

**RESULTS OF TOXICITY TESTS ON SRS NPDES OUTFALLS
A-01, A-11 AND G-10, JANUARY - SEPTEMBER 2002**

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1.0 Introduction

Based on information received in SRS's partial draft NPDES permit (May 2002), monthly chronic definitive toxicity tests will be required at outfalls A-01, A-11 and G-10. Toxicity limits for A-01 and A-11 will be based on 100% effluent. The toxicity limit for outfall G-10 will be based on an effluent concentration of 19% for two years, and on an effluent concentration of 100% for the remainder of the permit.

In October 2001, the Savannah River Site (SRS) received approval from SCDHEC for the use of *Daphnia ambigua* for routine toxicity testing at SRS. In January 2002, definitive *Daphnia ambigua* toxicity tests were initiated at outfalls A-01, A-11 and G-10, using SCDHEC's 25/40 method of data analysis (3-parameter logistic regression model). These tests were initiated as a demonstration of "No Reasonable Potential" for toxicity at these outfalls. Communication with SCDHEC indicated that 10 sets of toxicity data for each outfall would be adequate to determine if a reasonable potential still exists for toxicity failures at these outfalls. This report contains the results of these tests.

2.0 Methods

The methods used for toxicity testing and data analyses are identical to those specified in the draft NPDES permit. Chronic definitive toxicity tests were conducted using *Daphnia ambigua* exposed to a laboratory control and the following effluent concentrations: 6.25%, 12.5%, 25%, 50% and 100%. The data were analyzed using the 3-parameter logistic regression (3PLR) model assuming a Poisson distribution as recommended in the SCDHEC Bureau of Water document entitled "Options for Data Analysis of Whole Effluent Toxicity Testing Required by NPDES Permits" for calculating biological effect (percent inhibition) at the applicable CTC. Using the 3PLR, toxicity tests are considered to pass if the percent reduction in reproduction averages less than 25% in any quarter of a calendar year, and no single test in a quarter has a percent reduction that exceeds 40%.

All of the toxicity tests and data analyses were performed by ETT Environmental, Greenville, SC (SCDHEC Certification # 23104). ETT Environmental was certified by SCDHEC for toxicity testing with *Daphnia ambigua* in October 2001.

3.0 Results

A summary of the results of the 10 sets of toxicity testing is presented in Tables 1 through 3.

3.1 Outfall A-01

The mean reproduction of *Daphnia ambigua* in 100% A-01 effluent equaled or exceeded the mean reproduction of the controls in 9 of the 10 tests (Table 1). The data for the week of February 4 indicated that the reproduction in 100% A-01 effluent was 12.6% lower than the control, but reproduction rates in the test dilutions were somewhat sporadic (i.e. the reproduction rate in 12.5% effluent was slightly lower than in 100% effluent). This variation indicates a weak dose-response relationship, and suggests that the slight impairment in 100% effluent may not have been due to toxicity. In all 10 data sets, the 25% Inhibition Concentration (IC25) was >100% effluent and the No Observed Effect Concentration (NOEC) was 100% effluent, which indicates that all 10 tests conducted on A-01 effluent passed.

Table 1. Toxicity Results for SRS NPDES Outfall A-01

Week of		Control	6.25%	12.50%	25.00%	50.00%	100%	Pass/Fail	IC25	%Reduction*	NOEC
1/14/2002	Reproduction	21.0	21.9	18.8	22.2	18.8	21.7				100%
	Predicted Values	20.7	20.7	20.7	20.7	20.7	20.7	Pass	>100%	0.0%	
1/21/2002	Reproduction	25.3	21.0	25.3	26.6	25.5	26.5				100%
	Predicted Values	24.3	24.3	24.3	24.3	24.3	24.3	Pass	>100%	0.0%	
2/4/2002	Reproduction	30.5	29.0	25.3	26.8	28.2	26.3				100%
	Predicted Values	30.5	27.6	27.4	27.1	26.9	26.6	Pass	>100%	12.6%	
2/25/2002	Reproduction	26.3	25.7	24.8	26.7	27.2	26.8				100%
	Predicted Values	26.0	26.0	26.0	26.0	26.0	26.0	Pass	>100%	0.0%	
4/15/2002	Reproduction	25.3	25.1	24.7	26.4	27.5	27.1				100%
	Predicted Values	22.2	22.2	22.2	22.2	22.2	22.2	Pass	>100%	0.0%	
5/6/2002	Reproduction	25.5	28.2	29.9	29.2	27.2	27.9				100%
	Predicted Values	28.0	28.0	28.0	28.0	28.0	28.0	Pass	>100%	0.0%	
6/3/2002	Reproduction	20.5	20.9	19.9	27.0	23.3	24.8				100%
	Predicted Values	22.7	22.7	22.7	22.7	22.7	22.7	Pass	>100%	0.0%	
7/15/02	Reproduction	24.7	27.3	25.7	27.8	29.2	31				100%
	Predicted Values	27.7	27.7	27.7	27.7	27.7	27.7	Pass	>100%	0.0%	
8/5/2002	Reproduction	24.9	25.5	27.2	29.0	24.6	25.5				100%
	Predicted Values	26.2	26.2	26.2	26.2	26.2	26.2	Pass	>100%	0.0%	
9/9/2002	Reproduction	22.2	21.4	23.2	20.9	22.5	22.5				100%
	Predicted Values	22.1	22.1	22.1	22.1	22.1	22.1	Pass	>100%	0.0%	

