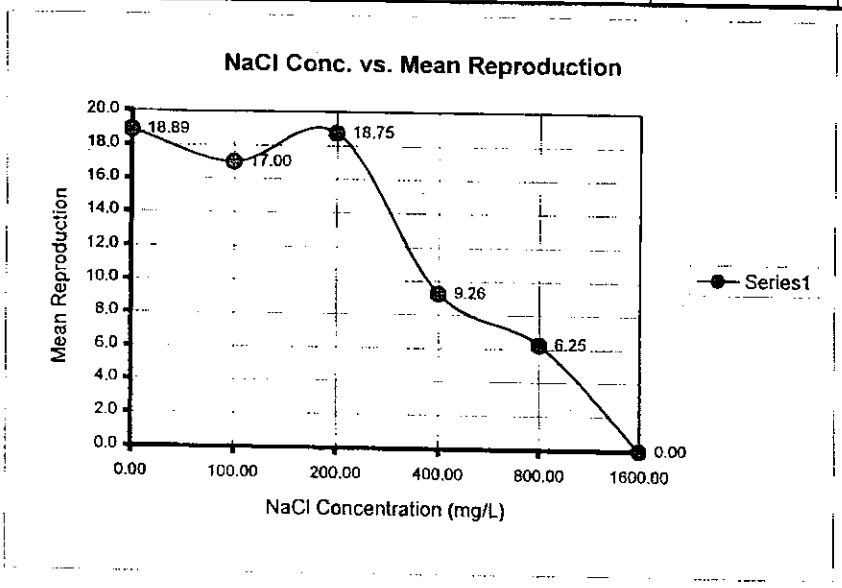
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	Reference Toxicant - Daphnia ambigua	Start Date:	5/12/2000
Sample ID:	NaCl - Soft Synthetic w/ Cl	Lab ID:	none

Normality Test
Kolmogorov's Test: D*= 1.327 critical= 1.035
Data are not normal in distribution.

Heterogeneity of Variance Test
Bartlett's Test B= 17.34 critical= 9.21
Data are not homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 mg/L	11.1%	18.89	7.42			
100 mg/L	15.0%	17.00	9.21			Pass
200 mg/L	10.0%	18.75	8.43	381.00	282	Pass
400 mg/L	26.3%	9.26	6.15	223.50	282	Fail
800 mg/L	45.0%	6.25	6.89			Fail
1600 mg/L	100.0%	0.00	0.00			
			CV 39.3%			



Test Summary

Survival
No Observed Effect Concentration
NOEC= 400 mg/L
Lowest Observed Effect Concentration
LOEC= 800 mg/L
7 Day LC50
LC50= 780 mg/L

Reproduction
No Observed Effect Concentration
NOEC= 200 mg/L
Lowest Observed Effect Concentration
LOEC= 400 mg/L
Chronic Value
ChV= 283 mg/L
IC25= 346 mg/L

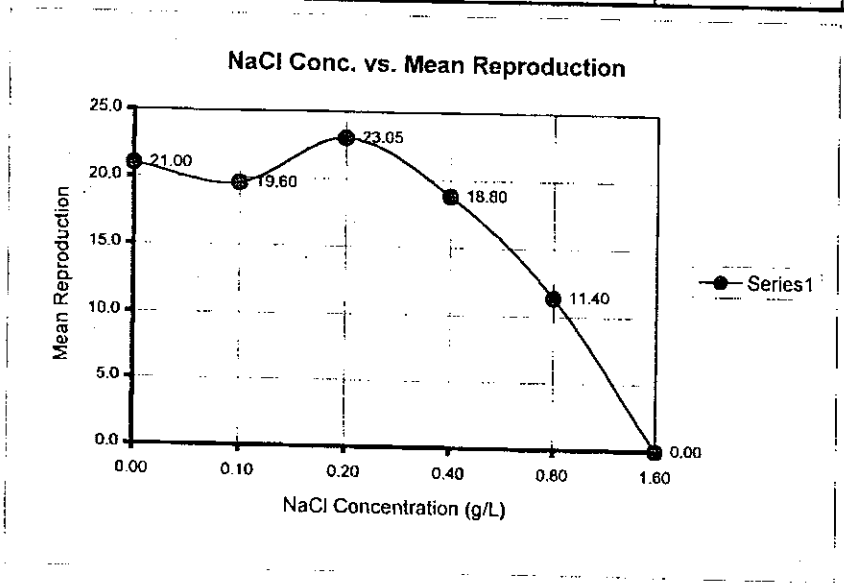
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	Reference Toxicant - Daphnia ambigua	Start Date:	5/18/2000
Sample ID:	NaCl	Lab ID:	0

Normality Test
Kolmogorov's Test: D*= 1.043 critical= 1.035
Data are not normal in distribution.

Heterogeneity of Variance Test
Bartlett's Test B= 10.47 critical= 13.28
Data are homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	t Test t value	t Test Critical Value	Pass/Fail
0 g/L	0.0%	21.00	5.79			
0.1 g/L	15.0%	19.60	7.94	0.70	2.27	Pass
0.2 g/L	0.0%	23.05	3.69	-1.03	2.27	Pass
0.4 g/L	5.0%	18.80	6.62	1.10	2.27	Pass
0.8 g/L	10.0%	11.40	6.68	4.82	2.27	Fail
1.6 g/L	100.0%	0.00	0.00			Fail
			CV 27.6%			



Test Summary

Survival
No Observed Effect Concentration
NOEC= 800 mg/L
Lowest Observed Effect Concentration
LOEC= 1600 mg/L
7 Day LC50
LC50= 1070 mg/L

Reproduction
No Observed Effect Concentration
NOEC= 400 mg/L
Lowest Observed Effect Concentration
LOEC= 800 mg/L
Chronic Value
ChV= 565 mg/L
IC25= 588 mg/L

APPENDIX B

ETT Environmental, Inc.
(864) 877-6942 • FAX (864) 877-6938
P.O. Box 16414, Greenville, SC 29606
4 Craftsman Court, Greer, SC 29650

7 Day Chronic Definitive Survival and Reproduction Bioassay

Method: EPA/600/4-91/002

Test Organism: *Ceriodaphnia dubia*

Facility: WSRC/A-01
Sample ID: A-01 w/ Ceriodaphnia dubia

ETT#: T14557

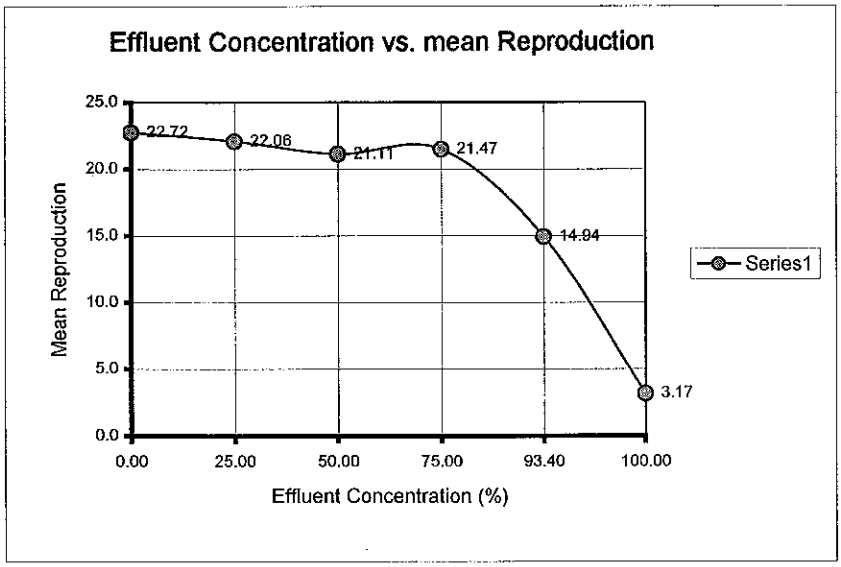
Date: May 23, 2000

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	WSRC	Start Date:	5/23/00
Sample ID:	A-01 - Ceriodaphnia dubia	Lab ID:	T14557

Normality Test	Heterogeneity of Variance Test
Kolmogorov's Test: D*= 1.040 critical= 1.035	Bartlett's Test B= -1.96 critical= 13.28
Data are not normal in distribution.	Data are homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	t Test Rank Sum	t Test Critical Value	Pass/Fail
0 %	5.6%	22.72	4.86			
25 %	0.0%	22.06	4.60	0.34	2.30	Pass
50 %	5.6%	21.11	5.78	0.83	2.30	Pass
75 %	0.0%	21.47	4.68	0.63	2.30	Pass
93.4 %	5.6%	14.94	7.04	4.00	2.30	Fail
100 %	55.6%	3.17	4.37			Fail
			CV 21.4%			



Test Summary

Survival

No Observed Effect Concentration
NOEC= 93.4 %
Lowest Observed Effect Concentration
LOEC= 100 %
7 Day LC50
LC50= 99.4 % (95% C.L. 96.6-102.3)

Reproduction

No Observed Effect Concentration
NOEC= 75 %
Lowest Observed Effect Concentration
LOEC= 93.4 %
Chronic Value
ChV= 83.7 %

CHRONIC DEFINITIVE

Facility: WSRC
Outfall: A-01 - Ceriodaphnia dubia

Start Date: 5/23/00
Lab ID: T14557

Replicate	Control	dead	lost	25	dead	lost	50	dead	lost	75	dead	lost	93.4	dead	lost	100	dead	lost
1	26	0	0	22	0	0	26	0	0	26	0	0	21	0	0	0	1	0
2	25	0	0	27	0	0	23	0	0	24	0	0	10	0	0	0	1	0
3	26	0	0	13	0	0	12	0	0	24	0	0	9	0	0	0	1	0
4	26	0	0	11	0	0	23	0	0	20	0	0	22	0	0	0	0	0
5	16	0	0	20	0	0	13	0	0	12	0	0	13	0	0	0	1	0
6	19	0	0	24	0	0	22	0	0	27	0	0	21	0	0	0	1	0
7	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1	na	1	1
8	28	0	0	28	0	0	25	0	0	22	0	0	18	0	0	0	1	0
9	25	0	0	20	0	0	18	0	0	24	0	0	6	0	0	9	0	0
10	23	0	0	24	0	0	12	0	0	24	0	0	10	0	0	12	0	0
11	27	0	0	23	0	0	27	0	0	29	0	0	17	0	0	4	0	0
12	28	0	0	20	0	0	23	0	0	19	0	0	0	1	0	0	1	0
13	24	0	0	22	0	0	23	0	0	11	0	0	21	0	0	0	1	0
14	20	0	0	23	0	0	25	0	0	21	0	0	19	0	0	3	0	0
15	27	0	0	na	0	1	23	0	0	20	0	0	24	0	0	0	1	0
16	19	0	0	23	0	0	30	0	0	na	0	1	10	0	0	2	0	0
17	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1
18	10	1	0	28	0	0	25	0	0	19	0	0	22	0	0	11	0	0
19	18	0	0	21	0	0	10	1	0	21	0	0	6	0	0	9	0	0
20	22	0	0	26	0	0	20	0	0	22	0	0	20	0	0	7	0	0

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC/A-01 w/ Daphnia ambigua in Very Soft Synthetic Water**
Sample Identification: **T14557**
Test Date: **May 23, 2000**

pH (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Initial	7.21	7.32	7.38	7.42	7.47	7.50
Day 1		8.20	7.33	7.34	7.36	7.36
Day 2	6.78	6.88	7.08	6.92	7.76	7.31
Day 3	7.67	7.31	7.21	7.25	7.67	7.68
Day 4	7.17	7.68	7.82	7.92	7.99	7.83
Day 5	7.18	7.20	7.18	7.17	7.28	7.33
Day 6	7.80	7.71	7.55	7.92	7.70	7.79

pH (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Day 1		8.11	7.96	7.90	7.81	7.76
Day 2	7.54	7.00	6.93	7.12	7.58	7.49
Day 3	7.17	7.42	7.28	7.25	7.31	7.68
Day 4		7.58	7.84	7.42	7.52	8.04
Day 5	7.21	7.21	7.16	7.23	7.14	7.21
Day 6	7.14	7.14	7.15	7.13	7.20	7.20
Final	7.08	7.26	7.03	7.23	7.31	7.12

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Initial	8.6	8.6	8.6	8.7	8.7	8.7
Day 1		8.5	8.5	8.5	8.5	8.6
Day 2	8.2	8.4	8.6	8.8	8.7	8.6
Day 3	8.2	8.3	8.4	8.4	8.4	8.5
Day 4		8.4	8.4	8.5	8.5	8.5
Day 5	7.7	7.7	7.7	7.7	7.7	7.7
Day 6	8.6	8.3	8.4	8.4	8.5	8.5

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Day 1		8.5	8.5	8.5	8.5	8.5
Day 2	8.1	7.8	7.8	7.7	7.8	8.0
Day 3	8.0	7.9	7.9	7.8	8.2	7.8
Day 4		8.3	8.3	8.4	8.4	8.5
Day 5	7.8	7.7	7.8	7.7	7.7	7.6
Day 6	8.5	8.5	8.5	8.5	8.5	8.5
Final	8.2	8.2	8.0	8.2	8.3	8.2

Date	Alkalinity	Hardness	Conductivity	Res. Cl.
5-22-00	17	8.0	52	<0.05
5-24-00	14	4.0	87	<0.05
5-26-00	17	4.0	74	<0.05

Temperature

Incubator °C	
Initial	24.4
Day 1	24.8
Day 2	24.8
Day 3	24.5
Day 4	24.6
Day 5	24.6
Day 6	24.5
Final	24.5

Test Results Reviewed and Approved By: 

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4 Craftsman Court, Greer, SC 29650

7 Day Chronic Definitive Survival and Reproduction Bioassay

Method: EPA/600/4-91/002

Test Organism: *Ceriodaphnia dubia*

Facility: WSRC/A-01
Sample ID: A-01 w/ Ceriodaphnia dubia

ETT#: T14611

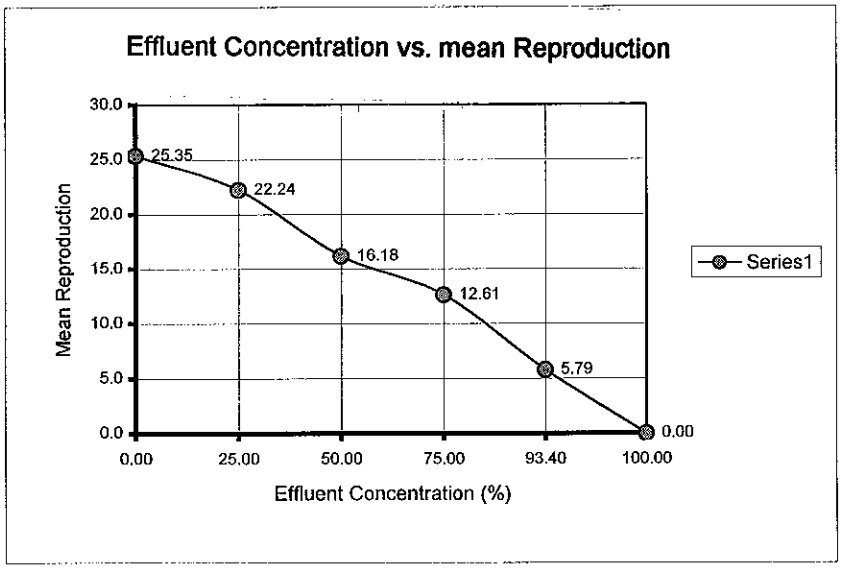
Date: June 1, 2000

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	WSRC	Start Date:	6/1/00
Sample ID:	A-01 - Ceriodaphnia dubia	Lab ID:	T14611

Normality Test	Heterogeneity of Variance Test
Kolmogorov's Test: D*= 1.447 critical= 1.035	Bartlett's Test B= 15.69 critical= 9.21
Data are not normal in distribution.	Data are not homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	t Test Rank Sum	t Test Critical Value	Pass/Fail
0 %	5.9%	25.35	3.04			
25 %	0.0%	22.24	4.44	231.50	217.00	Pass
50 %	17.6%	16.18	8.27	180.00	217.00	Fail
75 %	27.8%	12.61	7.98	181.50	217.00	Fail
93.4 %	57.9%	5.79	7.57		2.30	Fail
100 %	100.0%	0.00	0.00			Fail
			CV 12.0%			



Test Summary

Survival

No Observed Effect Concentration
NOEC= 75 %
Lowest Observed Effect Concentration
LOEC= 93.4 %
7 Day LC50
LC50= 76.7 % (95% C.L. 68.7-85.6)

Reproduction

No Observed Effect Concentration
NOEC= 25 %
Lowest Observed Effect Concentration
LOEC= 50 %
Chronic Value
ChV= 35.4 %
IC25= 51.6 %

CHRONIC DEFINITIVE

Facility: WSRC
Outfall: A-01 - Ceriodaphnia dubia

Start Date: 6/1/00
Lab ID: T14611

Replicate	Control	dead	lost	25	dead	lost	50	dead	lost	75	dead	lost	93.4	dead	lost	100	dead	lost
1	29	0	0	25	0	0	17	0	0	na	0	1	13	0	0	0	1	0
2	19	0	0	25	0	0	15	0	0	0	1	0	6	0	0	0	1	0
3	23	0	0	22	0	0	22	0	0	24	0	0	4	0	0	0	1	0
4	na	0	1	23	0	0	14	0	0	9	0	0	0	1	0	0	1	0
5	na	0	1	21	0	0	22	0	0	18	0	0	0	1	0	0	1	0
6	28	0	0	28	0	0	22	0	0	22	0	0	14	0	0	0	1	0
7	26	0	0	24	0	0	0	1	0	0	1	0	0	1	0	0	1	0
8	27	0	0	24	0	0	5	0	0	7	0	0	0	1	0	0	1	0
9	23	0	0	na	0	1	22	0	0	12	0	0	0	1	0	0	1	0
10	25	0	0	na	0	1	0	1	0	18	0	0	14	0	0	0	1	0
11	29	0	0	23	0	0	18	0	0	21	0	0	na	0	1	0	1	0
12	24	0	0	24	0	0	18	0	0	0	1	0	0	1	0	0	1	0
13	27	0	0	24	0	0	na	0	1	19	0	0	0	1	0	0	1	0
14	25	0	0	26	0	0	7	0	0	9	0	0	0	1	0	0	1	0
15	31	0	0	24	0	0	26	0	0	6	0	0	3	1	0	0	1	0
16	26	0	0	19	0	0	23	0	0	21	0	0	19	0	0	0	1	0
17	22	0	0	8	0	0	na	0	1	na	0	1	0	1	0	0	1	0
18	22	1	0	19	0	0	21	0	0	19	0	0	0	1	0	0	1	0
19	25	0	0	19	0	0	23	1	0	11	1	0	18	0	0	0	1	0
20	na	0	1	na	0	1	na	0	1	11	1	0	19	0	0	0	1	0

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC/A-01 w/ Daphnia ambigua in Very Soft Synthetic Water**
Sample Identification: **T14611**
Test Date: **June 1, 2000**

pH (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Initial	6.79	7.33	7.14	7.22	7.17	7.38
Day 1	6.68	7.31	7.10	7.00	7.13	7.29
Day 2	7.00	7.11	7.17	7.23	7.27	7.31
Day 3	7.04	7.05	7.20	7.24	7.37	7.91
Day 4		7.16	7.56	7.24	7.26	7.34
Day 5	6.82	6.98	7.81	7.02	7.25	6.89
Day 6		6.62	7.49	7.52	6.26	7.33

pH (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Day 1	7.06	7.25	7.18	7.10	7.35	7.17
Day 2	7.11	7.23	7.26	7.31	7.32	7.29
Day 3	7.53	6.98	7.07	7.10	7.35	7.55
Day 4		7.43	7.20	7.22	7.74	7.80
Day 5	6.77	6.77	6.80	6.79	6.85	6.81
Day 6		7.38	6.53	7.49	7.02	6.31
Final	7.08	7.27	7.34	7.20	7.11	7.38