3.2 Outfall A-11

The mean reproduction of *Daphnia ambigua* in 100% A-11 effluent equaled or exceeded the mean reproduction of the controls in 6 of the 10 tests (Table 2). For the four tests in which reproduction was reduced, reductions ranged from 9.3 to 19.4%. All three tests with reduced reproduction show a weak dose-response relationship (i.e. in the test conducted the week of January 14, control reproduction was slightly lower than reproduction in 100 effluent, but reproduction in intermediate concentrations of effluent were higher; in the test conducted the week of February 4, reproduction rates in 6.25% effluent and 100% effluent were almost identical; in September, reproduction was higher in 100% effluent than in 12.5% effluent). In all 10 data sets the IC25 was >100% effluent and the NOEC was 100% effluent, which indicates that all 10 tests conducted on A-11 effluent passed.

3.3 Outfall G-10

The mean reproduction of *Daphnia ambigua* in 100% G-10 effluent equaled or exceeded the mean reproduction of the controls in 5 of the 10 tests (Table 3). Percent reductions in the remaining tests ranged from 6.4% to 25.2%. With the exception of the test conducted in August, all of the tests conducted on G-10 effluent had NOECs of 100% effluent and IC25s of >100% effluent. In August, the IC25 was 98.8% effluent, the percent reduction in reproduction in 100% effluent was 25.2%, and the NOEC was 50% effluent, although the actual NOEC would have been greater than 50% if more intermediate dilutions (between 50% and 100%) had been tested. These results indicate that 9 of the 10 tests had a reduction in reproduction that was less than 25% and that the remaining test was just over 25%. The requirements specified in the draft NPDES permit state that the mean reduction in reproduction for any quarter must be less than 25%, and that reproduction may not be reduced by more than 40% in any single test. Based on these requirements, the test results for G-10 do not indicate an unacceptable level of toxicity.

4.0 Conclusions

The results of the 10 rounds of toxicity tests that were performed on SRS NPDES outfalls A-01, A-11 and G-10 indicate that there would have been no toxicity failures if these tests had been compliance tests. Except for one set of test results for G-10, all of the tests resulted in NOECs of 100% effluent. All of the tests met the criteria of less than a 25% mean reduction in reproduction for any quarter and less than a 40% reduction in any single test. Therefore, there is no reasonable potential to discharge toxic effluents in toxic amounts.

Table 2. Toxicity Results for SRS NPDES Outfall A-11

Week of		Control	6.25%	12.50%	25.00%	50.00%	100%	Pass/Fail	IC25	%Reduction*	NOEC
1/14/2002	Reproduction	21.0	25.6	22.0	24.4	26.9	21.7				100%
	Predicted Values	24.5	24.5	24.5	24.5	24.5	21.7	Pass	>100%	9.3%	
1/21/2002	Reproduction	25.3	27.4	22.9	23.7	20.6	22.3				100%
	Predicted Values	22.8	22.8	22.8	22.8	22.8	22.8	Pass	>100%	0.0%	
2/4/2002	Reproduction	30.5	27.4	24.7	25.8	21.2	27.2				100%
	Predicted Values	30.5	25.9	25.6	25.3	24.9	24.6	Pass	>100%	19.4%	
2/25/2002	Reproduction	26.3	26.0	26.0	29.1	26.0	27.7				100%
	Predicted Values	26.6	26.6	26.6	26.6	26.6	26.6	Pass	>100%	0.0%	
4/15/2002	Reproduction	25.3	26.1	26.6	26.8	27.7	24.8				100%
	Predicted Values	26.5	26.5	26.5	26.5	26.5	26.5	Pass	>100%	0.0%	
5/6/2002	Reproduction	25.5	25.2	23.8	26.1	28.4	20.7				100%
	Predicted Values	26.0	26.0	26.0	26.0	26.0	20.7	Pass	>100%	15.6%	
6/3/2002	Reproduction	20.5	22.4	23.8	25.8	24.4	22.5				100%
	Predicted Values	23.2	23.2	23.2	23.2	23.2	23.2	Pass	>100%	0.0%	
7/22/02	Reproduction	19.3	20.7	21.3	14.1	20.0	18.6				100%
	Predicted Values	19.0	19.0	19.0	19.0	19.0	19.0	Pass	>100%	0.0%	
8/5/2002	Reproduction	24.9	27.1	24.8	27.5	29.3	25.9				100%
	Predicted Values	26.6	26.6	26.6	26.6	26.6	26.6	Pass	>100%	0.0%	
9/9/2002	Reproduction	22.2	22.7	19.2	22.8	20	20.1				100%
	Predicted Values	22.2	21.6	21.4	21.1	20.6	20	Pass	>100%	10.0%	