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Initial	8.4	9.0	9.4	9.8	10.0	9.8
Day 1	8.2	8.2	8.2	8.3	8.3	8.4
Day 2	8.3	8.3	8.3	8.3	8.4	8.5
Day 3	8.7	8.6	8.6	8.6	8.6	8.6
Day 4		8.3	8.3	8.4	8.5	8.7
Day 5	8.2	8.2	8.3	8.5	8.5	8.6
Day 6		8.2	8.2	8.3	8.3	8.3

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Day 1	8.1	8.2	8.2	8.3	8.3	8.3
Day 2	8.2	8.2	8.3	8.3	8.3	8.4
Day 3	8.3	8.3	8.3	8.3	8.3	8.3
Day 4		8.2	8.2	8.3	8.2	8.2
Day 5	8.1	8.1	8.1	8.1	8.0	8.1
Day 6		8.2	8.2	8.2	8.1	8.1
Final	8.4	8.2	8.2	8.2	8.3	8.4

Date	Alkalinity	Hardness	Conductivity	Res. Cl.
5-31-00	19	18.0	99	
6-2-00	14	6.0	81	0.07
6-5-00	20	6.0	54	<0.05

Temperature

Incubator °C	
Initial	24.5
Day 1	24.9
Day 2	24.4
Day 3	24.8
Day 4	24.9
Day 5	24.7
Day 6	24.3
Final	24.4

Test Results Reviewed and Approved By: 

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7 Day Chronic Definitive Survival and Reproduction Bioassay

Method: EPA/600/4-91/002

Test Organism: *Ceriodaphnia dubia*

Facility: WSRC/A-01
Sample ID: A-01 w/ Ceriodaphnia dubia

ETT#: T14656

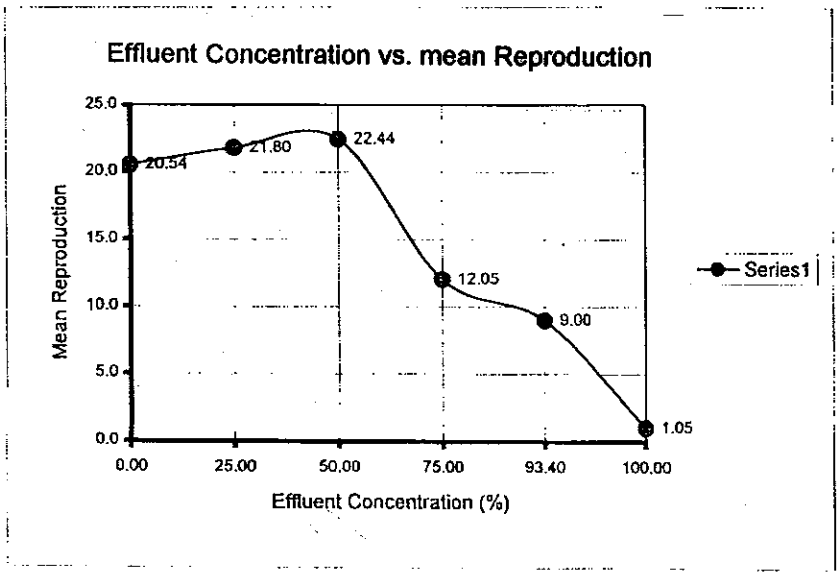
Date: June 6, 2000

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	WSRC	Start Date:	5/23/00
Sample ID:	A-01 - Ceriodaphnia dubia	Lab ID:	T14557

Normality Test	Heterogeneity of Variance Test
Kolmogorov's Test: D*= 1.551 critical= 1.035	Bartlett's Test B= 19.33 critical= 9.21
Data are not normal in distribution.	Data are not homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 %	7.7%	20.54	5.61			
25 %	0.0%	21.80	2.83			Pass
50 %	6.3%	22.44	4.19	261.50	178.00	Pass
75 %	31.6%	12.05	8.41	244.00	178.00	Pass
93.4 %	53.3%	9.00	9.53	156.00	178.00	Fail
100 %	95.0%	1.05	2.93			Fail
			CV 27.3%			



Test Summary

Survival

No Observed Effect Concentration
NOEC= 50 %
Lowest Observed Effect Concentration
LOEC= 75 %
7 Day LC50
LC50= 82.4 % (95% C.L. 75.8-89.6)

Reproduction

No Observed Effect Concentration
NOEC= 75 %
Lowest Observed Effect Concentration
LOEC= 93.4 %
Chronic Value
ChV= 83.7 %
IC25= 78.2 %

CHRONIC DEFINITIVE

Facility: WSRC
Outfall: A-01 - Ceriodaphnia dubia

Start Date: 6/6/00
Lab ID: T14656

Replicate	Control	dead	lost	25	dead	lost	50	dead	lost	75	dead	lost	93.4	dead	lost	100	dead	lost
1	21	0	0	21	0	0	19	0	0	0	1	0	19	0	0	12	0	0
2	na	0	1	17	0	0	na	0	1	0	1	0	na	0	1	0	1	0
3	27	0	0	na	0	1	29	0	0	10	1	0	na	0	1	0	1	0
4	23	0	0	26	0	0	14	0	0	19	0	0	0	1	0	0	1	0
5	na	0	1	na	0	1	23	0	0	23	0	0	0	1	0	5	1	0
6	11	0	0	18	0	0	na	0	1	18	0	0	9	0	0	0	1	0
7	19	0	0	22	0	0	24	0	0	17	0	0	21	0	0	0	1	0
8	na	0	1	22	0	0	21	0	0	17	0	0	20	0	0	0	1	0
9	na	0	1	na	0	1	na	0	1	21	0	0	na	0	1	0	1	0
10	25	0	0	22	0	0	22	0	0	18	0	0	4	1	0	0	1	0
11	na	0	1	na	0	1	25	0	0	5	0	0	17	0	0	0	1	0
12	na	0	1	23	0	0	27	0	0	17	0	0	na	0	1	0	1	0
13	27	0	0	27	0	0	26	0	0	na	0	1	0	1	0	0	1	0
14	14	0	0	22	0	0	23	0	0	14	0	0	0	1	0	0	1	0
15	18	0	0	23	0	0	20	0	0	16	0	0	na	0	1	0	1	0
16	16	0	0	17	0	0	na	0	1	0	1	0	23	0	0	4	1	0
17	15	0	0	23	0	0	29	0	0	0	1	0	3	1	0	0	1	0
18	22	1	0	21	0	0	17	0	0	21	0	0	0	1	0	0	1	0
19	na	0	1	na	0	1	19	1	0	0	1	0	0	1	0	0	1	0
20	29	0	0	23	0	0	21	0	0	13	0	0	19	0	0	0	1	0

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC/A-01 w/ Daphnia ambigua in Very Soft Synthetic Water**
Sample Identification: **T14656**
Test Date: **June 6, 2000**

pH (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Initial	6.82	6.98	7.01	7.02	7.05	6.89
Day 1		6.62	7.49	7.52	6.26	7.33
Day 2	7.20	7.23	7.15	7.38	7.22	7.43
Day 3	7.79	8.08	8.02	7.98		7.54
Day 4		7.11	7.00	7.22	7.25	
Day 5	6.90	7.40	7.39	7.39	7.42	
Day 6	7.08	7.53	7.93	7.28	7.80	

pH (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Day 1		7.38	6.53	7.49	7.02	6.31
Day 2	7.08	7.27	7.34	7.20	7.11	7.38
Day 3	8.15	8.08	8.02	7.88	7.89	
Day 4		7.04	7.04	7.02	7.10	
Day 5	6.17	6.44	6.40	6.41	6.49	
Day 6	7.21	7.53	7.38	7.03	6.87	
Final	7.32	7.19	7.37	7.29	7.25	

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Initial	8.2	8.2	8.3	8.5	8.5	8.6
Day 1		8.2	8.2	8.3	8.3	8.3
Day 2	8.4	8.4	8.4	8.4	8.4	8.4
Day 3	8.5	8.8	8.7	8.7	8.7	8.6
Day 4		8.2	8.4	8.4	8.6	
Day 5	8.2	8.3	8.3	8.4	8.4	
Day 6	8.2	8.6	8.3	8.4	8.3	

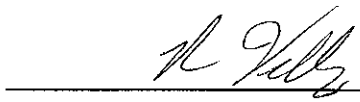
Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Day 1		8.2	8.2	8.2	8.1	8.1
Day 2	8.4	8.2	8.2	8.2	8.3	8.4
Day 3	8.4	8.4	8.4	8.4		8.4
Day 4		8.0	8.1	8.1	8.0	
Day 5	7.9	8.0	8.0	8.0	8.0	
Day 6	7.8	7.6	7.4	7.7	7.9	
Final	7.9	7.8	7.6	7.8	7.6	

Date	Alkalinity	Hardness	Conductivity	Res. Cl.
6-5-00	20	6.0	54	<0.05
6-7-00	22	8.0	140	<0.05
6-9-00	19	6.0	105	<0.05

Temperature

Incubator °C	
Initial	24.7
Day 1	24.3
Day 2	24.4
Day 3	24.5
Day 4	24.5
Day 5	24.4
Day 6	24.7
Final	24.7

Test Results Reviewed and Approved By: 

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7 Day Chronic Definitive Survival and Reproduction Bioassay

Method: EPA/600/4-91/002

Test Organism: *Ceriodaphnia dubia*

Facility: WSRC/A-01
Sample ID: A-01 w/ Ceriodaphnia dubia

ETT#: T14721

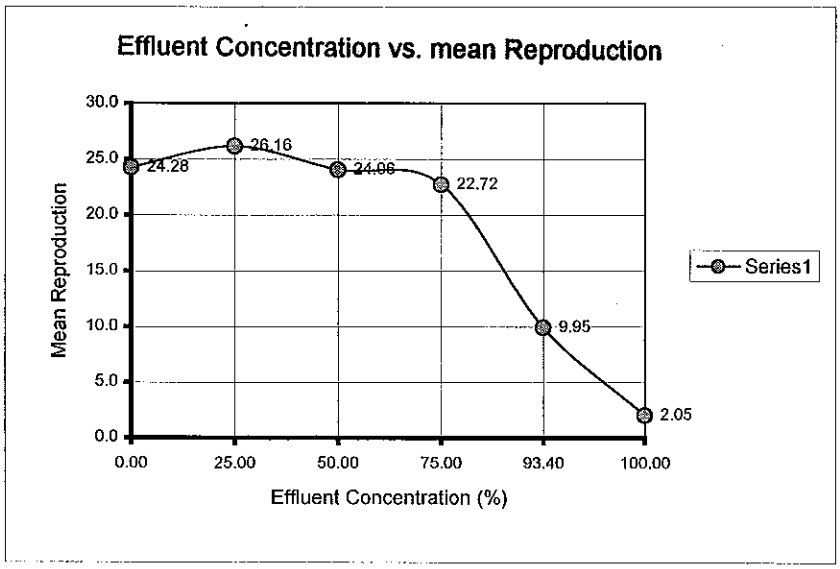
Date: June 13, 2000

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	WSRC	Start Date:	6/13/00
Sample ID:	A-01 - Ceriodaphnia dubia	Lab ID:	T14721

Normality Test	Heterogeneity of Variance Test
Kolmogorov's Test: D*= 1.071 critical= 1.035	Bartlett's Test B= 14.39 critical= 11.35
Data are not normal in distribution.	Data are not homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Rank Sum Test Rank Sum	Wilcoxon's Rank Sum Test Critical Value	Pass/Fail
0 %	0.0%	24.28	5.45			
25 %	0.0%	26.16	2.46			Pass
50 %	0.0%	24.06	3.19	262.50	262.00	Pass
75 %	0.0%	22.72	2.67	256.50	262.00	Fail
93.4 %	47.4%	9.95	9.63	212.00	262.00	Fail
100 %	85.0%	2.05	4.29	214.00	262	Fail
			CV 22.5%			



Test Summary

Survival

No Observed Effect Concentration
NOEC= 75 %
Lowest Observed Effect Concentration
LOEC= 93.4 %
7 Day LC50
LC50= 91.9 % (95% C.L. 87.3-96.7)

Reproduction

No Observed Effect Concentration
NOEC= 50 %
Lowest Observed Effect Concentration
LOEC= 75 %
Chronic Value
ChV= 61.2 %
IC25= 86.2 %

CHRONIC DEFINITIVE

Facility: WSRC
Outfall: A-01 - Ceriodaphnia dubia

Start Date: 6/13/00
Lab ID: T14721

Replicate	Control	dead	lost	25	dead	lost	50	dead	lost	75	dead	lost	93.4	dead	lost	100	dead	lost
1	29	0	0	25	0	0	23	0	0	23	0	0	24	0	0	0	1	0
2	23	0	0	25	0	0	na	0	1	19	0	0	0	1	0	0	1	0
3	26	0	0	29	0	0	22	0	0	22	0	0	0	1	0	0	1	0
4	27	0	0	29	0	0	17	0	0	26	0	0	17	0	0	16	0	0
5	28	0	0	28	0	0	26	0	0	24	0	0	18	0	0	0	1	0
6	28	0	0	25	0	0	25	0	0	24	0	0	22	0	0	4	1	0
7	27	0	0	28	0	0	24	0	0	27	0	0	0	1	0	0	1	0
8	23	0	0	24	0	0	27	0	0	na	0	1	0	1	0	0	1	0
9	26	0	0	28	0	0	22	0	0	22	0	0	16	0	0	9	0	0
10	23	0	0	20	0	0	na	0	1	19	0	0	24	0	0	0	1	0
11	26	0	0	26	0	0	26	0	0	na	0	1	0	1	0	0	1	0
12	na	0	1	na	0	1	na	0	1	22	0	0	0	1	0	0	1	0
13	24	0	0	23	0	0	31	0	0	24	0	0	0	1	0	0	1	0
14	26	0	0	29	0	0	26	0	0	26	0	0	4	1	0	4	1	0
15	26	0	0	23	0	0	28	0	0	22	0	0	0	1	0	0	1	0
16	26	0	0	26	0	0	24	0	0	18	0	0	14	0	0	0	1	0
17	4	0	0	27	0	0	21	0	0	23	0	0	17	0	0	0	1	0
18	23	0	0	28	0	0	22	0	0	26	0	0	17	0	0	0	1	0
19	22	0	0	26	0	0	22	0	0	19	0	0	16	0	0	8	0	0
20	na	0	1	28	0	0	23	0	0	23	0	0	na	0	1	0	1	0

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC/A-01 w/ Daphnia ambigua in Very Soft Synthetic Water**
Sample Identification: **T14721**
Test Date: **June 13, 2000**

pH (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Initial		7.28	7.96	7.93	7.97	7.87
Day 1	7.52	7.47	7.46	7.46	7.44	7.43
Day 2	7.17	7.11	7.09	7.18	7.07	7.20
Day 3	7.04	6.59	6.61	7.29	6.66	7.43
Day 4		7.32	7.26	7.29	7.17	7.13
Day 5	7.07	7.13				
Day 6	7.29	7.86				

pH (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Day 1	7.58	7.51	7.49	7.45	7.46	7.38
Day 2	7.30	7.01	7.28	7.21	7.01	7.25
Day 3	7.13	6.52	6.28	6.61	7.32	7.40
Day 4		7.66	7.43	7.16	7.26	7.39
Day 5	7.17	7.13	7.16	7.15	7.13	
Day 6	7.48	7.23				
Final		7.47				

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Initial		8.4	9.0	8.7	9.1	8.8
Day 1	8.2	8.2	8.2	8.2	8.4	8.4
Day 2	8.1	8.2	8.3	8.4	8.4	8.6
Day 3	7.9	8.2	8.0	7.8	7.8	8.0
Day 4		8.4	8.4	8.4	8.2	8.5
Day 5	8.5	8.5				
Day 6	8.5	8.6				

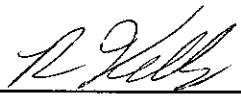
Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Day 1	8.1	8.0	8.1	8.2	8.2	8.2
Day 2	7.9	8.0	8.0	7.8	7.9	7.8
Day 3	8.0	7.8	7.8	8.0	7.9	8.0
Day 4		8.1	8.2	8.3	8.2	8.3
Day 5	8.1	8.1	8.2	8.2	8.2	
Day 6	8.2	8.2				
Final		7.7				

Date	Alkalinity	Hardness	Conductivity	Res. Cl.
6-12-00	20	10.0	66	<0.05
6-14-00	19	2.0	85	0.05
6-16-00	24	10.0	107	<0.05

Temperature

Incubator °C	
Initial	24.7
Day 1	24.8
Day 2	24.7
Day 3	24.3
Day 4	24.4
Day 5	24.7
Day 6	24.8
Final	24.2

Test Results Reviewed and Approved By: 

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7 Day Chronic Definitive Survival and Reproduction Bioassay

Method: EPA/600/4-91/002

Test Organism: *Daphnia ambigua*

Facility: WSRC/A-01
Sample ID: A-01 w/ Daphnia ambigua

ETT#: T14557

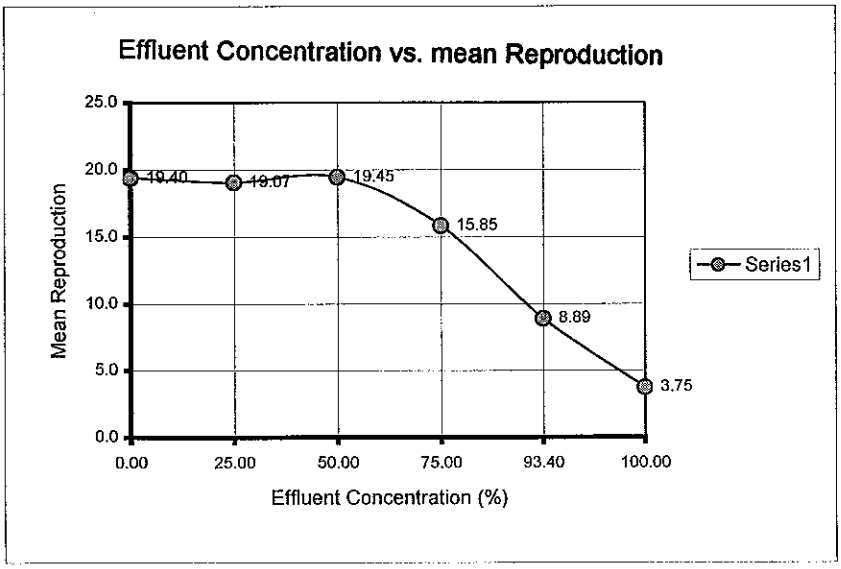
Date: May 23, 2000

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	WSRC	Start Date:	5/23/00
Sample ID:	A-01 - Daphnia ambigua	Lab ID:	T14557

Normality Test	Heterogeneity of Variance Test
Kolmogorov's Test: D*= 1.024 critical= 1.035	Bartlett's Test B= -19.29 critical= 11.35
Data are normal in distribution.	Data are homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	t Test calc. T	t Test Critical Value	Pass/Fail
0 %	10.0%	19.40	8.10			
25 %	13.3%	19.07	8.66	0.10	2.36	Pass
50 %	10.0%	19.45	7.08	-0.02	2.30	Pass
75 %	20.0%	15.85	9.20	1.11	2.30	Pass
93.4 %	52.6%	8.89	8.86	3.25	2.30	Fail
100 %	85.0%	3.75	7.03			Fail
			CV 41.8%			



Test Summary

Survival

No Observed Effect Concentration
NOEC= 75 %
Lowest Observed Effect Concentration
LOEC= 93.4 %
7 Day LC50
LC50= 91.7 % (95% C.L. 87.1-96.6)

Reproduction

No Observed Effect Concentration
NOEC= 75 %
Lowest Observed Effect Concentration
LOEC= 93.4 %
Chronic Value
ChV= 83.7 %

CHRONIC DEFINITIVE

Facility: WSRC
Outfall: A-01 - Daphnia ambigua

Start Date: 5/23/00
Lab ID: T14557

Replicate	Control	dead	lost	25	dead	lost	50	dead	lost	75	dead	lost	93.4	dead	lost	100	dead	lost
1	26	0	0	25	0	0	28	0	0	11	0	0	0	1	0	0	1	0
2	24	0	0	21	0	0	0	1	0	0	1	0	0	1	0	10	1	0
3	19	0	0	16	0	0	24	0	0	0	1	0	17	0	0	18	0	0
4	22	0	0	0	1	0	23	0	0	21	0	0	15	0	0	0	1	0
5	0	1	0	23	0	0	22	0	0	17	0	0	15	0	0	0	1	0
6	15	0	0	25	0	0	20	0	0	13	0	0	0	1	0	0	1	0
7	18	0	0	9	0	0	18	0	0	13	0	0	0	1	0	0	1	0
8	27	0	0	19	0	0	17	0	0	0	1	0	13	1	0	0	1	0
9	22	0	0	20	0	0	22	0	0	20	0	0	0	1	0	10	1	0
10	22	0	0	24	0	0	23	0	0	17	0	0	0	1	0	0	1	0
11	25	0	0	24	0	0	20	0	0	18	0	0	18	0	0	21	0	0
12	27	0	0	27	0	0	21	0	0	23	0	0	0	1	0	0	1	0
13	7	0	0	25	0	0	20	0	0	22	0	0	0	1	0	0	1	0
14	20	0	0	26	0	0	23	0	0	0	1	0	na	0	1	0	1	0
15	24	0	0	2	1	0	23	0	0	23	0	0	16	0	0	0	1	0
16	0	1	0	na	0	1	22	0	0	18	0	0	17	0	0	0	1	0
17	18	0	0	na	0	1	19	0	0	25	0	0	0	1	0	0	1	0
18	24	0	0	na	0	1	0	1	0	28	0	0	16	0	0	0	1	0
19	24	0	0	na	0	1	24	0	0	23	0	0	20	0	0	0	1	0
20	24	0	0	na	0	1	20	0	0	25	0	0	22	0	0	16	0	0

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC/A-01 w/ Ceriodaphnia dubia in MHSF**
Sample Identification: **T14557**
Test Date: **May 23, 2000**

pH (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Initial	7.51	7.37	7.45	7.61	7.78	7.84
Day 1	7.82	7.31	7.61	7.68	7.75	7.62
Day 2	7.49	7.46	7.79	7.51	7.80	7.37
Day 3	7.66	7.48	7.76	7.67	7.45	7.84
Day 4	7.53	7.45	7.65	7.69	7.79	7.88
Day 5	7.72	6.87	7.82	7.21	7.32	7.53
Day 6	7.70		7.63	7.59	7.50	7.65

pH (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Day 1	7.84	7.74	7.79	7.86	7.91	7.95
Day 2	7.72	7.25	7.78	7.41	7.59	7.27
Day 3	7.83	7.54	7.75	7.79	7.71	7.81
Day 4	7.06	7.72	7.71	7.81	8.01	7.49
Day 5	7.76	7.61	8.02	7.94	7.78	7.81
Day 6	8.06	7.89	7.80	6.46	7.54	7.65
Final	7.46	8.01	7.61	7.26	7.77	7.43

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Initial	8.2	8.5	8.6	8.5	8.6	8.6
Day 1	8.4	8.5	8.5	8.5	8.5	8.6
Day 2	8.3	8.3	8.3	8.2	8.2	8.1
Day 3	8.4	8.3	8.3	8.4	8.4	8.4
Day 4		8.1	8.1	8.0	8.1	8.1
Day 5	8.1	8.2	8.2	8.2	8.2	8.3
Day 6	8.4	8.5	8.6	8.9	8.9	9.1

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Day 1	8.3	8.5	8.5	8.5	8.5	8.5
Day 2	8.1	8.2	8.4	8.1	8.2	8.2
Day 3	8.3	8.1	8.2	8.2	8.2	8.2
Day 4	8.4	8.2	8.2	8.1	8.2	8.2
Day 5	8.4	8.2	8.2	8.2	8.2	8.2
Day 6	8.5	8.3	8.3	8.4	8.3	8.4
Final	8.6	8.2	8.2	8.2	8.3	8.3

Date	Alkalinity	Hardness	Conductivity	Res. Cl.
5-22-00	17	8.0	52	<0.05
5-24-00	14	4.0	87	<0.05
5-26-00	17	4.0	74	<0.05

Temperature

Incubator °C	
Initial	24.4
Day 1	24.8
Day 2	24.8
Day 3	24.5
Day 4	24.6
Day 5	24.6
Day 6	24.5
Final	24.5

Test Results Reviewed and Approved By: R Kelly

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7 Day Chronic Definitive Survival and Reproduction Bioassay

Method: EPA/600/4-91/002

Test Organism: *Daphnia ambigua*

Facility: WSRC/A-01
Sample ID: A-01 w/ Daphnia ambigua

ETT#: T14611

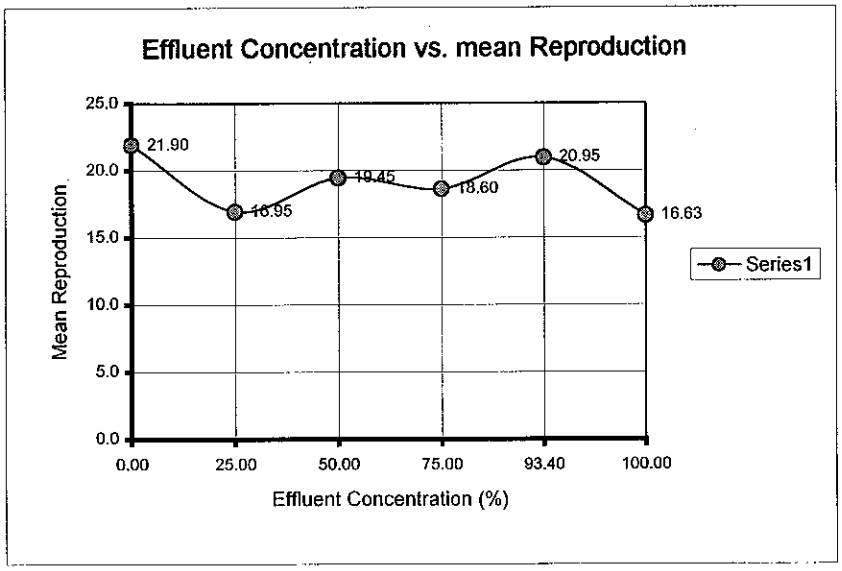
Date: June 1, 2000

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	WSRC	Start Date:	6/1/00
Sample ID:	A-01 - Daphnia ambigua	Lab ID:	T14611

Normality Test	Heterogeneity of Variance Test
Kolmogorov's Test: D*= 1.014 critical= 1.035	Bartlett's Test B= 27.18 critical= 13.28
Data are normal in distribution.	Data are not homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 %	0.0%	21.90	2.51			
25 %	10.5%	16.95	9.37			Pass
50 %	15.0%	19.45	8.01			Pass
75 %	20.0%	18.60	9.98			Pass
93.4 %	5.0%	20.95	6.24	397.00	327.00	Pass
100 %	21.1%	16.63	9.08	332.00	327	Pass
			CV 11.5%			



Test Summary

Survival

No Observed Effect Concentration
NOEC= >100 %
Lowest Observed Effect Concentration
LOEC= >100 %
7 Day LC50
LC50= >100 %

Reproduction

No Observed Effect Concentration
NOEC= >100 %
Lowest Observed Effect Concentration
LOEC= >100 %
Chronic Value
ChV= >100 %
IC25= >100 %

CHRONIC DEFINITIVE

Facility: WSRC
Outfall: A-01 - Daphnia ambigua

Start Date: 6/1/00
Lab ID: T14611

Replicate	Control	dead	lost	25	dead	lost	50	dead	lost	75	dead	lost	93.4	dead	lost	100	dead	lost
1	21	0	0	18	0	0	14	0	0	22	0	0	15	0	0	7	0	0
2	21	0	0	3	0	0	0	1	0	13	0	0	23	0	0	28	0	0
3	19	0	0	25	0	0	23	0	0	0	1	0	0	1	0	27	0	0
4	23	0	0	27	0	0	22	0	0	0	1	0	20	0	0	14	0	0
5	24	0	0	21	0	0	21	0	0	22	0	0	25	0	0	22	0	0
6	22	0	0	0	1	0	26	0	0	30	0	0	29	0	0	20	0	0
7	22	0	0	26	0	0	22	0	0	28	0	0	19	0	0	26	0	0
8	20	0	0	na	0	1	3	1	0	24	0	0	17	0	0	22	0	0
9	23	0	0	22	0	0	24	0	0	25	0	0	21	0	0	23	0	0
10	18	0	0	0	1	0	26	0	0	21	0	0	21	0	0	10	0	0
11	20	0	0	21	0	0	25	0	0	23	0	0	17	0	0	23	0	0
12	22	0	0	16	0	0	23	0	0	26	0	0	29	0	0	na	0	1
13	21	0	0	26	0	0	13	0	0	27	0	0	26	0	0	17	1	0
14	25	0	0	28	0	0	23	0	0	22	0	0	20	0	0	0	1	0
15	22	0	0	16	0	0	25	0	0	23	0	0	22	0	0	0	1	0
16	17	0	0	14	0	0	25	0	0	0	1	0	22	0	0	8	0	0
17	25	0	0	20	0	0	23	0	0	2	1	0	28	0	0	22	0	0
18	27	0	0	16	0	0	23	0	0	19	0	0	21	0	0	22	0	0
19	25	0	0	22	0	0	23	0	0	26	0	0	22	0	0	4	1	0
20	21	0	0	1	0	0	5	1	0	19	0	0	22	0	0	21	0	0

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC/A-01 w/ Ceriodaphnia dubia in MHSF**
Sample Identification: **T14611**
Test Date: **June 1, 2000**

pH (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Initial	7.80	8.01	7.52	7.53	7.70	7.67
Day 1	7.69	7.34	7.66	7.72	7.51	
Day 2	7.81	7.61	7.72	7.81	7.81	
Day 3	7.48	7.51	7.72	7.76	7.70	
Day 4	7.42	6.93	7.18	7.26	7.37	
Day 5	7.52	7.29	7.48	7.54	7.83	
Day 6	7.53	7.86	7.39	7.75	7.57	

pH (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Day 1	7.53	7.65	7.80	7.48	7.71	7.49
Day 2	7.67	7.64	7.79	7.76	7.69	
Day 3		7.31	7.91	7.75	7.70	
Day 4	7.03	7.85	7.87	7.73	7.57	
Day 5	7.56	7.09	7.48	7.75	7.56	
Day 6		7.19	7.46	7.78	7.52	
Final	7.81	7.70	7.85	7.77	7.65	

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Initial	8.2	8.4	8.5	8.6	8.6	8.6
Day 1	8.3	8.2	8.2	8.3	8.3	
Day 2	8.4	8.3	8.3	8.3	8.3	
Day 3	8.1	8.6	8.7	8.6	8.6	
Day 4	8.0	8.1	8.1	8.2	8.3	
Day 5	8.2	8.3	8.4	8.4	8.5	
Day 6	8.2	8.4	8.4	8.4	8.4	

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Day 1	8.0	8.0	8.2	8.2	8.2	8.2
Day 2	8.4	8.2	8.2	8.3	8.3	
Day 3		8.2	8.2	8.2	8.6	
Day 4	8.2	7.9	8.0	8.1	8.1	
Day 5	8.2	8.2	8.2	8.2	8.3	
Day 6		8.2	8.4	8.3	8.4	
Final	8.1	8.2	8.2	8.2	8.2	

Date	Alkalinity	Hardness	Conductivity	Res. Cl.
5-31-00	19	18.0	99	
6-2-00	14	6.0	81	0.07
6-5-00	20	6.0	54	<0.05

Temperature

Incubator °C	
Initial	24.5
Day 1	24.9
Day 2	24.4
Day 3	24.8
Day 4	24.9
Day 5	24.7
Day 6	24.3
Final	24.4

Test Results Reviewed and Approved By: _____

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7 Day Chronic Definitive Survival and Reproduction Bioassay

Method: EPA/600/4-91/002

Test Organism: *Daphnia ambigua*

Facility: WSRC/A-01
Sample ID: A-01 w/ Daphnia ambigua

ETT#: T14656

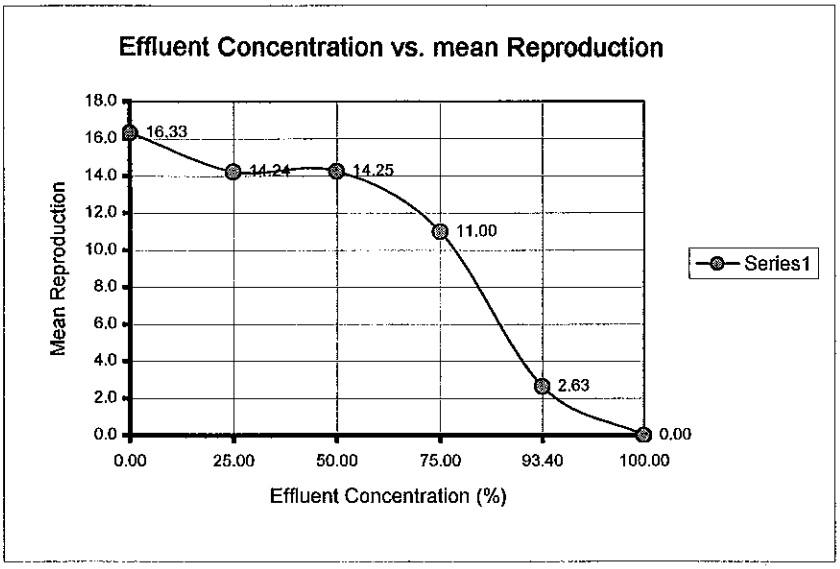
Date: June 6, 2000

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	WSRC	Start Date:	6/6/00
Sample ID:	A-01 - Daphnia ambigua	Lab ID:	T14611

Normality Test	Heterogeneity of Variance Test
Kolmogorov's Test: D*= 1.053 critical= 1.035	Bartlett's Test B= -14.75 critical= 11.35
Data are not normal in distribution.	Data are homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 %	16.7%	16.33	7.48			
25 %	35.3%	14.24	8.04	282.50	264	Pass
50 %	43.8%	14.25	10.48	275.50	264.00	Pass
75 %	47.1%	11.00	9.27	252.00	264.00	Fail
93.4 %	75.0%	2.63	4.86	161.50	264.00	Fail
100 %	100.0%	0.00	0.00			Fail
			CV 45.8%			



Test Summary

Survival

No Observed Effect Concentration
NOEC= 75 %
Lowest Observed Effect Concentration
LOEC= 93.4 %
7 Day LC50
LC50= 77.9 %

Reproduction

No Observed Effect Concentration
NOEC= 50 %
Lowest Observed Effect Concentration
LOEC= 75 %
Chronic Value
ChV= 61.2 %
IC25= 67.0 %

CHRONIC DEFINITIVE

Facility: WSRC
Outfall: A-01 - Daphnia ambigua

Start Date: 6/6/00
Lab ID: T14611

Replicate	Control	dead	lost	25	dead	lost	50	dead	lost	75	dead	lost	93.4	dead	lost	100	dead	lost
1	14	0	0	17	0	0	0	1	0	12	0	0	0	1	0	0	1	0
2	18	0	0	19	0	0	0	1	0	22	0	0	0	1	0	0	1	0
3	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1
4	18	0	0	9	1	0	0	1	0	0	1	0	0	1	0	0	1	0
5	18	0	0	20	0	0	21	0	0	na	0	1	14	0	0	0	1	0
6	0	1	0	na	0	1	na	0	1	2	1	0	0	1	0	0	1	0
7	22	0	0	15	0	0	25	0	0	0	1	0	na	0	1	0	1	0
8	19	0	0	21	0	0	19	1	0	0	1	0	0	1	0	0	1	0
9	20	0	0	19	0	0	22	0	0	12	0	0	0	1	0	0	1	0
10	21	0	0	23	1	0	29	0	0	12	0	0	5	0	0	0	1	0
11	18	0	0	0	1	0	16	0	0	18	0	0	0	1	0	0	1	0
12	17	0	0	0	1	0	21	0	0	0	1	0	na	0	1	0	1	0
13	na	0	1	na	1	1	na	0	1	na	0	1	na	0	1	na	0	1
14	3	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0
15	18	0	0	21	0	0	0	1	0	21	1	0	0	1	0	0	1	0
16	24	0	0	6	0	0	na	0	1	24	0	0	11	0	0	0	1	0
17	20	0	0	19	0	0	18	0	0	17	1	0	1	1	0	0	1	0
18	20	0	0	21	0	0	14	0	0	7	0	0	0	1	0	0	1	0
19	0	1	0	15	0	0	20	0	0	16	0	0	11	0	0	0	1	0
20	24	0	0	17	0	0	23	1	0	24	0	0	0	1	0	0	1	0

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC/A-01 w/ Ceriodaphnia dubia in MHSF**
Sample Identification: **T14656**
Test Date: **June 6, 2000**

pH (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Initial	7.52	7.29	7.48	7.54	7.83	8.04
Day 1	7.53	7.86	7.39	7.75	7.57	7.29
Day 2	7.42	7.86	7.73	7.94	7.89	8.10
Day 3	7.78	7.81	7.91	7.75	7.68	8.00
Day 4	7.78	7.66	7.75	7.75	7.84	7.96
Day 5	7.66	7.69	7.85	7.71	7.85	7.85
Day 6	7.68	7.70	7.57	7.56	7.87	7.86

pH (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Day 1		7.19	7.46	7.78	7.52	6.31
Day 2	7.81	7.70	7.85	7.77	7.65	7.95
Day 3	7.93	7.43	7.70	7.91	7.78	7.67
Day 4	8.04	7.75	7.78	7.79	7.64	7.91
Day 5	7.89	8.08	7.94	7.74	7.73	8.00
Day 6	7.19	7.77	7.98	7.94	7.73	7.77
Final	7.69	7.87	7.38	7.52	7.65	7.64

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Initial	8.2	8.3	8.4	8.4	8.5	9.2
Day 1	8.2	8.4	8.4	8.4	8.4	8.3
Day 2	8.2	8.4	8.4	8.2	8.2	8.4
Day 3	8.2	8.2	8.4	8.3	8.2	8.4
Day 4	8.1	0.3	8.4	8.4	8.4	8.4
Day 5	8.2	8.5	8.4	8.6	8.5	8.4
Day 6	7.8	8.2	8.3	8.2	8.2	8.3

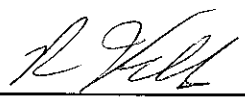
Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Day 1		8.2	8.4	8.3	8.4	8.1
Day 2	8.1	8.2	8.2	8.2	8.2	8.2
Day 3	8.2	8.2	8.2	8.2	8.2	8.2
Day 4	8.2	8.2	8.2	8.3	8.3	8.2
Day 5	8.4	8.6	8.6	8.3	8.4	8.3
Day 6	8.0	8.3	8.4	8.3	8.2	8.2
Final	8.2	8.2	8.2	8.2	8.2	8.2