Table 3. Toxicity Results for SRS NPDES Outfall G-10

Week of		Control	6.25%	12.50%	25.00%	50.00%	100%	Pass/Fail	IC25	%Reduction*	NOEC
1/14/2002	Reproduction	21.0	25.6	23.0	22.2	21.7	24.6				100%
	Predicted Values	22.4	22.4	22.4	22.4	22.4	22.4	Pass	>100%	0.0%	
1/21/2002	Reproduction	25.3	23.2	27.7	25.7	24.2	25.9				100%
	Predicted Values	24.9	24.9	24.9	24.9	24.9	24.9	Pass	>100%	0.0%	
2/4/2002	Reproduction	23.0	22.7	23.7	24.0	26.7	25.5				100%
	Predicted Values	24.3	24.3	24.3	24.3	24.3	24.3	Pass	>100%	0.0%	
2/25/2002	Reproduction	26.3	25.9	21.2	23.3	28.4	28.4				100%
	Predicted Values	25.7	25.7	25.7	25.7	25.7	25.7	Pass	>100%	0.0%	
4/22/2002	Reproduction	24.4	24.8	27.2	22.3	21.9	20.5				100%
	Predicted Values	25.3	24.9	24.5	23.8	22.5	20.1	Pass	>100%	20.4%	
5/13/2002	Reproduction	25.0	24.8	24.0	22.1	20.3	22.2				100%
	Predicted Values	25.3	23.9	23.4	22.8	22.0	21	Pass	>100%	16.9%	
6/3/2002	Reproduction	20.5	25.2	24.4	24.3	23.4	18.6				100%
	Predicted Values	23.6	23.6	23.6	23.6	23.4	18.6	Pass	>100%	21.1%	
7/17/02	Reproduction	27.0	25.5	24.7	24.5	26.9	21.5				100%
	Predicted Values	24.2	24.2	24.2	24.2	24.2	24.2	Pass	>100%	0.0%	
8/5/2002	Reproduction	24.9	27.3	26.1	25.4	22.2	19.9				50%
	Predicted Values	26.2	26.0	25.7	24.9	23.2	19.6	Pass	98.80%	25.2%	
9/9/2002	Reproduction	22.0	20.8	24.7	22.1	23.7	20.4				100%
	Predicted Values	22.1	22.1	22.1	22.1	22.1	20.7	Pass	>100%	6.4%	

APPENDIX 1



P.O. Box 16414, Greenville, SC 29606

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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
Sample ID: A-01**

Aiken County

ETT#: 19077

Sample ID: January 15, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Survival and Reproduction Results

Client: **WSRC**
 Sample Identification: **A-01**
 Test Date: **January 15, 2002**

County: **Aiken**
 NPDES#: **SC**
 ETT #: **19077**

Reproduction at		MHSF		Control		
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	0	11	0	12	27
2	4	0	8	13	0	25
3	4	9	0	14	0	27
4	6	8	13	0	0	27
5	4	0	4	X	X	8
6	3	0	2	0	0	5
7	4	0	10	0	11	25
8	2	6	0	11	0	19
9	3	0	7	13	0	23
10	4	0	8	12	0	24

Reproduction at		6.25%		Concentration		
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	7	0	13	0	24
2	3	0	8	15	0	26
3	5	5	11	X	X	21
4	4	6	0	12	0	22
5	3	8	0	12	0	23
6	4	3	X	X	X	7
7	0	5	10	0	11	26
8	0	7	11	X	X	18
9	3	9	1	12	0	25
10	4	0	11	0	12	27

Reproduction at		12.5%		Concentration		
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	3	9	12	0	0	24
2	3	0	7	13	0	23
3	5	8	12	0	0	25
4	3	7	1	X	X	11
5	0	0	X	X	X	0
6	5	9	7	0	0	21
7	0	4	7	0	11	22
8	0	9	X	X	X	9
9	0	8	1	13	12	34
10	3	3	0	13	0	19