Date	Alkalinity	Hardness	Conductivity	Res. Cl.
6-5-00	20	6.0	54	<0.05
6-7-00	22	8.0	140	<0.05
6-9-00	19	6.0	105	<0.05

Temperature

Incubator °C	
Initial	24.7
Day 1	24.3
Day 2	24.4
Day 3	24.5
Day 4	24.5
Day 5	24.4
Day 6	24.7
Final	24.7

Test Results Reviewed and Approved By: 

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7 Day Chronic Definitive Survival and Reproduction Bioassay

Method: EPA/600/4-91/002

Test Organism: *Daphnia ambigua*

Facility: WSRC/A-01
Sample ID: A-01 w/ Daphnia ambigua

ETT#: T14721

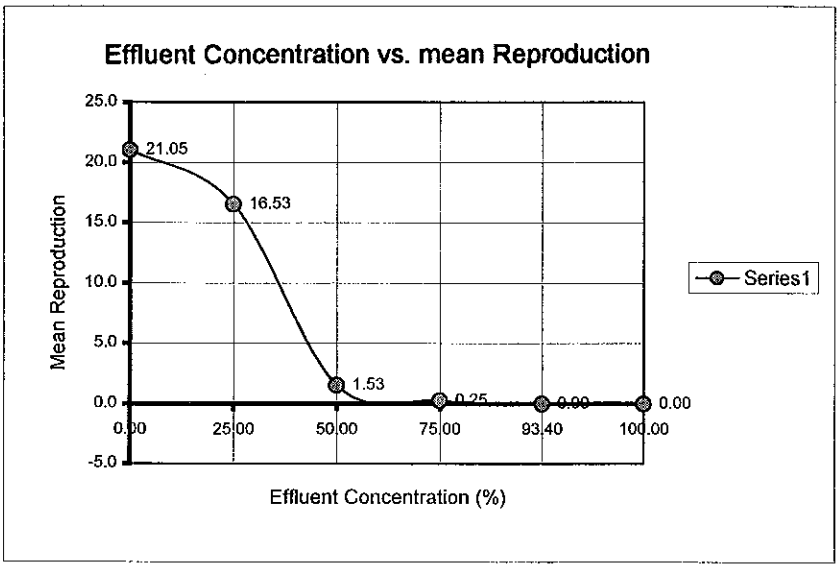
Date: June 13, 2000

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	WSRC	Start Date:	6/13/00
Sample ID:	A-01 - Daphnia ambigua	Lab ID:	T14721

Normality Test	Heterogeneity of Variance Test
Kolmogorov's Test: D*= 2.249 critical= 1.035	Bartlett's Test B= 9.96 critical= 9.21
Data are not normal in distribution.	Data are not homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 %	0.0%	21.05	4.11			
25 %	21.1%	16.53	10.39	334.00	317	Pass
50 %	100.0%	1.53	1.71			Fail
75 %	100.0%	0.25	0.79			Fail
93.4 %	100.0%	0.00	0.00			Fail
100 %	95.0%	0.00	0.00			Fail
			CV 19.5%			



Test Summary

Survival

No Observed Effect Concentration
NOEC= 25 %
Lowest Observed Effect Concentration
LOEC= 50 %
7 Day LC50
LC50= 43.6 %

Reproduction

No Observed Effect Concentration
NOEC= 25 %
Lowest Observed Effect Concentration
LOEC= 50 %
Chronic Value
ChV= 35.4 %
IC25= 31.2 %

CHRONIC DEFINITIVE

Facility: WSRC
Outfall: A-01 - Daphnia ambigua

Start Date: 6/13/00
Lab ID: T14721

Replicate	Control	dead	lost	25	dead	lost	50	dead	lost	75	dead	lost	93.4	dead	lost	100	dead	lost
1	23	0	0	2	1	0	4	1	0	0	1	0	0	1	0	0	1	0
2	23	0	0	24	0	0	0	1	0	0	1	0	0	1	0	0	1	0
3	22	0	0	25	0	0	2	1	0	3	1	0	0	1	0	0	1	0
4	18	0	0	26	0	0	0	1	0	0	1	0	0	1	0	0	1	0
5	20	0	0	21	0	0	1	1	0	0	1	0	0	1	0	0	1	0
6	18	0	0	20	0	0	na	0	1	0	1	0	0	1	0	0	1	0
7	25	0	0	na	0	1	0	1	0	0	1	0	0	1	0	0	1	0
8	19	0	0	10	0	0	3	1	0	0	1	0	0	1	0	0	1	0
9	23	0	0	0	1	0	1	1	0	0	1	0	0	1	0	0	1	0
10	32	0	0	28	0	0	4	1	0	0	1	0	0	1	0	0	1	0
11	14	0	0	33	0	0	0	1	0	0	1	0	0	1	0	0	1	0
12	21	0	0	18	0	0	0	1	0	0	1	0	0	1	0	0	1	0
13	16	0	0	13	0	0	0	1	0	0	1	0	0	1	0	0	1	0
14	21	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0
15	21	0	0	15	0	0	0	1	0	2	1	0	0	1	0	0	1	0
16	18	0	0	19	0	0	0	1	0	0	1	0	0	1	0	0	1	0
17	23	0	0	0	1	0	4	1	0	0	1	0	0	1	0	0	1	0
18	24	0	0	17	0	0	3	1	0	0	1	0	0	1	0	0	1	0
19	15	0	0	13	0	0	4	1	0	0	1	0	0	1	0	0	1	0
20	25	0	0	30	0	0	3	1	0	0	1	0	0	1	0	0	0	0

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC/A-01 w/ Ceriodaphnia dubia in MHSF**
Sample Identification: **T14721**
Test Date: **June 13, 2000**

pH (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Initial	7.58	7.35	7.36	7.31	7.36	7.43
Day 1	7.53	7.82	7.76	7.73	7.70	7.57
Day 2	7.79	7.19	7.70	7.73	7.64	7.56
Day 3	7.48	7.77	6.81	7.41	7.35	7.45
Day 4	7.54	7.80	7.84		7.40	7.48
Day 5	7.54	7.81	7.87	7.88	7.89	7.90
Day 6	7.78	7.81	7.27	7.31	7.40	7.45

pH (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Day 1	7.67	7.84	7.74	7.75	7.72	7.54
Day 2		7.44	7.51	7.63	7.62	7.67
Day 3	8.00	7.68	7.06	6.89	7.66	7.57
Day 4	7.86	6.75	7.16	7.24	7.40	7.45
Day 5	7.97	6.96	7.01	7.13	7.16	7.35
Day 6	7.36	6.78	7.86	7.41	7.55	7.58
Final	7.59	7.85	7.86	7.72	7.54	7.40

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Initial	8.2	8.0	8.0	8.1	8.2	8.2
Day 1	8.0	8.2	8.2	8.2	8.2	8.2
Day 2	8.1	8.1	8.1	8.1	8.1	8.1
Day 3		8.2	8.4	8.6	9.0	9.1
Day 4		8.3	8.4		8.4	8.2
Day 5		8.3	8.6	8.7	8.7	8.7
Day 6	8.2	8.7	8.6	8.4	8.5	8.6

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	93.4%	100%
Day 1	8.0	8.2	8.2	8.2	8.3	8.4
Day 2		8.1	8.1	8.2	8.2	8.2
Day 3	7.8	7.3	8.2	8.0	8.2	8.1
Day 4	8.4	8.5	8.3	8.3	8.4	8.3
Day 5	8.5	8.6	8.5	8.6	8.5	8.5
Day 6	8.4	8.4	8.4	8.5	8.4	8.0
Final	8.3	8.1	8.2	8.2	8.2	8.0

Date	Alkalinity	Hardness	Conductivity	Res. Cl.
6-12-00	20	10.0	66	<0.05
6-14-00	19	2.0	85	0.05
6-16-00	24	10.0	107	<0.05

Temperature

Incubator °C	
Initial	24.7
Day 1	24.8
Day 2	24.7
Day 3	24.3
Day 4	24.4
Day 5	24.7
Day 6	24.8
Final	24.2

Test Results Reviewed and Approved By: R Kelly

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7 Day Chronic Definitive Survival and Reproduction Bioassay

Method: EPA/600/4-91/002

Test Organism: *Ceriodaphnia dubia*

Facility: WSRC/A-11
Sample ID: A-11 w/ Ceriodaphnia dubia

ETT#: T14558

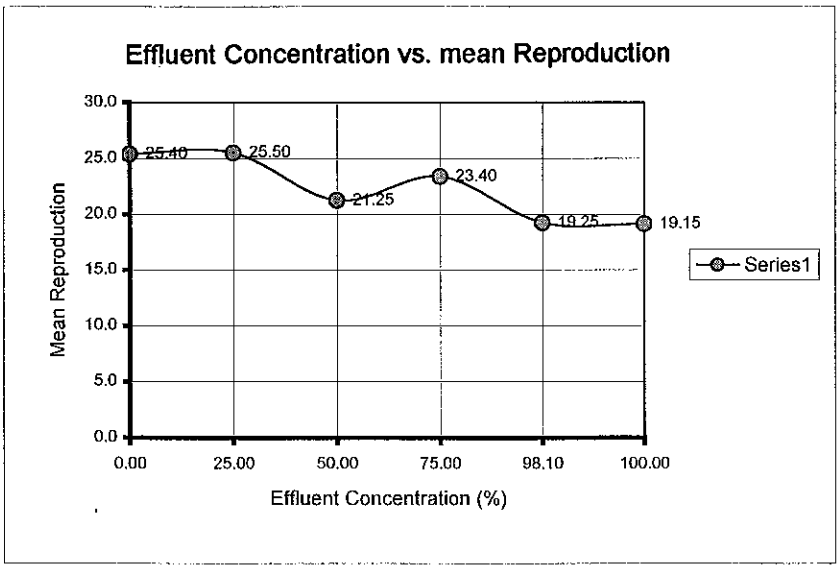
Date: May 23, 2000

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	WSRC	Start Date:	5/23/00
Sample ID:	A-11 - Ceriodaphnia dubia	Lab ID:	T14558

Normality Test	**Heterogeneity of Variance Test**
Kolmogorov's Test: D*= 1.065 critical= 1.035	Bartlett's Test B= 32.47 critical= 15.09
Data are not normal in distribution.	Data are not homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 %	0.0%	25.40	2.60			
25 %	0.0%	25.50	3.63			Pass
50 %	0.0%	21.25	7.23			Pass
75 %	0.0%	23.40	3.83	347.5	305	Pass
98.1 %	0.0%	19.25	7.72	304.0	305	Fail
100 %	0.0%	19.15	4.30	246.5	305	Fail
			CV 10.3%			



Test Summary

Survival

No Observed Effect Concentration
NOEC= >100 %
Lowest Observed Effect Concentration
LOEC= >100 %
7 Day LC50
LC50= >100 %

Reproduction

No Observed Effect Concentration
NOEC= 75 %
Lowest Observed Effect Concentration
LOEC= 98.1 %
Chronic Value
ChV= 85.8 %

CHRONIC DEFINITIVE

Facility: WSRC
Outfall: A-11 - Ceriodaphnia dubia

Start Date: 5/23/00
Lab ID: T14558

Replicate	Control	dead	lost	25	dead	lost	50	dead	lost	75	dead	lost	98.1	dead	lost	100	dead	lost
1	22	0	0	25	0	0	31	0	0	20	0	0	18	0	0	23	0	0
2	24	0	0	30	0	0	22	0	0	26	0	0	4	0	0	14	0	0
3	25	0	0	31	0	0	6	0	0	27	0	0	21	0	0	13	0	0
4	22	0	0	26	0	0	23	0	0	20	0	0	10	0	0	22	0	0
5	28	0	0	24	0	0	11	0	0	25	0	0	24	0	0	16	0	0
6	24	0	0	25	0	0	4	0	0	28	0	0	7	0	0	20	0	0
7	25	0	0	24	0	0	20	0	0	24	0	0	23	0	0	18	0	0
8	24	0	0	27	0	0	25	0	0	26	0	0	4	0	0	10	0	0
9	22	0	0	22	0	0	21	0	0	23	0	0	29	0	0	23	0	0
10	26	0	0	28	0	0	24	0	0	27	0	0	25	0	0	18	0	0
11	27	0	0	22	0	0	19	0	0	23	0	0	27	0	0	21	0	0
12	26	0	0	29	0	0	26	0	0	20	0	0	16	0	0	20	0	0
13	25	0	0	28	0	0	21	0	0	15	0	0	28	0	0	12	0	0
14	27	0	0	22	0	0	25	0	0	25	0	0	23	0	0	23	0	0
15	29	0	0	20	0	0	17	0	0	25	0	0	23	0	0	19	0	0
16	20	0	0	25	0	0	25	0	0	26	0	0	19	0	0	22	0	0
17	29	0	0	18	0	0	24	0	0	23	0	0	19	0	0	19	0	0
18	28	0	0	32	0	0	33	0	0	26	0	0	24	0	0	27	0	0
19	26	0	0	25	0	0	25	0	0	25	0	0	15	0	0	22	0	0
20	29	0	0	27	0	0	23	0	0	14	0	0	26	0	0	21	0	0

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC/A-11 w/ Ceriodaphnia dubia in MHSF**
Sample Identification: **T14558**
Test Date: **May 23, 2000**

pH (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Initial	7.51	8.03	7.84	7.80	7.79	7.72
Day 1	7.82	7.75	7.70	7.71	7.69	7.51
Day 2	7.49	7.85	7.81	7.56	7.78	7.19
Day 3	7.66	7.84	7.94	7.96	8.03	7.96
Day 4	7.53	7.56	7.64	7.76	7.94	7.96
Day 5	7.72	7.82	7.98	7.91	7.74	7.42
Day 6	7.70	7.59	7.48	7.58	7.80	8.02

pH (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Day 1	7.84	7.51	7.62	7.69	7.79	7.87
Day 2	7.72	7.76	7.53	7.72	7.83	7.69
Day 3	7.83	8.00	7.85	7.99	7.45	8.04
Day 4	7.06	7.94	7.67	7.73	7.98	7.38
Day 5	7.76	7.80	7.95	7.84	7.98	7.78
Day 6	8.06	7.53	7.37	7.53	7.45	7.33
Final	7.46	7.99	7.81	7.79	7.45	7.80

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Initial	8.2	8.3	8.4	8.4	8.4	8.2
Day 1	8.4	8.3	8.3	8.4	8.4	8.5
Day 2	8.3	8.3	8.2	8.2	8.1	8.2
Day 3	8.4	8.2	8.6	8.7	9.0	9.0
Day 4		8.3	8.3	8.3	8.2	8.2
Day 5	8.1	8.2	8.3	8.3	8.3	8.2
Day 6	8.4	8.4	8.4	9.1	9.1	9.2

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Day 1	8.3	8.4	8.4	8.4	8.5	8.5
Day 2	8.1	8.1	8.0	8.0	8.2	8.0
Day 3	8.3	8.2	8.3	8.4	8.2	8.4
Day 4	8.4	8.1	8.2	8.2	8.3	8.3
Day 5	8.4	8.2	8.2	8.2	8.3	8.2
Day 6	8.5	8.4	8.4	8.5	8.5	8.6
Final	8.6	8.4	8.2	8.3	8.4	8.4

Date	Alkalinity	Hardness	Conductivity	Res. Cl.
5-22-00	12	6.00	66	<0.05
5-24-00	9.5	6.00	62	0.06
5-26-00	7.7	8.00	131	0.06

Temperature

Incubator °C	
Initial	24.4
Day 1	24.8
Day 2	24.8
Day 3	24.5
Day 4	24.6
Day 5	24.6
Day 6	24.5
Final	24.5

Test Results Reviewed and Approved By: R Kelly

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7 Day Chronic Definitive Survival and Reproduction Bioassay

Method: EPA/600/4-91/002

Test Organism: *Ceriodaphnia dubia*

Facility: WSRC/A-11
Sample ID: A-11 w/ Ceriodaphnia dubia

ETT#: T14612

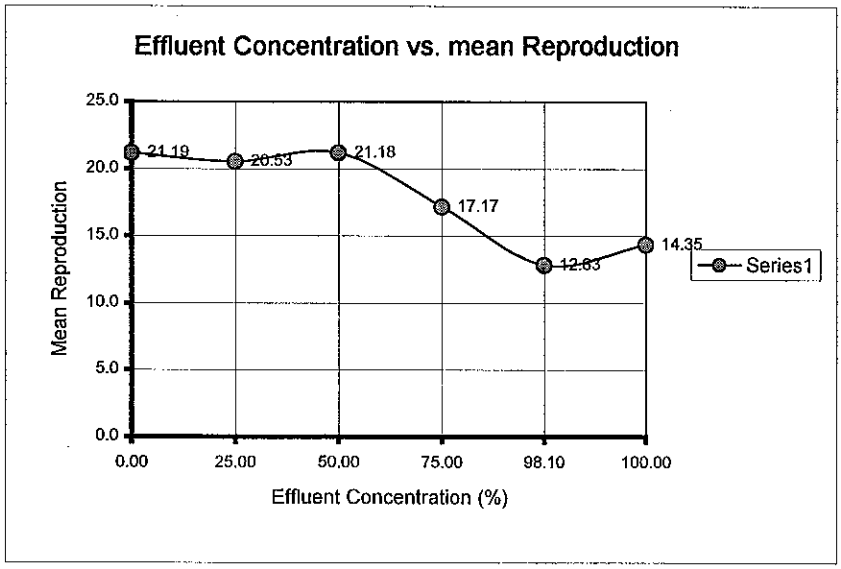
Date: June 1, 2000

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	WSRC	Start Date:	6/1/00
Sample ID:	A-11 - Ceriodaphnia dubia	Lab ID:	T14612

Normality Test	Heterogeneity of Variance Test
Kolmogorov's Test: D*= 1.464 critical= 1.035	Bartlett's Test B= 19.27 critical= 9.21
Data are not normal in distribution.	Data are not homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 %	12.5%	21.19	8.61			
25 %	5.9%	20.53	4.98			Pass
50 %	0.0%	21.18	3.43	271.0	262	Pass
75 %	22.2%	17.17	8.85	271.5	262	Pass
98.1 %	50.0%	12.83	7.03	229.0	262	Fail
100 %	29.4%	14.35	7.00	217.5	262	Fail
			CV 40.6%			



Test Summary

Survival

No Observed Effect Concentration
NOEC= 75 %
Lowest Observed Effect Concentration
LOEC= 98.1 %
7 Day LC50
LC50= >100 %

Reproduction

No Observed Effect Concentration
NOEC= 75 %
Lowest Observed Effect Concentration
LOEC= 98.1 %
Chronic Value
ChV= 85.8 %
IC25= 81.0 %

CHRONIC DEFINITIVE

Facility: WSRC
Outfall: A-11 - Ceriodaphnia dubia

Start Date: 6/1/00
Lab ID: T14612

Replicate	Control	dead	lost	25	dead	lost	50	dead	lost	75	dead	lost	98.1	dead	lost	100	dead	lost
1	0	1	0	22	0	0	19	0	0	25	0	0	12	0	0	11	0	0
2	24	0	0	21	0	0	na	0	1	3	1	0	17	0	0	22	0	0
3	26	0	0	20	0	0	22	0	0	20	0	0	18	0	0	9	0	0
4	26	0	0	25	0	0	25	0	0	19	0	0	18	0	0	3	1	0
5	na	0	1	16	0	0	22	0	0	23	0	0	4	1	0	19	0	0
6	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1	na	1	1
7	27	0	0	20	0	0	21	0	0	23	0	0	12	1	0	4	1	0
8	15	0	0	na	0	1	14	0	0	25	0	0	0	1	0	22	0	0
9	18	0	0	25	0	0	19	0	0	16	0	0	10	1	0	23	0	0
10	34	0	0	25	0	0	22	0	0	26	0	0	24	0	0	20	0	0
11	24	0	0	24	0	0	28	0	0	14	1	0	10	1	0	na	0	1
12	19	0	0	24	0	0	22	0	0	23	0	0	11	1	0	14	0	0
13	25	0	0	18	0	0	20	0	0	0	1	0	3	1	0	14	0	0
14	na	0	1	4	1	0	19	0	0	3	1	0	10	1	0	18	0	0
15	15	1	0	20	0	0	24	0	0	20	0	0	19	0	0	0	1	0
16	30	0	0	23	0	0	24	0	0	22	0	0	14	0	0	16	0	0
17	18	0	0	20	0	0	21	0	0	26	0	0	20	0	0	19	0	0
18	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1	na	1	1
19	9	0	0	20	0	0	15	0	0	18	0	0	5	1	0	12	0	0
20	29	0	0	22	0	0	23	0	0	3	0	0	24	0	0	18	0	0

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC/A-11 w/ Ceriodaphnia dubia in MHSF**
Sample Identification: **T14612**
Test Date: **June 1, 2000**

pH (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Initial	7.80	7.63	7.28	6.74	7.19	6.98
Day 1	7.69	7.28	7.78	7.76	7.09	7.81
Day 2	7.81	7.41	7.49	7.56	7.63	7.80
Day 3	7.48	7.41	7.44	7.47	7.57	7.21
Day 4	7.42	7.73	7.23	7.68	7.67	7.76
Day 5	7.52	7.65	7.70	7.59	7.72	7.71
Day 6	7.53	7.35	7.43	7.46	7.59	7.58

pH (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Day 1	7.53	7.88	7.76	7.51	7.67	7.56
Day 2	7.67	7.57	7.62	7.52	7.49	7.61
Day 3		7.40	7.52	7.47	7.51	7.41
Day 4	7.03	7.75	7.80	7.84	7.93	7.91
Day 5	7.56	7.28	7.52	7.77	7.85	7.59
Day 6		7.19	7.81	7.48	7.37	7.63
Final	7.81	7.85	7.56	7.20	7.61	7.30

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Initial	8.2	8.6	8.8	9.0	9.2	9.2
Day 1	8.3	8.0	8.2	8.2	8.2	8.2
Day 2	8.4	8.3	8.3	8.4	8.4	8.7
Day 3	8.1	7.7	7.8	7.8	7.9	7.9
Day 4	8.0	8.3	8.3	8.3	8.3	8.4
Day 5	8.2	8.4	8.6	8.8	9.1	9.0
Day 6	8.2	8.3	8.3	8.4	8.4	8.4

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Day 1	8.0	8.2	8.1	8.2	8.2	8.2
Day 2	8.4	8.3	8.3	8.3	8.3	8.4
Day 3		8.5	8.5	8.4	8.4	8.5
Day 4	8.2	8.4	8.4	8.4	8.5	8.5
Day 5	8.2	8.2	8.2	8.1	8.1	8.2
Day 6		8.3	8.3	8.3	8.4	8.3
Final	8.1	8.0	8.1	8.2	8.3	8.3

Date	Alkalinity	Hardness	Conductivity	Res. Cl.
5-31-00	6.9	8.0	72	<0.05
6-2-00	25	2.0	176	<0.05
6-5-00	10	6.0	51	<0.05

Temperature

Incubator °C	
Initial	24.5
Day 1	24.9
Day 2	24.4
Day 3	24.8
Day 4	24.9
Day 5	24.7
Day 6	24.3
Final	24.4

Test Results Reviewed and Approved By: _____

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7 Day Chronic Definitive Survival and Reproduction Bioassay

Method: EPA/600/4-91/002

Test Organism: *Ceriodaphnia dubia*

Facility: WSRC/A-11
Sample ID: A-11 w/ Ceriodaphnia dubia

ETT#: T14657

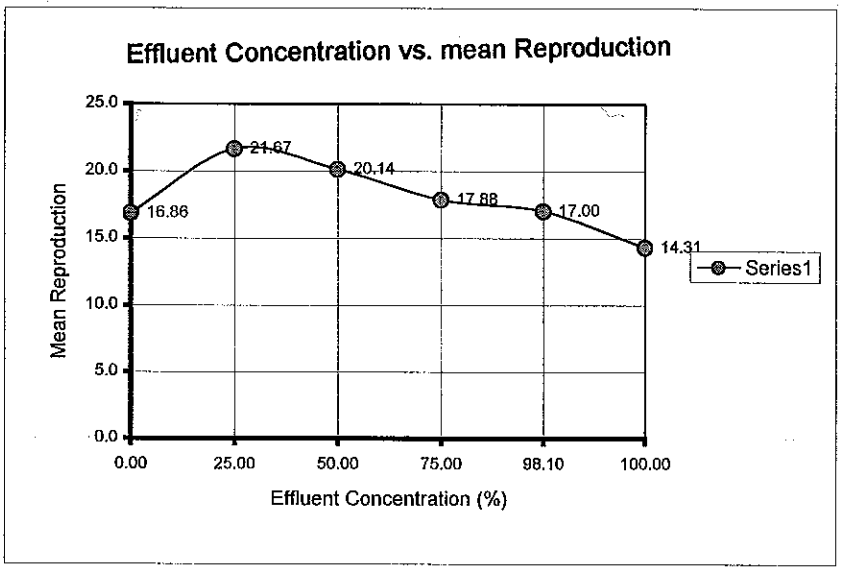
Date: June 6, 2000

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	WSRC	Start Date:	6/6/00
Sample ID:	A-11 - Ceriodaphnia dubia	Lab ID:	T14657

Normality Test	Heterogeneity of Variance Test
Kolmogorov's Test: D*= 1.053 critical= 1.035	Bartlett's Test B= 16.13 critical= 15.09
Data are not normal in distribution.	Data are not homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 %	7.1%	16.86	6.31			
25 %	0.0%	21.67	3.75			Pass
50 %	0.0%	20.14	4.91			Pass
75 %	0.0%	17.88	5.66			Pass
98.1 %	14.3%	17.00	6.60	184.5	154	Pass
100 %	0.0%	14.31	8.43	138.5	154	Fail
			CV 37.4%			



Test Summary

Survival

No Observed Effect Concentration
NOEC= >100 %
Lowest Observed Effect Concentration
LOEC= >100 %
7 Day LC50
LC50= >100 %

Reproduction

No Observed Effect Concentration
NOEC= 98.1 %
Lowest Observed Effect Concentration
LOEC= 100 %
Chronic Value
ChV= 99 %
IC25= >100 %

CHRONIC DEFINITIVE

Facility: WSRC
Outfall: A-11 - Ceriodaphnia dubia

Start Date: 6/6/00
Lab ID: T14657

Replicate	Control	dead	lost	25	dead	lost	50	dead	lost	75	dead	lost	98.1	dead	lost	100	dead	lost
1	12	0	0	21	0	0	21	0	0	21	0	0	21	0	0	13	0	0
2	21	0	0	25	0	0	27	0	0	22	0	0	21	0	0	14	0	0
3	15	0	0	23	0	0	18	0	0	18	0	0	4	0	0	24	0	0
4	na	0	1	na	0	1	na	0	1	12	0	0	21	0	0	na	0	1
5	22	0	0	27	0	0	24	0	0	20	0	0	24	0	0	25	0	0
6	20	0	0	25	0	0	21	0	0	16	0	0	21	0	0	18	0	0
7	5	0	0	18	0	0	na	0	1	3	0	0	20	0	0	15	0	0
8	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1
9	na	0	1	20	0	0	24	0	0	18	0	0	7	1	0	na	0	1
10	17	0	0	na	0	1	na	0	1	25	0	0	na	0	1	na	0	1
11	17	0	0	22	0	0	18	0	0	18	0	0	9	1	0	11	0	0
12	24	0	0	24	0	0	10	0	0	11	0	0	19	0	0	18	0	0
13	23	0	0	15	0	0	10	0	0	17	0	0	9	0	0	20	0	0
14	na	0	1	28	0	0	21	0	0	na	0	1	na	0	1	0	0	0
15	20	0	0	22	0	0	24	0	0	20	0	0	20	0	0	0	0	0
16	18	0	0	18	0	0	22	0	0	27	0	0	22	0	0	5	0	0
17	3	1	0	20	0	0	21	0	0	19	0	0	na	0	1	na	0	1
18	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1
19	19	0	0	17	0	0	21	0	0	19	0	0	20	0	0	23	0	0
20	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC/A-11 w/ Ceriodaphnia dubia in MHSF**
Sample Identification: **T14657**
Test Date: **June 6, 2000**

pH (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Initial	7.52	7.65	7.70	7.59	7.72	7.71
Day 1	7.53	7.35	7.43	7.46	7.59	7.58
Day 2	7.42	7.56	7.10	7.46	7.29	8.13
Day 3	7.78	8.04	8.31	8.93	8.39	7.38
Day 4	7.78	7.54	7.78	7.58	7.25	7.08
Day 5	7.66	7.89	7.87	7.92	7.35	7.98
Day 6	7.68	7.68	7.72	7.76	7.91	7.88

pH (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Day 1		7.19	7.81	7.48	7.37	7.63
Day 2	7.81	7.85	7.56	7.20	7.61	7.30
Day 3	7.93	7.38	7.96	7.73	8.01	8.01
Day 4	8.04	7.73	7.79	7.77	7.66	7.77
Day 5	7.89	8.01	8.09	8.03	8.36	8.21
Day 6	7.19	8.99	6.16	8.20	7.46	7.69
Final	7.69	7.52	7.75	7.56	7.64	7.37

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Initial	8.2	8.4	8.6	8.8	9.1	9.0
Day 1	8.2	8.3	8.3	8.4	8.4	8.4
Day 2	8.2	8.2	8.2	8.2	8.2	8.2
Day 3	8.2	8.2	8.4	8.4	8.6	8.6
Day 4	8.1	8.2	8.3	8.4	8.4	8.4
Day 5	8.2	8.2	8.2	8.4	8.4	8.5
Day 6	7.8	8.4	8.4	8.6	8.4	8.4

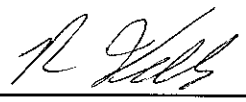
Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Day 1		8.3	8.3	8.3	8.4	8.3
Day 2	8.1	8.0	8.1	8.2	8.3	8.3
Day 3	8.2	8.3	8.3	8.2	8.2	8.3
Day 4	8.2	8.1	8.2	8.2	8.3	8.2
Day 5	8.4	8.4	8.4	8.3	8.3	8.3
Day 6	8.0	8.3	8.4	8.4	8.4	8.2
Final	8.2	8.1	8.1	8.2	8.2	8.2

Date	Alkalinity	Hardness	Conductivity	Res. Cl.
6-5-00	10	6.0	51	<0.05
6-7-00	9.1	4.0	166	<0.05
6-9-00	11	10.0	109	<0.05

Temperature

Incubator °C	
Initial	24.7
Day 1	24.3
Day 2	24.4
Day 3	24.5
Day 4	24.5
Day 5	24.4
Day 6	24.7
Final	24.7

Test Results Reviewed and Approved By: 

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7 Day Chronic Definitive Survival and Reproduction Bioassay

Method: EPA/600/4-91/002

Test Organism: *Ceriodaphnia dubia*

Facility: WSRC/A-11
Sample ID: A-11 w/ Ceriodaphnia dubia

ETT#: T14722

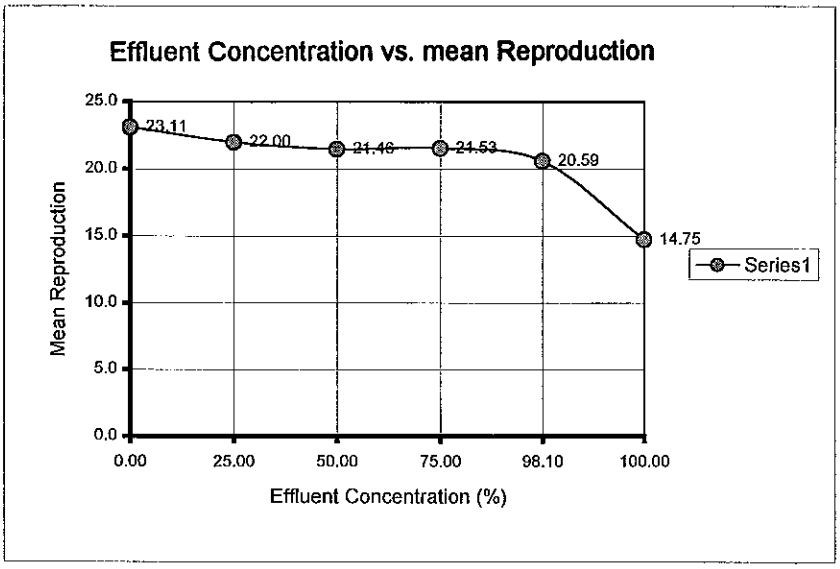
Date: June 13, 2000

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	WSRC	Start Date:	6/13/00
Sample ID:	A-11 - Ceriodaphnia dubia	Lab ID:	T14722

Normality Test	Heterogeneity of Variance Test
Kolmogorov's Test: D*= 1.472 critical= 1.035	Bartlett's Test B= -5.31 critical= 9.21
Data are not normal in distribution.	Data are homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 %	0.0%	23.11	5.82			
25 %	11.8%	22.00	7.33	302	262	Pass
50 %	23.1%	21.46	10.84	233.0	204	Pass
75 %	23.5%	21.53	8.59	297.0	232	Pass
98.1 %	5.9%	20.59	5.36	241.0	262	Fail
100 %	31.3%	14.75	10.07	141.0	262	Fail
			CV 25.2%			



Test Summary

Survival

No Observed Effect Concentration
NOEC= 98.1 %
Lowest Observed Effect Concentration
LOEC= 100 %
7 Day LC50
LC50= >100 %

Reproduction

No Observed Effect Concentration
NOEC= 75 %
Lowest Observed Effect Concentration
LOEC= 98.1 %
Chronic Value
ChV= 85.8 %
IC25= 100 %

CHRONIC DEFINITIVE

Facility: WSRC
Outfall: A-11 - Ceriodaphnia dubia

Start Date: 6/13/00
Lab ID: T14722

Replicate	Control	dead	lost	25	dead	lost	50	dead	lost	75	dead	lost	98.1	dead	lost	100	dead	lost
1	24	0	0	22	0	0	na	0	1	22	0	0	9	1	0	24	0	0
2	24	0	0	22	0	0	22	0	0	23	0	0	22	0	0	0	1	0
3	25	0	0	27	0	0	29	0	0	28	0	0	25	0	0	22	0	0
4	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1
5	27	0	0	27	0	0	30	0	0	29	0	0	23	0	0	na	0	1
6	21	0	0	25	0	0	na	0	1	27	0	0	26	0	0	22	0	0
7	25	0	0	22	0	0	27	0	0	27	0	0	11	0	0	0	1	0
8	23	0	0	25	0	0	na	0	1	23	0	0	23	0	0	15	0	0
9	26	0	0	23	0	0	28	0	0	24	0	0	28	0	0	23	0	0
10	26	0	0	4	1	0	0	1	0	0	1	0	18	0	0	na	0	1
11	25	0	0	27	0	0	na	0	1	24	1	0	21	0	0	0	1	0
12	26	0	0	22	0	0	23	0	0	18	0	0	25	0	0	5	1	0
13	30	0	0	26	0	0	29	0	0	27	0	0	23	0	0	17	0	0
14	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1
15	23	0	0	26	0	0	25	0	0	24	0	0	20	0	0	22	0	0
16	26	0	0	20	0	0	28	0	0	22	1	0	23	0	0	25	0	0
17	21	0	0	25	0	0	na	0	1	0	1	0	22	0	0	0	1	0
18	25	0	0	na	0	1	4	1	0	21	0	0	19	0	0	20	0	0
19	3	0	0	28	0	0	29	0	0	27	0	0	12	0	0	25	0	0
20	16	0	0	3	1	0	5	1	0	na	0	1	na	0	1	16	0	0

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC/A-11 w/ Ceriodaphnia dubia in MHSF**
Sample Identification: **T14722**
Test Date: **June 13, 2000**

pH (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Initial	7.58	7.27	7.34	7.47	7.59	7.28
Day 1	7.53	7.49	7.52	7.58	7.69	7.74
Day 2	7.79	7.61	7.68	7.44	7.38	7.55
Day 3	7.48	7.97	6.80	6.96	7.37	7.28
Day 4	7.54	7.31	7.21	7.28	7.28	7.28
Day 5	7.54	7.61	7.63	7.33	7.32	7.31
Day 6	7.78	7.55	7.38	7.42	7.56	7.35

pH (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Day 1	7.67	7.63	7.69	7.72	7.81	7.76
Day 2		7.62	7.38	7.67	7.63	7.83
Day 3	8.00	7.98	7.38	6.96	7.18	7.26
Day 4	7.86	7.61	7.73	7.71	7.62	7.35
Day 5	7.97	7.53	7.51	7.10	7.21	7.51
Day 6	7.36	7.73	7.56	8.02	7.59	7.54
Final	7.59	7.96	7.71	7.84	7.45	7.88

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Initial	8.2	8.3	8.4	8.7	8.8	9.0
Day 1	8.0	8.1	8.2	8.2	8.2	8.3
Day 2	8.1	8.2	8.2	8.2	8.3	8.3
Day 3		7.9	8.1	8.3	8.9	8.7
Day 4		8.2	8.2	8.2	8.2	8.5
Day 5		8.5	8.2	8.2	8.2	8.2
Day 6	8.2	8.4	8.5	8.5	8.6	8.4

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Day 1	8.0	8.2	8.2	8.2	8.2	8.2
Day 2		8.1	8.1	8.1	8.2	8.2
Day 3	7.8	8.3	8.2	8.2	8.2	8.3
Day 4	8.4	8.2	8.2	8.2	8.2	8.2
Day 5	8.5	8.5	8.5	8.2	8.2	8.2
Day 6	8.4	8.6	8.4	8.4	8.5	8.6
Final	8.3	8.0	8.2	8.0	7.9	8.0

Date	Alkalinity	Hardness	Conductivity	Res. Cl.
6-12-00	12	14.0	60	0.05
6-14-00	7.6		65	<0.05
6-16-00	11	10.0	182	<0.05

Temperature

Incubator °C	
Initial	24.7
Day 1	24.8
Day 2	24.7
Day 3	24.3
Day 4	24.4
Day 5	24.7
Day 6	24.8
Final	24.2

Test Results Reviewed and Approved By: _____

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7 Day Chronic Definitive Survival and Reproduction Bioassay

Method: EPA/600/4-91/002

Test Organism: *Daphnia ambigua*

Facility: WSRC/A-11
Sample ID: A-11 w/ Daphnia ambigua

ETT#: T14558

Date: May 23, 2000

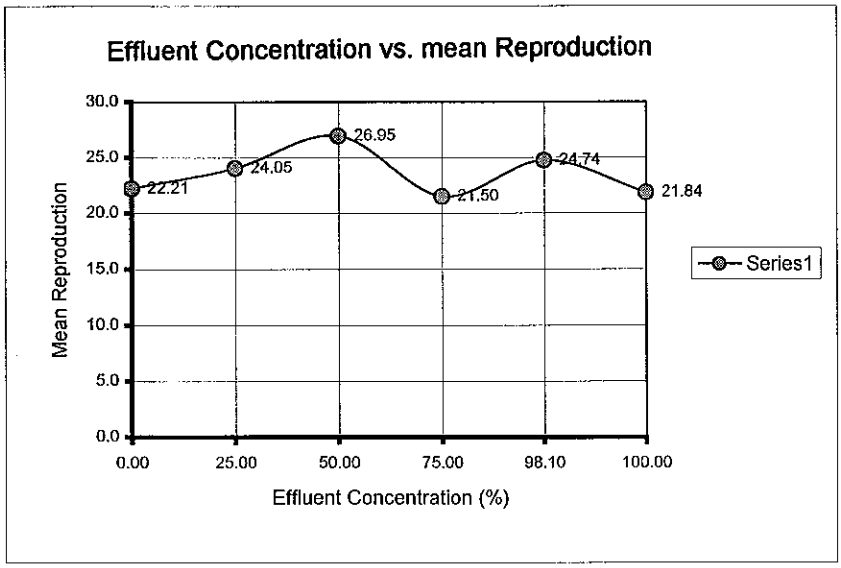
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	WSRC	Start Date:	5/23/00
Sample ID:	A-11 - Daphnia ambigua	Lab ID:	T14558

Normality Test
Kolmogorov's Test: D*= 0.985 critical= 1.035
Data are normal in distribution.