Reproduction at		25%		Concentration		
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	9	0	14	0	27
2	0	0	11	13	0	24
3	2	8	0	13	0	23
4	4	7	X	X	X	11
5	0	6	3	8	X	17
6	5	7	0	15	0	27
7	0	2	11	0	11	24
8	0	0	13	0	14	27
9	2	3	1	14	0	20
10	0	3	L	L	L	L

Reproduction at		50%		Concentration		
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	9	0	12	0	25
2	4	7	0	13	0	24
3	2	9	10	0	0	21
4	2	0	9	X	X	11
5	3	6	0	13	0	22
6	5	4	12	0	0	21
7	0	4	9	0	11	24
8	0	X	X	X	X	0
9	3	5	0	12	0	20
10	3	4	0	13	0	20

Reproduction at		100%		Concentration		
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	3	0	X	X	X	3
2	5	0	0	14	13	32
3	3	6	0	7	0	16
4	2	5	0	16	0	23
5	3	7	1	16	0	27
6	4	8	0	12	0	24
7	0	8	5	0	5	18
8	0	4	9	0	13	26
9	2	7	0	14	0	23
10	0	9	0	14	2	25

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC**
 Sample Identification: **A-01**
 Test Date: **January 15, 2002**

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	7.45	7.47	7.32	7.27	7.13	7.12
Day 1		7.86	7.82	7.74	7.72	7.68
Day 2	7.59	7.24	7.10	7.05	6.97	7.04
Day 3	7.65	7.51	7.44	7.38	7.31	7.29
Day 4	6.90	6.90	6.95	7.10	7.06	7.10
Day 5	8.31	8.47	8.35	8.23	8.12	7.89
Day 6	7.52	7.43	7.40	7.39	7.36	7.40

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1		7.11	7.17	7.20	7.31	7.36
Day 2	7.68	7.53	7.48	7.42	7.43	7.45
Day 3	8.00	7.87	7.72	7.64	7.61	7.62
Day 4	6.25	7.16	7.19	7.12	7.26	7.33
Day 5	8.41	8.61	8.50	8.34	8.27	8.10
Day 6	7.82	7.78	7.74	7.72	7.72	7.82
Final	7.77	7.39	7.30	7.28	7.32	7.42

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial		8.6	8.5	8.5	8.6	8.6
Day 1		8.6	8.6	8.6	8.7	8.7
Day 2	8.9	8.7	8.7	8.7	8.8	8.9
Day 3	8.9	8.6	8.9	8.8	8.9	9.0
Day 4	8.9	8.8	8.9	8.9	9.0	9.1
Day 5	8.8	8.8	8.8	8.8	8.8	8.9
Day 6						

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1		8.4	8.4	8.3	8.3	8.3
Day 2	8.5	8.6	8.6	8.5	8.6	8.6
Day 3	8.9	8.8	8.9	9.1	9.0	9.1
Day 4	8.8	8.7	8.9	9.0	9.0	9.0
Day 5	8.8	8.8	8.8	8.8	8.8	8.8
Day 6	8.8	8.8	8.8	8.8	8.8	8.8
Final	8.6	8.6	8.6	8.8	8.9	9.0

Temperature

Incubator °C	
Initial	25.0
Day 1	24.2
Day 2	24.9
Day 3	25.3
Day 4	24.5
Day 5	24.0
Day 6	24.0
Final	24.5

Test Results Reviewed and Approved By:

R. W. Kelly

7 Day Chronic Definitive Survival and Reproduction Bioassay

Method: EPA/600/4-91/002

Test Organism: *Ceriodaphnia dubia*

Facility: WSRC
Sample ID: A-11

Aiken County

ETT#: 19078

Sample ID: January 15, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Survival and Reproduction Results

Client: **WSRC**
 Sample Identification: **A-11**
 Test Date: **January 15, 2002**

County: **Aiken**
 NPDES#: **SC**
 ETT #: **19078**

Reproduction at		MHSF			Control		
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total	
1	4	0	11	0	12	27	
2	4	0	8	13	0	25	
3	4	9	0	14	0	27	
4	6	8	13	0	0	27	
5	4	0	4	X	X	8	
6	3	0	2	0	0	5	
7	4	0	10	0	11	25	
8	2	6	0	11	0	19	
9	3	0	7	13	0	23	
10	4	0	8	12	0	24	

Reproduction at		6.25%			Concentration		
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total	
1	3	10	0	16	0	29	
2	4	6	0	13	0	23	
3	5	9	0	13	0	27	
4	3	8	0	15	0	26	
5	3	10	0	12	0	25	
6	6	0	9	0	18	33	
7	6	0	11	0	18	35	
8	0	7	0	X	X	7	
9	2	6	0	13	0	21	
10	0	7	0	10	13	30	