Heterogeneity of Variance Test
Bartlett's Test B= 19.57 critical= 15.09
Data are not homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 %	5.3%	22.21	6.94			
25 %	5.3%	24.05	6.64			Pass
50 %	0.0%	26.95	3.42			Pass
75 %	5.0%	21.50	7.63			Pass
98.1 %	0.0%	24.74	6.47	426.0	273	Pass
100 %	5.3%	21.84	9.28	396.0	273	Pass
			CV 31.3%			



Test Summary

Survival
No Observed Effect Concentration
NOEC= >100 %
Lowest Observed Effect Concentration
LOEC= >100 %
7 Day LC50
LC50= >100 %

Reproduction
No Observed Effect Concentration
NOEC= >100 %
Lowest Observed Effect Concentration
LOEC= >100 %
Chronic Value
ChV= >100 %

CHRONIC DEFINITIVE

Facility: WSRC
Outfall: A-11 - Daphnia ambigua

Start Date: 5/23/00
Lab ID: T14558

Replicate	Control	dead	lost	25	dead	lost	50	dead	lost	75	dead	lost	98.1	dead	lost	100	dead	lost
1	na	0	1	na	0	1	29	0	0	16	0	0	34	0	0	29	0	0
2	10	0	0	22	0	0	16	0	0	26	0	0	28	0	0	28	0	0
3	18	0	0	31	0	0	29	0	0	30	0	0	31	0	0	31	0	0
4	24	0	0	25	0	0	29	0	0	22	0	0	24	0	0	0	0	0
5	27	0	0	25	0	0	29	0	0	28	0	0	25	0	0	25	0	0
6	25	0	0	25	0	0	28	0	0	28	0	0	27	0	0	24	0	0
7	25	0	0	24	0	0	28	0	0	0	1	0	22	0	0	25	0	0
8	30	0	0	24	0	0	25	0	0	14	0	0	8	0	0	20	0	0
9	19	0	0	30	0	0	28	0	0	15	0	0	13	0	0	14	0	0
10	18	0	0	27	0	0	34	0	0	30	0	0	27	0	0	27	0	0
11	27	0	0	24	0	0	27	0	0	20	0	0	20	0	0	26	0	0
12	1	1	0	0	1	0	27	0	0	19	0	0	29	0	0	9	0	0
13	28	0	0	28	0	0	25	0	0	29	0	0	27	0	0	25	0	0
14	24	0	0	21	0	0	27	0	0	21	0	0	26	0	0	27	0	0
15	26	0	0	27	0	0	na	0	1	22	0	0	na	0	1	26	0	0
16	23	0	0	30	0	0	25	0	0	13	0	0	28	0	0	28	0	0
17	24	0	0	25	0	0	27	0	0	16	0	0	30	0	0	0	1	0
18	20	0	0	22	0	0	28	0	0	25	0	0	26	0	0	na	0	1
19	27	0	0	19	0	0	24	0	0	27	0	0	16	0	0	24	0	0
20	26	0	0	28	0	0	27	0	0	29	0	0	29	0	0	27	0	0

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC/A-11 w/ Daphnia ambigua in Very Soft Synthetic Water**
Sample Identification: **T14558**
Test Date: **May 23, 2000**

pH (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Initial	7.89	7.79	7.77	7.78	7.71	7.68
Day 1	7.07	7.06	7.12	7.06	7.09	7.09
Day 2	7.72	7.09	7.05	7.07	7.46	7.29
Day 3	7.09	7.43	7.00	7.09	7.05	7.04
Day 4		7.18	7.22	7.23	7.52	7.26
Day 5	7.30	7.25	7.18	7.13	7.12	7.18
Day 6		7.64	7.74	7.83	7.92	8.02

pH (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Day 1	7.63	7.57	7.65	7.63	7.59	7.59
Day 2	7.54	7.04	7.05	7.38	7.08	7.06
Day 3	7.05	7.48	7.39	6.96	7.34	7.25
Day 4	7.42	7.15	7.20	7.63	7.65	7.14
Day 5	7.14	6.11	6.16	6.08	7.11	7.14
Day 6	7.22	7.32	7.15	7.23	7.27	7.31
Final	7.12	6.47	6.38	6.45	7.20	6.54

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Initial		8.4	8.4	8.4	8.7	8.4
Day 1		8.4	8.4	8.5	8.5	8.4
Day 2	8.3	8.4	8.4	8.5	8.4	8.5
Day 3	8.3	8.3	8.3	8.2	8.3	8.4
Day 4	8.6	8.6	8.3	8.4	8.4	8.4
Day 5	7.7	7.5	7.5	7.5	7.3	7.6
Day 6		8.4	8.4	8.5	8.5	8.5

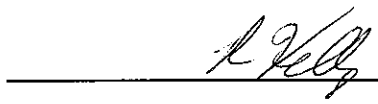
Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Day 1		8.3	8.3	8.4	8.9	8.3
Day 2	8.1	7.9	7.8	7.8	7.8	7.9
Day 3	7.8	8.0	7.8	7.8	7.6	7.7
Day 4	8.6	8.5	8.4	8.5	8.5	8.5
Day 5	7.8	7.7	7.5	7.7	7.5	7.4
Day 6	8.3	8.9	8.9	8.9	8.4	8.4
Final	8.2	8.0	8.0	8.0	8.4	8.2

Date	Alkalinity	Hardness	Conductivity	Res. Cl.
5-22-00	12	6.00	66	<0.05
5-24-00	9.5	6.00	62	0.06
5-26-00	7.7	8.00	131	0.06

Temperature

Incubator °C	
Initial	24.4
Day 1	24.8
Day 2	24.8
Day 3	24.5
Day 4	24.6
Day 5	24.6
Day 6	24.5
Final	24.5

Test Results Reviewed and Approved By: 

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7 Day Chronic Definitive Survival and Reproduction Bioassay

Method: EPA/600/4-91/002

Test Organism: *Daphnia ambigua*

Facility: WSRC/A-11
Sample ID: A-11 w/ Daphnia ambigua

ETT#: T14612

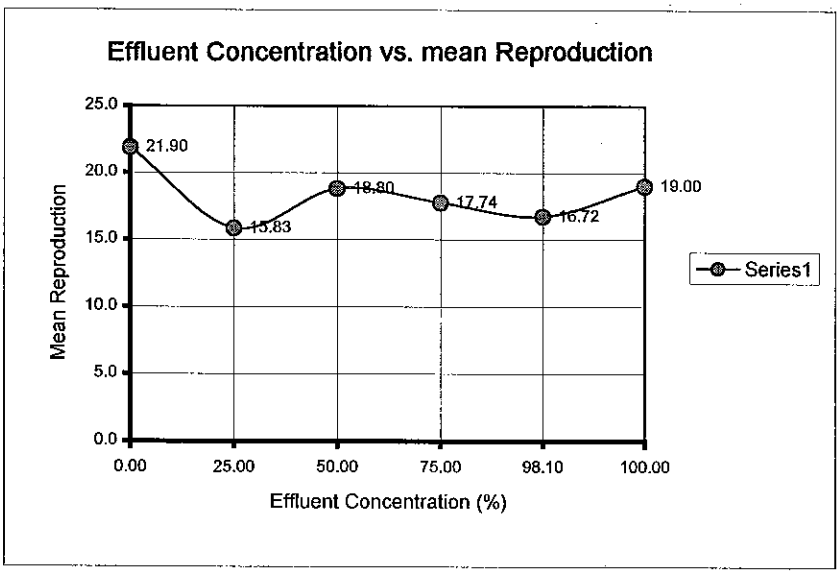
Date: June 1, 2000

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	WSRC	Start Date:	6/1/00
Sample ID:	A-11 - Daphnia ambigua	Lab ID:	T14611

Normality Test	Heterogeneity of Variance Test
Kolmogorov's Test: D*= 1.028 critical= 1.035	Bartlett's Test B= 15.27 critical= 11.35
Data are normal in distribution.	Data are not homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 %	0.0%	21.90	2.51			
25 %	27.8%	15.83	9.61	306.5	305	Pass
50 %	10.0%	18.80	7.88	379.0	305	Pass
75 %	10.5%	17.74	7.94	317.5	305	Pass
98.1 %	22.2%	16.72	9.51	315.5	305	Pass
100 %	29.4%	19.00	9.85	322.0	273	Pass
			CV 11.5%			



Test Summary

Survival

No Observed Effect Concentration
NOEC= >100 %
Lowest Observed Effect Concentration
LOEC= >100 %
7 Day LC50
LC50= >100 %

Reproduction

No Observed Effect Concentration
NOEC= >100 %
Lowest Observed Effect Concentration
LOEC= >100 %
Chronic Value
ChV= >100 %
IC25= >100 %

CHRONIC DEFINITIVE

Facility: WSRC
Outfall: A-11 - Daphnia ambigua

Start Date: 6/1/00
Lab ID: T14611

Replicate	Control	dead	lost	25	dead	lost	50	dead	lost	75	dead	lost	98.1	dead	lost	100	dead	lost
1	21	0	0	0	1	0	15	0	0	22	0	0	15	0	0	2	1	0
2	21	0	0	19	0	0	21	0	0	16	0	0	15	0	0	11	1	0
3	19	0	0	27	0	0	25	0	0	0	1	0	22	0	0	na	0	1
4	23	0	0	0	1	0	22	0	0	0	1	0	19	0	0	0	1	0
5	24	0	0	0	1	0	12	0	0	14	0	0	na	0	1	32	0	0
6	22	0	0	15	1	0	24	0	0	24	0	0	20	0	0	na	0	1
7	22	0	0	21	0	0	28	0	0	17	0	0	23	0	0	24	0	0
8	20	0	0	0	1	0	15	0	0	17	0	0	na	0	1	26	0	0
9	23	0	0	21	0	0	23	0	0	26	0	0	0	1	0	24	0	0
10	18	0	0	23	0	0	13	0	0	20	0	0	12	0	0	27	0	0
11	20	0	0	9	0	0	17	0	0	21	0	0	27	0	0	19	0	0
12	22	0	0	21	0	0	21	0	0	27	0	0	23	0	0	19	0	0
13	21	0	0	22	0	0	23	0	0	28	0	0	4	1	0	27	0	0
14	25	0	0	25	0	0	23	0	0	9	0	0	24	0	0	25	0	0
15	22	0	0	16	0	0	21	0	0	22	0	0	24	0	0	19	0	0
16	17	0	0	na	0	1	27	0	0	na	0	1	24	0	0	na	0	1
17	25	0	0	na	0	1	19	0	0	15	0	0	24	0	0	23	1	0
18	27	0	0	22	0	0	0	1	0	24	0	0	25	0	0	24	0	0
19	25	0	0	19	0	0	27	0	0	15	0	0	0	1	0	0	1	0
20	21	0	0	25	0	0	0	1	0	20	0	0	0	1	0	21	0	0

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC/A-11 w/ Daphnia ambigua in Very Soft Synthetic Water**
Sample Identification: **T14612**
Test Date: **June 1, 2000**

pH (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Initial	6.79	6.95	5.79	6.69	6.56	6.64
Day 1		4.96	5.36	6.13	6.50	6.57
Day 2	6.86	6.97	7.01	7.12	7.17	7.21
Day 3	6.73	6.66	6.67	6.75	6.86	6.88
Day 4	7.51	7.51	7.27	7.66	7.61	7.64
Day 5	7.42	7.36	7.36	7.30	7.30	7.27
Day 6	7.34	6.62	7.21	7.12	6.65	7.07

pH (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Day 1	7.06	4.27	4.89	5.10	5.63	5.57
Day 2	7.17		7.21	7.18	7.13	7.21
Day 3	6.72	6.82	6.99	7.07	7.19	7.25
Day 4	6.00	6.85	6.91	6.93	6.91	6.92
Day 5	7.47	7.39	7.35	7.35	7.38	7.01
Day 6	6.98	7.20	6.51	6.53	7.16	7.12
Final	7.08	6.85	6.35	7.03	7.03	7.02

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Initial	8.4	8.3	9.0	9.2	9.2	9.5
Day 1		8.2	8.3	8.3	8.4	8.4
Day 2	8.2	8.2	8.2	8.2	8.4	8.3
Day 3	8.2	8.2	8.2	8.2	8.2	8.3
Day 4	8.3	8.2	8.3	8.2	8.3	8.3
Day 5	8.2	8.4	8.6	8.6	8.9	9.4
Day 6	8.2	8.2	8.3	8.4	8.2	8.2

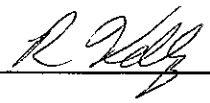
Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Day 1		7.8	7.9	7.9	8.0	8.0
Day 2		8.3	8.3	8.3	8.4	8.5
Day 3		8.3	8.4	8.4	8.4	8.4
Day 4	7.9	8.2	8.1	8.2	8.1	8.1
Day 5	7.8	7.8	7.8	8.0	7.8	7.8
Day 6	8.2	8.2	8.2	8.3	8.2	8.3
Final		8.3	8.3	8.4	8.3	8.4

Date	Alkalinity	Hardness	Conductivity	Res. Cl.
5-31-00	6.9	8.0	72	<0.05
6-2-00	25	2.0	176	<0.05
6-5-00	10	6.0	51	<0.05

Temperature

Incubator °C	
Initial	24.5
Day 1	24.9
Day 2	24.4
Day 3	24.8
Day 4	24.9
Day 5	24.7
Day 6	24.3
Final	24.4

Test Results Reviewed and Approved By: 

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7 Day Chronic Definitive Survival and Reproduction Bioassay

Method: EPA/600/4-91/002

Test Organism: *Daphnia ambigua*

Facility: WSRC/A-11
Sample ID: A-11 w/ Daphnia ambigua

ETT#: T14657

Date: June 6, 2000

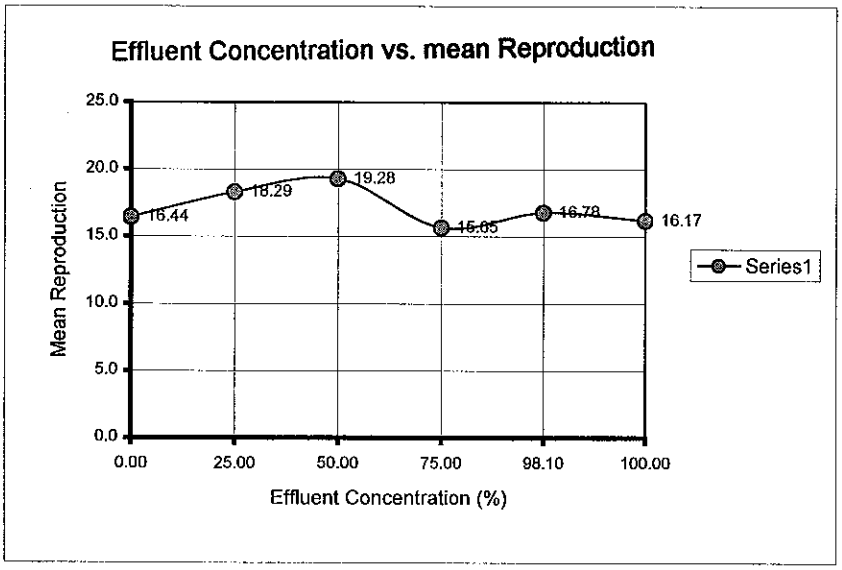
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	WSRC	Start Date:	6/6/00
Sample ID:	A-11 - Daphnia ambigua	Lab ID:	T14657

Normality Test
Kolmogorov's Test: D*= 1.281 critical= 1.035
Data are not normal in distribution.

Heterogeneity of Variance Test
Bartlett's Test B= 0.96 critical= 11.35
Data are homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 %	11.1%	16.44	5.38			
25 %	5.9%	18.29	5.88			Pass
50 %	5.6%	19.28	6.06			Pass
75 %	29.4%	15.65	9.05	317.5	262	Pass
98.1 %	16.7%	16.78	8.60	352.5	262	Pass
100 %	22.2%	16.17	10.22	348.0	262	Pass
			CV 32.7%			



Test Summary

Survival
No Observed Effect Concentration
NOEC= >100 %
Lowest Observed Effect Concentration
LOEC= >100 %
7 Day LC50
LC50= >100 %

Reproduction
No Observed Effect Concentration
NOEC= >100 %
Lowest Observed Effect Concentration
LOEC= >100 %
Chronic Value
ChV= >100 %
IC25= >100 %

CHRONIC DEFINITIVE

Facility: WSRC
Outfall: A-11 - Daphnia ambigua

Start Date: 6/6/00
Lab ID: T14657

Replicate	Control	dead	lost	25	dead	lost	50	dead	lost	75	dead	lost	98.1	dead	lost	100	dead	lost
1	19	0	0	21	0	0	22	0	0	20	0	0	18	0	0	23	0	0
2	17	0	0	23	0	0	22	0	0	4	1	0	20	0	0	0	1	0
3	16	0	0	18	0	0	20	0	0	0	1	0	22	0	0	23	0	0
4	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1
5	13	0	0	14	0	0	17	0	0	0	1	0	0	1	0	24	0	0
6	17	0	0	na	0	1	14	0	0	23	0	0	22	0	0	19	0	0
7	22	0	0	18	0	0	26	0	0	20	1	0	18	0	0	14	0	0
8	16	0	0	17	0	0	18	0	0	0	1	0	24	0	0	21	0	0
9	20	0	0	27	0	0	21	0	0	18	0	0	17	0	0	21	0	0
10	17	0	0	25	0	0	24	0	0	17	0	0	16	0	0	8	0	0
11	19	0	0	20	0	0	18	0	0	26	0	0	25	0	0	16	0	0
12	20	0	0	17	0	0	21	0	0	na	0	1	28	0	0	28	0	0
13	0	1	0	21	0	0	20	0	0	25	0	0	19	0	0	16	0	0
14	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1	na	0	1
15	7	1	0	21	0	0	28	0	0	23	0	0	12	0	0	0	1	0
16	19	0	0	0	1	0	13	0	0	20	0	0	0	1	0	0	1	0
17	20	0	0	15	0	0	0	1	0	23	0	0	21	0	0	0	1	0
18	16	0	0	21	0	0	22	0	0	13	0	0	16	0	0	26	0	0
19	16	0	0	15	0	0	20	0	0	15	0	0	0	1	0	29	0	0
20	22	0	0	18	0	0	21	0	0	19	0	0	24	0	0	23	0	0

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC/A-11 w/ Daphnia ambigua in Very Soft Synthetic Water**
Sample Identification: **T14657**
Test Date: **June 6, 2000**

pH (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Initial	7.42	7.36	7.36	7.30	7.30	7.27
Day 1	7.34	6.62	7.21	7.12	6.65	7.07
Day 2	7.20	6.48	7.91	7.29	7.29	7.20
Day 3	7.47	7.57	7.29	7.64	7.56	7.21
Day 4	7.38	7.01	7.26	7.33	7.08	7.11
Day 5	6.90	6.87	6.86	6.85	6.86	6.75
Day 6		6.87	7.59	6.76	6.75	7.09

pH (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Day 1	6.98	7.20	6.51	6.53	7.16	7.12
Day 2	7.08	6.85	6.35	7.03	7.03	7.02
Day 3	7.62	7.74	7.78	7.86	7.49	7.42
Day 4	7.50	7.35	7.29	7.20	7.26	7.02
Day 5	6.17	6.20	6.20	6.20	6.16	6.15
Day 6		7.20	7.41	7.05	7.38	7.28
Final	7.39	7.52	7.41	8.16	6.87	7.05

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Initial	8.2	8.4	8.6	8.6	8.9	9.4
Day 1	8.2	8.2	8.3	8.4	8.2	8.2
Day 2		8.3	8.3	8.4	8.4	8.4
Day 3	8.4	8.4	8.6	8.8	8.9	8.8
Day 4	8.2	8.2	8.3	8.4	8.4	8.4
Day 5	8.2	8.1	8.2	8.2	8.1	8.1
Day 6		8.2	8.2	8.3	8.3	8.4

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Day 1	8.2	8.2	8.2	8.3	8.2	8.3
Day 2		8.3	8.3	8.4	8.3	8.4
Day 3	8.0	8.4	8.4	8.5	8.6	8.8
Day 4	7.8	8.0	8.2	8.2	8.0	8.0
Day 5	7.9	7.8	7.7	8.0	7.9	7.9
Day 6		8.0	7.9	7.8	8.0	8.0
Final	7.9	7.3	7.6	8.0	7.6	7.3

Date	Alkalinity	Hardness	Conductivity	Res. Cl.
6-5-00	10	6.0	51	<0.05
6-7-00	9.1	4.0	166	<0.05
6-9-00	11	10.0	109	<0.05

Temperature

Incubator °C	
Initial	24.7
Day 1	24.3
Day 2	24.4
Day 3	24.5
Day 4	24.5
Day 5	24.4
Day 6	24.7
Final	24.7

Test Results Reviewed and Approved By: 

ETT Environmental, inc.
P.O. Box 16414, Greenville, SC 29606
(864) 877-6942 • FAX (864) 877-6938
4 Craftsman Court, Greer, SC 29650

7 Day Chronic Definitive Survival and Reproduction Bioassay

Method: EPA/600/4-91/002

Test Organism: *Daphnia ambigua*

Facility: WSRC/A-11
Sample ID: A-11 w/ Daphnia ambigua

ETT#: T14722

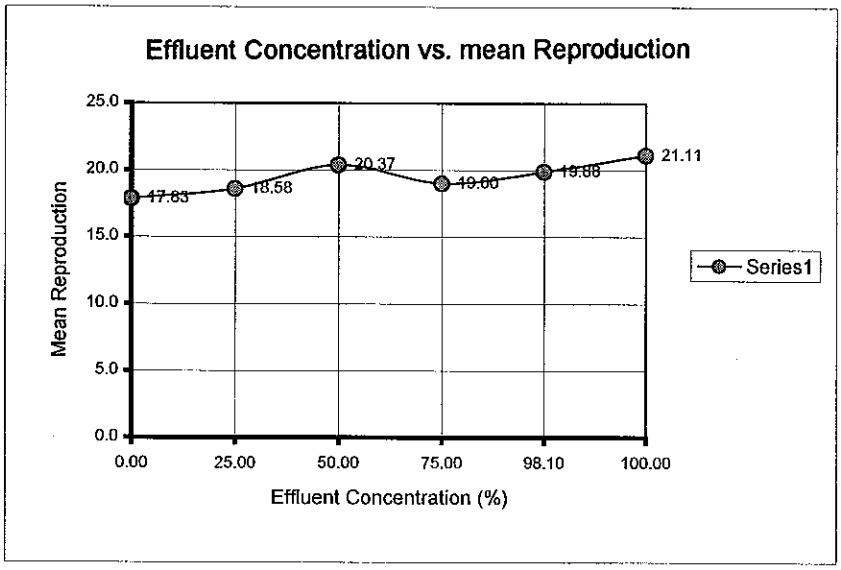
Date: June 13, 2000

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Statistical Analysis

Facility:	WSRC	Start Date:	6/13/00
Sample ID:	A-11 - Daphnia ambigua	Lab ID:	T14722

Normality Test	Heterogeneity of Variance Test
Kolmogorov's Test: D*= 0.973 critical= 1.035	Bartlett's Test B= 19.16 critical= 15.09
Data are normal in distribution.	Data are not homogeneous in variance.

Test Concentration	7 Day Mortality	Mean Reproduction	Standard Deviation	Wilcoxon's Test Rank Sum	Wilcoxon's Test Critical Value	Pass/Fail
0 %	11.1%	17.83	7.35			
25 %	10.5%	18.58	8.24			Pass
50 %	5.3%	20.37	5.65			Pass
75 %	15.0%	19.00	9.71			Pass
98.1 %	17.6%	19.88	10.09			Pass
100 %	11.1%	21.11	8.49			Pass
			CV 41.2%			



Test Summary

Survival

No Observed Effect Concentration
NOEC= >100 %
Lowest Observed Effect Concentration
LOEC= >100 %
7 Day LC50
LC50= >100 %

Reproduction

No Observed Effect Concentration
NOEC= >100 %
Lowest Observed Effect Concentration
LOEC= >100 %
Chronic Value
ChV= >100 %
IC25= >100 %

CHRONIC DEFINITIVE

Facility: WSRC
Outfall: A-11 - Daphnia ambigua

Start Date: 6/13/00
Lab ID: T14722

Replicate	Control	dead	lost	25	dead	lost	50	dead	lost	75	dead	lost	98.1	dead	lost	100	dead	lost
1	19	0	0	24	0	0	0	1	0	30	0	0	0	1	0	22	0	0
2	20	0	0	26	0	0	23	0	0	1	0	0	23	0	0	25	0	0
3	21	0	0	22	0	0	21	0	0	19	0	0	15	0	0	24	0	0
4	11	0	0	23	0	0	19	0	0	26	0	0	23	0	0	19	0	0
5	20	0	0	11	0	0	na	0	1	16	0	0	26	0	0	15	0	0
6	24	0	0	28	0	0	23	0	0	0	1	0	27	0	0	24	0	0
7	0	1	0	0	1	0	19	0	0	25	0	0	na	0	1	na	0	1
8	na	0	1	29	0	0	21	0	0	0	1	0	na	0	1	22	0	0
9	22	0	0	na	0	1	25	0	0	24	0	0	23	0	0	28	0	0
10	22	0	0	26	0	0	23	0	0	22	0	0	28	0	0	28	0	0
11	23	0	0	21	0	0	22	0	0	23	0	0	26	0	0	26	0	0
12	21	0	0	21	0	0	18	0	0	18	0	0	0	1	0	0	1	0
13	20	0	0	2	1	0	21	0	0	23	0	0	29	0	0	29	0	0
14	18	0	0	10	0	0	22	0	0	4	1	0	21	0	0	21	0	0
15	15	0	0	22	0	0	15	0	0	25	0	0	26	0	0	26	0	0
16	25	0	0	22	0	0	21	0	0	29	0	0	27	0	0	27	0	0
17	16	0	0	22	0	0	28	0	0	26	0	0	25	0	0	25	0	0
18	24	0	0	12	0	0	23	0	0	24	0	0	na	0	1	na	0	1
19	0	1	0	16	0	0	20	0	0	21	0	0	19	0	0	19	0	0
20	na	0	1	16	0	0	23	0	0	24	0	0	0	1	0	0	1	0

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC/A-11 w/ Daphnia ambigua in Very Soft Synthetic Water**
Sample Identification: **T14722**
Test Date: **June 13, 2000**

pH (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Initial		7.44	7.43	7.34	7.23	7.42
Day 1	7.92	7.71	7.42	7.67	7.60	7.54
Day 2	7.17	7.00	6.92	7.10	7.15	6.90
Day 3	7.24	6.67	7.05	7.02	6.69	7.18
Day 4	7.45	7.30	7.29	7.12	7.20	7.09
Day 5	7.21	7.17	7.18	7.13	7.12	7.07
Day 6	7.92	7.54	7.39	7.40	7.26	7.21

pH (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Day 1	8.08	7.74	7.73	7.69	7.61	7.52
Day 2	7.30	7.01	6.80	7.94	6.97	7.11
Day 3	7.20	6.52	7.37	7.23	7.21	7.13
Day 4	7.18	7.13	7.28	7.23	7.09	7.05
Day 5	7.38	7.27	7.35	7.37	7.21	7.31
Day 6	7.40	7.61	7.38	7.37	7.23	7.16
Final	7.25	7.24	7.11	6.92	6.94	

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Initial		8.4	8.6	8.9	8.9	9.0
Day 1	8.2	8.2	8.2	8.4	8.4	8.4
Day 2	8.1	8.0	8.1	8.2	8.2	8.2
Day 3	8.0	8.3	8.7	9.0	9.2	8.1
Day 4	8.4	8.5	8.4	8.4	8.3	8.4
Day 5	8.5	8.5	8.5	8.5	8.5	8.5
Day 6	8.5	8.6	8.5	8.6	8.6	8.4

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	25%	50%	75%	98.1%	100%
Day 1	8.1	8.0	8.0	8.7	8.2	8.3
Day 2	7.9	7.8	8.0	7.8	7.8	8.0
Day 3	7.8	7.9	8.0	7.9	8.3	8.0
Day 4	8.3	8.2	8.4	8.3	8.5	8.4
Day 5	8.0	8.2	8.2	8.2	8.2	8.2
Day 6	8.4	8.3	8.2	8.4	8.3	8.5
Final	8.0	8.0	7.7	7.6	7.8	

Date	Alkalinity	Hardness	Conductivity	Res. Cl.
6-12-00	12	14.0	60	0.05
6-14-00	7.6		65	<0.05
6-16-00	11	10.0	182	<0.05

Temperature

Incubator °C	
Initial	24.7
Day 1	24.8
Day 2	24.7
Day 3	24.3
Day 4	24.4
Day 5	24.7
Day 6	24.8
Final	24.2

Test Results Reviewed and Approved By: 

APPENDIX C

ETT Environmental, inc.
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DAPHNID TOXICITY TESTING WITH UPPER THREE RUNS CREEK WATER
May - June 2000

		Mortality		Reproduction			
Test Date	Test Species	Control	U3R	Control	U3R		t Value
5/22/00	*C. dubia*	0%	45%	25.4	1.1	Fail	35.1
5/22/00	*D. ambigua*	5%	25%	22.2	6.5	Fail	6.2
5/31/00	*C. dubia*	0%	35%	25.4	3.9	Fail	21.6
5/31/00	*D. ambigua*	0%	95%	21.9	0.0	Fail	39.0
6/5/00	*C. dubia*	0%	20%	20.5	5.1	Fail	9.25
6/5/00	*D. ambigua*	17%	10%	16.3	16.9	Pass	-0.22
6/12/00	*C. dubia*	0%	20%	24.3	10.3	Fail	7.80
6/12/00	*D. ambigua*	0%	15%	21.1	21.7	Pass	-0.30

DMR Attachment for Toxicity Test Results. Bureau of Water

WSRC/UTR (Ceriodaphnia dubia) Permit number **SC** Discharge #:

Final Limits: Parameter Code TGP3B MLOC=1 IWC= 100.00%Effluent

Monitoring Period	Year	Month	Day		Year	Month	Day
From	00	5	1	To	00	5	31

Date	5-22-00	Group	All tests #Adults	#Dead	Pass/Fail	Chronic Tests Only Average	Variance	Pass/Fail
Lab ID	**23104**	Control	20	0		25.4	6.78	
		Test	19	9	**FAIL**	1.1	2.50	**FAIL**

Date		Group	All tests #Adults	#Dead	Pass/Fail	Chronic Tests Only Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

Date		Group	All tests #Adults	#Dead	Pass/Fail	Chronic Tests Only Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

Date		Group	All tests #Adults	#Dead	Pass/Fail	Chronic Tests Only Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

Date		Group	All tests #Adults	#Dead	Pass/Fail	Chronic Tests Only Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

Date		Group	All tests #Adults	#Dead	Pass/Fail	Chronic Tests Only Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

Signature of Principal Executive Officer or Authorized Agent ______________________________

Name/Title of Principal Executive Officer (typed or printed) ______________________________

DHEC 3420 (8/96)

STATISTICAL ANALYSIS RESULTS

Facili **WSRC/UTR (Ceriodaphnia dubia)**		NPDES# **SC**	
Samp **UTR w/ C. dubia in MHSF**	ETT# T14559-1	Date:	5-22-00
Labor **ETT Environmental, Inc.**	Certification #: 23104		Exp. Date: 10/2001

SURVIVAL AND REPRODUCTION				
	Control		100.00 Effluent	
Rep	(L/D)	# young	(L/D)	# young
1	L	22	D	0
2	L	24	L	2
3	L	25	L	5
4	L	22	D	0
5	L	28	N/A	0
6	L	24	D	0
7	L	25	D	0
8	L	24	D	0
9	L	22	D	0
10	L	26	D	0
11	L	27	L	1
12	L	26	D	0
13	L	25	L	5
14	L	27	D	0
15	L	29	L	1
16	L	20	L	2
17	L	29	L	0
18	L	28	L	2
19	L	26	L	1
20	L	29	L	1

Survival Data

	7 Day Survival	Test Used:	Fisher's Test
Control	100%	Test Statistic:	P= 0.00
Effluent	53%	Critical Value:	P= 0.05

FAIL: The effluent reduces survival of the test organisms.

Reproduction Data

Raw Data

	young/female	Std. Dev.
Control	25.4	2.6
Effluent	1.1	1.6

Test for Normality

Test Used:	**Shapiro-Wilks Test**
Control W:	0.950
Critical Value:	0.868
Effluent W:	0.695
Critical Value:	0.863

The data are not normally distributed

Analysis for Differences in Reproduction

Test Used: Wilcoxon Test

t=	35.07
Critical Value:	1.69

The effluent does reduce reproduction

Test for Homogeneity of Variance

Test Used:	**F Test**
F=	2.71
Critical Value:	7.37

The data are homogeneous in variance

FAIL: The effluent is chronically toxic.

QUALITY CONTROL RESULTS

Reference Toxicant: NaCl

Current Acute LC5	1.96	g/L	Current Chronic NOEC:	0.8	g/L
Mean Acute LC50:	2.01	g/L	Mean Chronic NOEC::	0.8	g/L
Lower & Upper Limits (g/	1.75	2.22	Lower & Upper Limits (g/L)	0.4	1.5

DMR Attachment for Toxicity Test Results. Bureau of Water

WSRC/UTR (Daphnia ambigua) Permit number **SC** Discharge #:

Final Limits: Parameter Code TGP3B MLOC=1 IWC= 100.00%Effluent

Monitoring Period	Year	Month	Day		Year	Month	Day
From	00	5	1	To	00	5	31

			All tests			Chronic Tests Only		
Date	5-22-00	Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Lab ID	**23104**	Control	19	1		22.2	48.18	
		Test	20	5	**PASS**	6.5	76.47	**FAIL**

			All tests			Chronic Tests Only		
Date		Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

			All tests			Chronic Tests Only		
Date		Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

			All tests			Chronic Tests Only		
Date		Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

			All tests			Chronic Tests Only		
Date		Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

			All tests			Chronic Tests Only		
Date		Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

Signature of Principal Executive Officer or Authorized Agent ______________________

Name/Title of Principal Executive Officer (typed or printed) ______________________

DHEC 3420 (8/96)

STATISTICAL ANALYSIS RESULTS

Facili **WSRC/UTR (Daphnia ambigua)**		NPDES# **SC**	
Samp **UTR w/ D. ambigua in Very Soft W**	ETT# T14559	Date:	5-22-00
Labor **ETT Environmental, Inc.**	Certification #: 23104		Exp. Date: 10/2001

SURVIVAL AND REPRODUCTION				
	Control		100.00 Effluent	
Rep	(L/D)	# young	(L/D)	# young
1	N/A	0	D	8
2	L	10	L	24
3	L	18	D	6
4	L	24	L	2
5	L	27	L	2
6	L	25	L	13
7	L	25	L	0
8	L	30	L	13
9	L	19	L	3
10	L	18	L	5
11	L	27	D	0
12	D	1	L	6
13	L	28	L	33
14	L	24	L	6
15	L	26	L	9
16	L	23	D	0
17	L	24	L	0
18	L	20	L	0
19	L	27	L	0
20	L	26	D	0

Survival Data

	7 Day Survival
Control	95%
Effluent	75%

Test Used: **Fisher's Test**

Test Statistic: P= 0.09

Critical Value: P= 0.05

PASS: The effluent does not reduce survival of the test organisms.

Reproduction Data

Raw Data

	young/female	Std. Dev.
Control	22.2	6.9
Effluent	6.5	8.7

Test for Normality

Test Used: **Shapiro-Wilks Test**

Control W: 0.810

Critical Value: 0.863

Effluent W: 0.752

Critical Value: 0.868

The data are not normally distributed

Analysis for Differences in Reproduction

Test Used: Wilcoxon Test

t= 6.19

Critical Value: 1.69

The effluent does reduce reproduction

Test for Homogeneity of Variance

Test Used: **F Test**

F= 1.59

Critical Value: 7.37

The data are homogeneous in variance

FAIL: The effluent is chronically toxic.

QUALITY CONTROL RESULTS

Reference Toxicant: NaCl

Current Acute LC5	1.96	g/L	Current Chronic NOEC:	0.8	g/L
Mean Acute LC50:	2.01	g/L	Mean Chronic NOEC::	0.8	g/L
Lower & Upper Limits (g/	1.75	2.22	Lower & Upper Limits (g/L)	0.4	1.5

DMR Attachment for Toxicity Test Results. Bureau of Water

WSRC/UTR (Ceriodaphnia dubia) Permit number **SC** Discharge #:

Final Limits: Parameter Code TGP3B MLOC=1 IWC= 100.00%Effluent

Monitoring Period	Year	Month	Day		Year	Month	Day
From	00	5	1	To	00	5	31

			All tests			Chronic Tests Only		
Date	5-31-00	Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Lab ID	**23104**	Control	17	0		25.4	9.24	
		Test	19	7	**FAIL**	3.9	8.54	**FAIL**

			All tests			Chronic Tests Only		
Date		Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

			All tests			Chronic Tests Only		
Date		Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

			All tests			Chronic Tests Only		
Date		Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

			All tests			Chronic Tests Only		
Date		Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

			All tests			Chronic Tests Only		
Date		Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

Signature of Principal Executive Officer or Authorized Agent ______________________________

Name/Title of Principal Executive Officer (typed or printed) ______________________________

STATISTICAL ANALYSIS RESULTS

Facili **WSRC/UTR (Ceriodaphnia dubia)**		NPDES# **SC**	
Samp **UTR w/ Ceriodaphnia dubia in MH**	ETT# T14613	Date:	5-31-00
Labor **ETT Environmental, Inc.**	Certification #: 23104		Exp. Date: 10/2001

SURVIVAL AND REPRODUCTION				
	Control		100.00 Effluent	
Rep	(L/D)	# young	(L/D)	# young
1	L	29	D	3
2	L	19	D	8
3	L	23	L	3
4	N/A	0	D	0
5	N/A	0	D	0
6	L	28	L	9
7	L	26	D	4
8	L	27	L	1
9	L	23	L	7
10	L	25	L	4
11	L	29	L	7
12	L	24	L	1
13	L	27	L	3
14	L	25	L	8
15	L	31	L	6
16	L	26	N/A	0
17	L	22	L	5
18	L	22	D	3
19	L	25	L	0
20	N/A	0	D	2

Survival Data

	7 Day Survival	Test Used:	Fisher's Test
Control	100%	Test Statistic:	P= 0.01
Effluent	63%	Critical Value:	P= 0.05

FAIL: The effluent reduces survival of the test organisms.