Reproduction at		12.5%			Concentration		
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total	
1	10	0	10	0	0	20	
2	5	8	0	12	0	25	
3	7	9	0	12	0	28	
4	4	7	0	11	0	22	
5	3	7	0	11	0	21	
6	6	7	0	12	0	25	
7	4	9	0	14	0	27	
8	X	X	X	X	X	0	
9	2	10	0	13	0	25	
10	3	9	0	15	0	27	

Reproduction at		25%			Concentration		
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total	
1	8	1	8	0	10	27	
2	3	10	0	13	0	26	
3	6	10	0	12	0	28	
4	3	10	0	12	0	25	
5	3	7	0	13	0	23	
6	4	6	0	7	0	17	
7	0	6	9	0	0	15	
8	7	1	10	0	18	36	
9	2	8	0	14	0	24	
10	2	8	0	13	0	23	

Reproduction at		50%			Concentration		
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total	
1	7	0	12	0	18	37	
2	5	10	0	13	0	28	
3	2	10	0	13	0	25	
4	5	10	0	14	0	29	
5	5	0	8	X	X	13	
6	3	8	0	12	0	23	
7	7	0	12	0	16	35	
8	6	0	11	0	10	27	
9	2	8	0	14	0	24	
10	4	10	0	14	0	28	

Reproduction at		100%			Concentration		
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total	
1	3	9	0	13	0	25	
2	2	10	0	15	0	27	
3	4	8	0	13	0	25	
4	3	8	0	12	0	23	
5	6	2	10	0	0	18	
6	3	4	10	0	0	17	
7	9	0	9	0	0	18	
8	7	2	11	0	0	20	
9	0	9	0	14	X	23	
10	9	0	12	0	0	21	

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: WSRC
 Sample Identification: A-11
 Test Date: January 15, 2002

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	7.45	8.22	8.30	7.87	7.69	7.60
Day 1		8.63	8.84	8.50	8.33	8.08
Day 2	7.59	7.05	6.89	6.88	6.83	6.91
Day 3		8.71	8.16	8.01	8.03	8.02
Day 4	6.90	7.23	7.28	7.39	7.49	7.52
Day 5		7.47	7.86	7.74	7.70	7.64
Day 6		7.62	7.50	7.44	7.37	7.31

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1		7.41	7.26	7.20	7.14	7.17
Day 2	7.68	7.42		7.38	7.35	7.37
Day 3		8.72	8.72	8.25	8.27	8.19
Day 4	6.25	6.88	6.99	7.14	7.33	7.40
Day 5		8.07	8.01	7.90	7.88	7.88
Day 6		7.82	7.55	7.66	7.57	7.60
Final	7.77	7.53	7.63	7.44	7.36	7.39

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial		8.5	8.5	8.5	8.5	8.6
Day 1		8.7	8.7	8.6	8.6	8.5
Day 2	8.9	8.8	8.8	8.7	8.7	8.5
Day 3		9.0	8.1	9.0	9.0	8.9
Day 4	8.9	9.0	9.0	8.9	8.9	9.1
Day 5		8.8	8.8	8.6	8.7	8.7
Day 6		8.8	8.8	8.7	8.9	9.0

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1		8.2	8.2	8.1	8.1	8.0
Day 2	8.5	8.4	8.2	8.5	8.5	8.5
Day 3		8.6	8.6	8.6	8.6	8.6
Day 4	8.9	8.8	8.9	9.0	9.1	9.1
Day 5		8.7	8.7	8.8	8.8	8.7
Day 6		8.8	8.9	8.9	8.9	8.9
Final	8.6	8.4	8.5	8.7	8.7	8.9

Temperature

Incubator °C	
Initial	25.0
Day 1	24.2
Day 2	24.9
Day 3	25.3
Day 4	24.5
Day 5	24.0
Day 6	24.0
Final	24.5

Test Results Reviewed and Approved By:

R. V. [Signature]



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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
Sample ID: G-10

Aiken County

ETT#: 19079

Sample ID: January 15, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Survival and Reproduction Results

Client: WSRC
 Sample Identification: G-10
 Test Date: January 15, 2002

County: Aiken
 NPDES#: SC
 ETT #: 19079

Reproduction at		MHSF		Control		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	4	0	11	0	12	27
2	4	0	8	13	0	25
3	4	9	0	14	0	27
4	6	8	13	0	0	27
5	4	0	4	X	X	8
6	3	0	2	0	0	5
7	4	0	10	0	11	25
8	2	6	0	11	0	19
9	3	0	7	13	0	23
10	4	0	8	12	0	24