Reproduction Data

Raw Data

	young/female	Std. Dev.
Control	25.4	3.0
Effluent	3.9	2.9

Test for Normality

Test Used:	**Shapiro-Wilks Test**
Control W:	0.986
Critical Value:	0.851
Effluent W:	0.931
Critical Value:	0.863

The data are normally distributed.

Analysis for Differences in Reproduction

Test Used: Equal Variance t Test.

t=	21.58
Critical Value:	1.69

The effluent does reduce reproduction

Test for Homogeneity of Variance

Test Used:	**F Test**
F=	1.08
Critical Value:	7.44

The data are homogeneous in variance

FAIL: The effluent is chronically toxic.

QUALITY CONTROL RESULTS

Reference Toxicant: NaCl

Current Acute LC5	1.96	g/L	Current Chronic NOEC:	0.8	g/L
Mean Acute LC50:	2.01	g/L	Mean Chronic NOEC::	0.8	g/L
Lower & Upper Limits (g/	1.75	2.22	Lower & Upper Limits (g/L)	0.4	1.5

DMR Attachment for Toxicity Test Results. Bureau of Water

WSRC/UTR (Daphnia ambigua) Permit number **SC** Discharge #:

Final Limits: Parameter Code TGP3B MLOC=1 IWC= 100.00%Effluent

Monitoring Period	Year	Month	Day		Year	Month	Day
From	00	5	1	To	00	5	31

Date	5-31-00	Group	#Adults (All tests)	#Dead (All tests)	Pass/Fail (All tests)	Average (Chronic Tests Only)	Variance (Chronic Tests Only)	Pass/Fail (Chronic Tests Only)
Lab ID	**23104**	Control	20	0		21.9	6.31	
		Test	20	19	**FAIL**	0.0		**FAIL**

Date		Group	#Adults (All tests)	#Dead (All tests)	Pass/Fail (All tests)	Average (Chronic Tests Only)	Variance (Chronic Tests Only)	Pass/Fail (Chronic Tests Only)
Lab ID		Control						
		Test						

Date		Group	#Adults (All tests)	#Dead (All tests)	Pass/Fail (All tests)	Average (Chronic Tests Only)	Variance (Chronic Tests Only)	Pass/Fail (Chronic Tests Only)
Lab ID		Control						
		Test						

Date		Group	#Adults (All tests)	#Dead (All tests)	Pass/Fail (All tests)	Average (Chronic Tests Only)	Variance (Chronic Tests Only)	Pass/Fail (Chronic Tests Only)
Lab ID		Control						
		Test						

Date		Group	#Adults (All tests)	#Dead (All tests)	Pass/Fail (All tests)	Average (Chronic Tests Only)	Variance (Chronic Tests Only)	Pass/Fail (Chronic Tests Only)
Lab ID		Control						
		Test						

Date		Group	#Adults (All tests)	#Dead (All tests)	Pass/Fail (All tests)	Average (Chronic Tests Only)	Variance (Chronic Tests Only)	Pass/Fail (Chronic Tests Only)
Lab ID		Control						
		Test						

Signature of Principal Executive Officer or Authorized Agent ______________________________

Name/Title of Principal Executive Officer (typed or printed) ______________________________

DHEC 3420 (8/96)

STATISTICAL ANALYSIS RESULTS

Facili **WSRC/UTR (Daphnia ambigua)**		NPDES# **SC**	
Samp **UTR w/ Daphnia ambigua in Very**	ETT# T14613-1	Date:	5-31-00
Labor **ETT Environmental, Inc.**	Certification #: 23104		Exp. Date: 10/2001

SURVIVAL AND REPRODUCTION

	Control		100.00 Effluent	
Rep	(L/D)	# young	(L/D)	# young
1	L	21	D	0
2	L	21	D	0
3	L	19	D	0
4	L	23	D	0
5	L	24	D	0
6	L	22	D	0
7	L	22	D	0
8	L	20	D	0
9	L	23	D	0
10	L	18	L	0
11	L	20	D	0
12	L	22	D	0
13	L	21	D	0
14	L	25	D	0
15	L	22	D	0
16	L	17	D	0
17	L	25	D	0
18	L	27	D	0
19	L	25	D	0
20	L	21	D	0

Survival Data

	7 Day Survival		
Control	100%	Test Used:	**Fisher's Test**
Effluent	5%	Test Statistic:	P= 0.00
		Critical Value:	P= 0.05

FAIL: The effluent reduces survival of the test organisms.

Reproduction Data

Raw Data

	young/female	Std. Dev.
Control	21.9	2.5
Effluent	0.0	0.0

Test for Normality

Test Used:	**Shapiro-Wilks Test**
Control W:	0.977
Critical Value:	0.868
Effluent W:	
Critical Value:	0.868

The data are not normally distributed

Analysis for Differences in Reproduction

Test Used: Wilcoxon Test

t=	39.00
Critical Value:	1.69

The effluent does reduce reproduction

Test for Homogeneity of Variance

Test Used:	**F Test**
F=	63052.63
Critical Value:	7.35

The data are not homogeneous in variance.

FAIL: The effluent is chronically toxic.

QUALITY CONTROL RESULTS

Reference Toxicant: NaCl

Current Acute LC5	1.96	g/L	Current Chronic NOEC:	0.8	g/L
Mean Acute LC50:	2.01	g/L	Mean Chronic NOEC::	0.8	g/L
Lower & Upper Limits (g/	1.75	2.22	Lower & Upper Limits (g/L)	0.4	1.5

DMR Attachment for Toxicity Test Results. Bureau of Water

WSRC/UTR (Ceriodaphnia dubia) Permit number **SC** Discharge #:

Final Limits: Parameter Code TGP3B MLOC=1 IWC= 100.00%Effluent

Monitoring Period	Year	Month	Day		Year	Month	Day
From	00	6	1	To	00	6	30

Date	6-5-00	Group	All tests: #Adults	#Dead	Pass/Fail	Chronic Tests Only: Average	Variance	Pass/Fail
Lab ID	**23104**	Control	13	0		20.5	31.44	
		Test	20	4	**PASS**	5.1	15.99	**FAIL**

Date		Group	All tests: #Adults	#Dead	Pass/Fail	Chronic Tests Only: Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

Date		Group	All tests: #Adults	#Dead	Pass/Fail	Chronic Tests Only: Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

Date		Group	All tests: #Adults	#Dead	Pass/Fail	Chronic Tests Only: Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

Date		Group	All tests: #Adults	#Dead	Pass/Fail	Chronic Tests Only: Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

Date		Group	All tests: #Adults	#Dead	Pass/Fail	Chronic Tests Only: Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

Signature of Principal Executive Officer or Authorized Agent ______________________

Name/Title of Principal Executive Officer (typed or printed) ______________________

DHEC 3420 (8/96)

STATISTICAL ANALYSIS RESULTS

Facili **WSRC/UTR (Ceriodaphnia dubia)**		NPDES# **SC**	
Samp **UTR w/ Ceriodaphnia dubia in MH**	ETT# T14658	Date:	6-5-00
Labor **ETT Environmental, Inc.**	Certification #: 23104		Exp. Date: 10/2001

SURVIVAL AND REPRODUCTION				
	Control		100.00 Effluent	
Rep	(L/D)	# young	(L/D)	# young
1	L	21	L	13
2	N/A	0	L	7
3	L	27	L	3
4	L	23	L	4
5	N/A	0	L	11
6	L	11	L	15
7	L	19	L	0
8	N/A	0	L	6
9	N/A	0	L	0
10	L	25	L	4
11	N/A	0	L	2
12	N/A	0	D	0
13	L	27	D	4
14	L	14	L	6
15	L	18	L	6
16	L	16	L	3
17	L	15	L	5
18	L	22	D	5
19	N/A	0	L	4
20	L	29	D	4

Survival Data

	7 Day Survival	Test Used:	Fisher's Test
Control	100%	Test Statistic:	P= 0.12
Effluent	80%	Critical Value:	P= 0.05

PASS: The effluent does not reduce survival of the test organisms.

Reproduction Data

Raw Data

	young/female	Std. Dev.
Control	20.5	5.6
Effluent	5.1	4.0

Test for Normality

Test Used:	**Shapiro-Wilks Test**
Control W:	0.968
Critical Value:	0.814
Effluent W:	0.881
Critical Value:	0.868

The data are normally distributed.

Analysis for Differences in Reproduction

Test Used: Equal Variance t Test.

t=	9.25
Critical Value:	1.69

The effluent does reduce reproduction

Test for Homogeneity of Variance

Test Used:	**F Test**
F=	1.97
Critical Value:	7.53

The data are homogeneous in variance

FAIL: The effluent is chronically toxic.

QUALITY CONTROL RESULTS

Reference Toxicant: NaCl

Current Acute LC5	1.96	g/L	Current Chronic NOEC:	0.8	g/L
Mean Acute LC50:	2.01	g/L	Mean Chronic NOEC::	0.8	g/L
Lower & Upper Limits (g/	1.75	2.22	Lower & Upper Limits (g/L)	0.4	1.5

DMR Attachment for Toxicity Test Results. Bureau of Water

WSRC/UTR (Daphnia ambigua) Permit number **SC** Discharge #:

Final Limits: Parameter Code TGP3B MLOC=1 IWC= 100.00%Effluent

Monitoring Period	Year	Month	Day		Year	Month	Day
From	00	6	1	To	00	6	30

Date 6-5-00
Lab ID **23104**

	All tests			Chronic Tests Only		
Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Control	18	3	**PASS**	16.3	55.88	**PASS**
Test	19	2		16.9	66.43	

Date
Lab ID

	All tests			Chronic Tests Only		
Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Control						
Test						

Date
Lab ID

	All tests			Chronic Tests Only		
Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Control						
Test						

Date
Lab ID

	All tests			Chronic Tests Only		
Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Control						
Test						

Date
Lab ID

	All tests			Chronic Tests Only		
Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Control						
Test						

Date
Lab ID

	All tests			Chronic Tests Only		
Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Control						
Test						

Signature of Principal Executive Officer or Authorized Agent ______________________

Name/Title of Principal Executive Officer (typed or printed) ______________________

DHEC 3420 (8/96)

STATISTICAL ANALYSIS RESULTS

Facili **WSRC/UTR (Daphnia ambigua)**		NPDES# **SC**	
Samp **UTR w/ Daphnia ambigua in Very**	ETT# T14658-1	Date:	6-5-00
Labor **ETT Environmental, Inc.**	Certification #: 23104		Exp. Date: 10/2001

SURVIVAL AND REPRODUCTION				
	Control		100.00 Effluent	
Rep	(L/D)	# young	(L/D)	# young
1	L	14	L	29
2	L	18	L	21
3	N/A	0	N/A	0
4	L	18	D	0
5	L	18	L	17
6	D	0	L	17
7	L	22	D	6
8	L	19	L	18
9	L	20	L	17
10	L	21	L	14
11	L	18	L	24
12	L	17	L	23
13	N/A	0	L	25
14	D	3	L	15
15	L	18	L	0
16	L	24	L	20
17	L	20	L	19
18	L	20	L	26
19	D	0	L	9
20	L	24	L	21

Survival Data

	7 Day Survival	Test Used:	Fisher's Test
Control	83%	Test Statistic:	P= 0.32
Effluent	89%	Critical Value:	P= 0.05

PASS: The effluent does not reduce survival of the test organisms.

Reproduction Data

Raw Data

	young/female	Std. Dev.
Control	16.3	7.5
Effluent	16.9	8.2

Test for Normality

Test Used:	**Shapiro-Wilks Test**
Control W:	0.774
Critical Value:	0.858
Effluent W:	0.920
Critical Value:	0.863

The data are not normally distributed

Analysis for Differences in Reproduction

Test Used: Wilcoxon Test

t=	-0.22
Critical Value:	1.69

The effluent does not reduce reproduction.

Test for Homogeneity of Variance

Test Used:	**F Test**
F=	1.19
Critical Value:	7.42

The data are homogeneous in variance

PASS: The effluent is not chronically toxic

QUALITY CONTROL RESULTS

Reference Toxicant: NaCl

Current Acute LC5	1.96	g/L	Current Chronic NOEC:	0.8	g/L
Mean Acute LC50:	2.01	g/L	Mean Chronic NOEC::	0.8	g/L
Lower & Upper Limits (g/	1.75	2.22	Lower & Upper Limits (g/L)	0.4	1.5

DMR Attachment for Toxicity Test Results. Bureau of Water

WSRC/UTR (Ceriodaphnia dubia) Permit number **SC** Discharge #:

Final Limits: Parameter Code TGP3B MLOC=1 IWC= 100.00%Effluent

Monitoring Period	Year	Month	Day		Year	Month	Day
From	00	6	1	To	00	6	30

Date	6-12-00		All tests			Chronic Tests Only		
		Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Lab ID	**23104**	Control	18	0		24.3	29.74	
		Test	19	4	**PASS**	10.3	29.56	**FAIL**

Date			All tests			Chronic Tests Only		
		Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

Date			All tests			Chronic Tests Only		
		Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

Date			All tests			Chronic Tests Only		
		Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

Date			All tests			Chronic Tests Only		
		Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

Date			All tests			Chronic Tests Only		
		Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Lab ID		Control						
		Test						

Signature of Principal Executive Officer or Authorized Agent ______________________________

Name/Title of Principal Executive Officer (typed or printed) ______________________________

DHEC 3420 (8/96)

STATISTICAL ANALYSIS RESULTS

Facili **WSRC/UTR (Ceriodaphnia dubia)**		NPDES# **SC**	
Samp **UTR w/ Ceriodaphnia dubia in MH**	ETT# T14723	Date:	6-12-00
Labor **ETT Environmental, Inc.**	Certification #: 23104		Exp. Date: 10/2001

SURVIVAL AND REPRODUCTION				
	Control		100.00	Effluent
Rep	(L/D)	# young	(L/D)	# young
1	L	29	L	17
2	L	23	L	9
3	L	26	D	0
4	L	27	L	19
5	L	28	D	8
6	L	28	L	11
7	L	27	L	17
8	L	23	L	9
9	L	26	L	6
10	L	23	L	8
11	L	26	L	12
12	N/A	0	L	13
13	L	24	D	2
14	L	26	L	3
15	L	26	L	7
16	L	26	L	15
17	L	4	D	10
18	L	23	N/A	0
19	L	22	L	12
20	N/A	0	L	18

Survival Data

	7 Day Survival	Test Used:	Fisher's Test
Control	100%	Test Statistic:	P= 0.06
Effluent	79%	Critical Value:	P= 0.05

PASS: The effluent does not reduce survival of the test organisms.

Reproduction Data

Raw Data

	young/female	Std. Dev.
Control	24.3	5.5
Effluent	10.3	5.4

Test for Normality

Test Used:	**Shapiro-Wilks Test**
Control W:	0.608
Critical Value:	0.858
Effluent W:	0.970
Critical Value:	0.863

The data are not normally distributed

Analysis for Differences in Reproduction

Test Used: Wilcoxon Test

t=	7.80
Critical Value:	1.69

The effluent does reduce reproduction

Test for Homogeneity of Variance

Test Used:	**F Test**
F=	1.01
Critical Value:	7.42

The data are homogeneous in variance

FAIL: The effluent is chronically toxic.

QUALITY CONTROL RESULTS

Reference Toxicant: NaCl

Current Acute LC5	1.96	g/L	Current Chronic NOEC:	0.8	g/L
Mean Acute LC50:	2.01	g/L	Mean Chronic NOEC::	0.8	g/L
Lower & Upper Limits (g/	1.75	2.22	Lower & Upper Limits (g/L)	0.4	1.5

DMR Attachment for Toxicity Test Results. Bureau of Water

WSRC/UTR (Daphnia ambigua) Permit number **SC** Discharge #:

Final Limits: Parameter Code TGP3B MLOC=1 IWC= 100.00%Effluent

Monitoring Period	Year	Month	Day		Year	Month	Day
From	00	5	1	To	00	5	31

Date 6-12-00
Lab ID **23104**

	All tests			Chronic Tests Only		
Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Control	20	0		21.1	16.89	
Test	19	3	**PASS**	21.7	90.09	**PASS**

Date ______
Lab ID ______

	All tests			Chronic Tests Only		
Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Control						
Test						

Date ______
Lab ID ______

	All tests			Chronic Tests Only		
Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Control						
Test						

Date ______
Lab ID ______

	All tests			Chronic Tests Only		
Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Control						
Test						

Date ______
Lab ID ______

	All tests			Chronic Tests Only		
Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Control						
Test						

Date ______
Lab ID ______

	All tests			Chronic Tests Only		
Group	#Adults	#Dead	Pass/Fail	Average	Variance	Pass/Fail
Control						
Test						

Signature of Principal Executive Officer or Authorized Agent ______________________

Name/Title of Principal Executive Officer (typed or printed) ______________________

DHEC 3420 (8/96)

STATISTICAL ANALYSIS RESULTS

Facili **WSRC/UTR (Daphnia ambigua)**		NPDES# **SC**	
Samp **UTR w/ Daphnia ambigua in Very**	ETT# T14723-1	Date:	6-12-00
Labor **ETT Environmental, Inc.**	Certification #: 23104		Exp. Date: 10/2001

SURVIVAL AND REPRODUCTION				
	Control		100.00	Effluent
Rep	(L/D)	# young	(L/D)	# young
1	L	23	N/A	0
2	L	23	L	27
3	L	22	L	28
4	L	18	L	26
5	L	20	L	29
6	L	18	L	20
7	L	25	L	29
8	L	19	L	27
9	L	23	D	11
10	L	32	L	33
11	L	14	L	27
12	L	21	D	0
13	L	16	L	22
14	L	21	L	14
15	L	21	D	0
16	L	18	L	29
17	L	23	L	16
18	L	24	L	25
19	L	15	L	27
20	L	25	L	23

Survival Data

	7 Day Survival	Test Used:	Fisher's Test
Control	100%	Test Statistic:	P= 0.11
Effluent	84%	Critical Value:	P= 0.05

PASS: The effluent does not reduce survival of the test organisms.

Reproduction Data

Raw Data

	young/female	Std. Dev.
Control	21.1	4.1
Effluent	21.7	9.5

Test for Normality

Test Used:	**Shapiro-Wilks Test**
Control W:	0.950
Critical Value:	0.868
Effluent W:	0.831
Critical Value:	0.863

The data are not normally distributed

Analysis for Differences in Reproduction

Test Used: Wilcoxon Test

t=	-0.30
Critical Value:	1.69

The effluent does not reduce reproduction.

Test for Homogeneity of Variance

Test Used:	**F Test**
F=	5.33
Critical Value:	7.37

The data are homogeneous in variance

PASS: The effluent is not chronically toxic

QUALITY CONTROL RESULTS

Reference Toxicant: NaCl

Current Acute LC5	1.96	g/L	Current Chronic NOEC:	0.8	g/L
Mean Acute LC50:	2.01	g/L	Mean Chronic NOEC::	0.8	g/L
Lower & Upper Limits (g/	1.75	2.22	Lower & Upper Limits (g/L)	0.4	1.5