Reproduction at		6.25% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	6	0	11	10	0	27	
2	4	9	0	12	0	25	
3	3	11	0	13	0	27	
4	0	7	0	11	0	18	
5	3	X	X	X	X	3	
6	3	7	0	12	0	22	
7	0	0	8	0	10	18	
8	3	6	0	13	0	22	
9	4	12	0	14	0	30	
10	8	0	12	0	18	38	

Reproduction at		12.5% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	4	0	11	12	0	27	
2	4	10	0	16	0	30	
3	4	8	0	10	0	22	
4	0	0	0	0	0	0	
5	4	0	X	X	X	4	
6	5	0	12	0	15	32	
7	4	10	0	14	0	28	
8	3	9	0	14	0	26	
9	6	10	0	13	0	29	
10	5	0	11	0	16	32	

Reproduction at		25% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	5	0	9	16	0	30	
2	6	0	9	0	14	29	
3	X	X	X	X	X	0	
4	4	11	12	0	0	27	
5	6	0	13	0	15	34	
6	0	9	0	13	12	34	
7	4	10	0	15	0	29	
8	1	0	3	10	0	14	
9	X	X	X	X	X	0	
10	3	10	0	12	0	25	

Reproduction at		50% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	3	0	9	10	0	22	
2	3	9	0	12	0	24	
3	4	10	0	13	0	27	
4	3	8	0	13	0	24	
5	4	6	0	X	X	10	
6	9	0	13	0	0	22	
7	1	10	0	10	0	21	
8	1	10	0	13	0	24	
9	3	6	0	10	0	19	
10	4	8	0	12	0	24	

Reproduction at		100% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	3	0	10	13	0	26	
2	4	6	0	12	0	22	
3	6	0	9	0	13	28	
4	3	8	0	13	0	24	
5	4	9	0	14	0	27	
6	0	6	0	10	0	16	
7	0	8	0	8	0	16	
8	0	7	6	2	12	27	
9	0	10	0	13	14	37	
10	4	7	0	12	0	23	

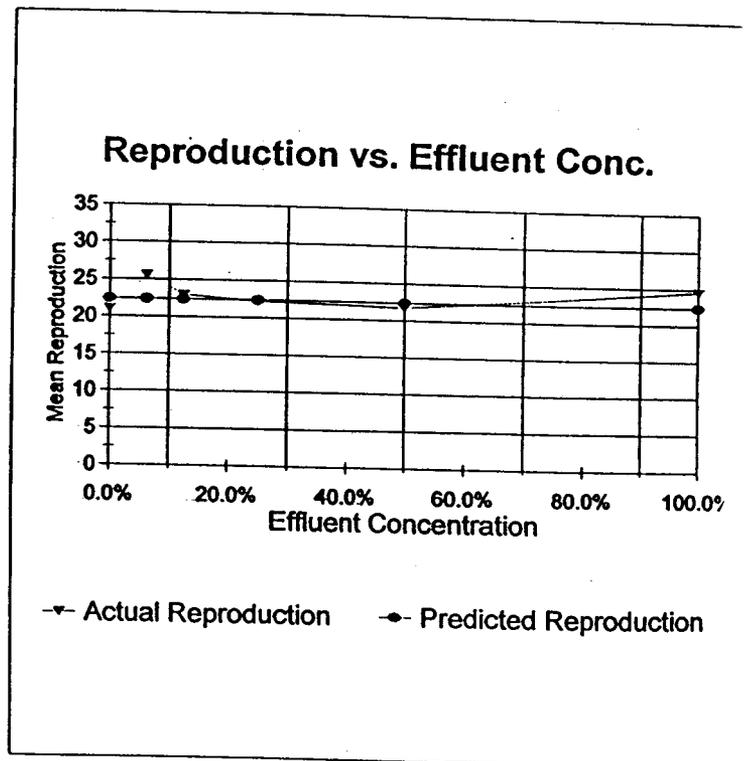
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST Statistical Analyses

Client: WSRC
 Sample Identification: G-10
 Test Date: January 15, 2002

Test for Normality	
Test Used: Kolmogorov D	D= NA critical NA
NA	

Test for Homogeneity of Variance	
Test Used: Bartlett's Test	B= NA critical NA
NA	

Test for Differences in Reproduction						
Test Type Used: Non-Linear Regression - Logistic Model						
Calculated Using JMP Software						
% Effluent						
Effect	MHSF	6.3%	12.5%	25.0%	50.0%	100%
Survival	90%	90%	90%	80%	90%	100%
Predicted	90%	90%	90%	90%	90%	90%
Reproduction	21.0	25.6	23.0	22.2	21.7	24.6
Predicted	22.4	22.4	22.4	22.4	22.4	22.4
Variance	64.67	21.78	132.00	168.40	21.57	37.38
CV=	38%		MSD=		8.96	
Test Parameters						
	alpha	beta	gamma	% Reduction		Pass/Fail
				CTC= 19%	CTC=100%	
Survival	3.00	-200.00	0.10	0.0%	0.0%	Pass
Reproduction	3.28	-1.57	22.40	0.0%	0.0%	Pass
IC25=		>100%		NOEC=		100.0%
				LOEC=		>100%



Summary

The effluent did not reduce reproduction or survival at any test concentration.

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC**
 Sample Identification: **G-10**
 Test Date: **January 15, 2002**

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	7.45	8.53	8.30	8.14	7.96	7.87
Day 1		7.66	7.54	7.51	7.69	7.96
Day 2	7.59	7.09	7.05	7.12	7.33	7.79
Day 3		7.64	7.57	7.61	7.67	7.93
Day 4	6.90	7.57	7.59	7.65	7.74	7.85
Day 5		7.49	7.51	7.54	8.05	8.19
Day 6		7.67	7.62	7.63	7.78	7.97

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1		7.74	7.50	7.74	7.78	7.96
Day 2	7.68	7.41	7.38	7.37	7.46	7.95
Day 3		7.79	7.70	7.69	7.70	7.85
Day 4	6.25	7.75	7.72	7.83	7.86	7.99
Day 5		7.70	7.79	7.72	7.94	8.01
Day 6		8.17	7.98	7.83	7.82	8.01
Final	7.77	7.76	7.59	7.55	7.66	7.95

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial		8.6	8.6	8.6	8.6	8.6
Day 1		8.7	8.7	8.7	8.8	8.8
Day 2	8.9	8.5	8.6	8.7	8.8	8.8
Day 3		8.6	8.6	8.6	8.6	8.6
Day 4	8.9	8.4	8.4	8.6	8.6	8.6
Day 5		8.5	8.5	8.5	8.6	8.6
Day 6		8.6	8.6	8.7	8.8	8.8

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1		8.4	8.4	8.3	8.2	8.2
Day 2	8.5	8.5	8.5	8.5	8.3	8.5
Day 3		8.6	8.6	8.6	8.6	8.6
Day 4	8.9	8.4	8.6	8.6	8.7	8.8
Day 5		8.6	8.5	8.5	8.6	8.6
Day 6		8.4	8.4	8.6	8.6	8.9
Final	8.6	8.4	8.4	8.5	8.5	8.5

Temperature

Incubator °C	
Initial	25.0
Day 1	24.2
Day 2	24.9
Day 3	25.3
Day 4	24.5
Day 5	24.0
Day 6	24.0
Final	24.5

Test Results Reviewed and Approved By:

R. W. Kelly



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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/ Daphnia ambigua

Aiken County

ETT#: 19113

Sample ID: January 22, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: **WSRC/ A-01**
 Sample Identification: **A-01 W/ Daphnia ambigua**
 Test Date: **January 22, 2002**

County: **Aiken**
 NPDES#: **SC**
 ETT #: **19113**

Reproduction at						
Rep.	Day 3/4	Day 5	MHSF Day 6	Control Day 7	Day 8	Total
1	4	8	0	15	0	27
2	5	8	0	15	0	28
3	0	2	6	0	7	15
4	6	0	10	15	0	31
5	5	7	0	13	0	25
6	6	7	0	13	0	26
7	male	L	L	L	L	L
8	4	0	9	12	0	25
9	6	6	0	13	0	25
10	5	0	8	0	13	26

Reproduction at						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	3	0	9	0	14	26
2	4	0	0	0	11	15
3	4	0	9	10	0	23
4	2	0	12	10	0	24
5	6	0	10	11	0	27
6	X	X	X	X	X	0
7	X	X	X	X	X	0
8	4	0	8	6	0	18
9	3	0	0	0	8	11
10	6	0	6	12	0	24

Reproduction at						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	5	0	10	0	13	28
2	6	0	10	0	13	29
3	4	0	8	11	0	23
4	6	0	10	12	0	28
5	0	0	7	12	0	19
6	0	0	10	12	0	22
7	4	0	6	0	11	21
8	5	0	9	13	0	27
9	5	0	8	0	10	23
10	6	0	12	15	0	33

Reproduction at						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	6	0	7	0	12	25
2	4	0	10	0	11	25
3	0	0	10	10	0	20
4	5	0	10	12	0	27
5	0	0	11	12	X	23
6	5	0	12	13	0	30
7	6	0	12	13	0	31
8	5	0	12	13	0	30
9	6	0	10	0	11	27
10	5	0	13	10	0	28

Reproduction at						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	0	9	0	10	23
2	4	0	9	10	0	23
3	4	0	10	12	0	26
4	6	0	10	12	0	28
5	6	0	8	14	0	28
6	5	0	12	14	0	31
7	5	0	8	13	0	26
8	7	0	10	12	0	29
9	5	0	9	0	12	26
10	4	0	11	X	X	15

Reproduction at						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	6	0	6	8	0	20
2	6	0	8	0	12	26
3	4	0	7	9	0	20
4	5	0	9	12	0	26
5	6	0	10	14	0	30
6	5	0	12	14	0	31
7	7	0	10	15	0	32
8	6	0	9	12	0	27
9	5	0	9	0	10	24
10	6	0	10	13	0	29

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST Statistical Analyses

Client: WSRC/ A-01
 Sample Identification: A-01 W/ Daphnia ambigua
 Test Date: January 22, 2002

Test for Normality

Test Used: Kolmogorov D
 D= NA
 critical NA
 NA

Test for Homogeneity of Variance

Test Used: Bartlett's Test
 B= NA
 critical NA
 NA

Test for Differences in Reproduction

Test Type Used: Non-Linear Regression - Logistic Model
 Calculated Using JMP Software

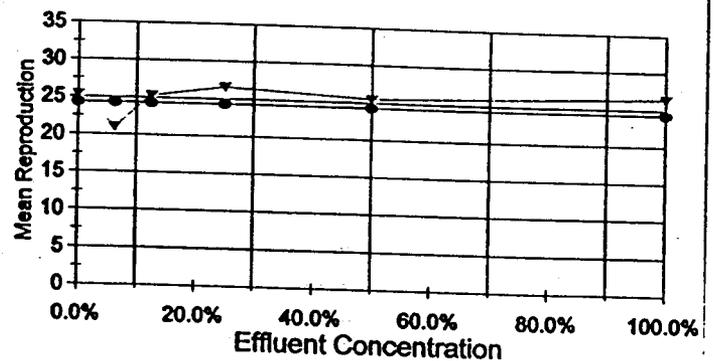
Effect	% Effluent					
	MHSF	6.3%	12.5%	25.0%	50.0%	100%
Survival	100%	100%	100%	90%	90%	100%
Predicted	100%	100%	100%	100%	100%	100%
Reproduction	25.3	21.0	25.3	26.6	25.5	26.5
Predicted	24.3	24.3	24.3	24.3	24.3	24.3
Variance	18.75	32.57	18.90	11.82	19.83	17.83
CV=	17%		MSD= 4.68			

Test Parameters

	alpha	beta	gamma	% Reduction	
				CTC= 93.4%	Pass/Fail
Survival	3.00	-200.00	0.00	0.0%	Pass
Reproduction	26.00	-196.00	24.30	0.0%	Pass

IC25= >100%
 NOEC= >100%

Reproduction vs. Effluent Conc.



▲ Actual Reproduction ● Predicted Reproduction

Summary

The reductions in survival and reproduction at the CTC are <25% - Pass

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST Water Chemistry

Client: WSRC/ A-01
 Sample Identification: A-01 W/ Daphnia ambigua
 Test Date: January 22, 2002

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Initial	7.64	7.72	7.77	7.47	7.21	7.89
Day 1	7.10	7.37	7.36	7.71	7.20	
Day 2	7.06	6.97	7.08	7.08	7.09	7.08
Day 3	7.08	7.51	7.80	7.44	7.47	7.46
Day 4	7.57	7.61	7.57	7.53	7.55	7.54
Day 5	7.26	8.29	8.16	7.98	7.85	7.61
Day 6	7.25	7.48	7.11	7.02	6.93	7.01

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Day 1	7.31	7.75	7.85	8.24	7.65	
Day 2	7.40	7.17	7.20	7.24	7.29	7.42
Day 3	7.17	7.40	7.40	7.41	7.41	7.42
Day 4	7.74	7.48	7.47	7.48	7.49	7.50
Day 5	7.74	8.86	8.64	8.46	8.31	8.11
Day 6	7.50	7.63	7.49	7.44	7.44	7.43
Final	7.33	7.25	7.67	7.59	7.43	7.43

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Initial	8.4	8.3	8.3	8.1	8.4	8.4
Day 1	8.0	8.2	8.2	8.2	8.2	8.2
Day 2	8.2	8.3	8.3	8.3	8.3	8.3
Day 3	8.2	8.3	8.4	8.4	8.4	8.4
Day 4	8.0	8.3	8.3	8.4	8.4	8.4
Day 5		8.3	8.3	8.4	8.4	8.5
Day 6	8.3	8.3	8.3	8.3	8.3	8.3

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Day 1	8.0	8.2	8.3	8.3	8.3	8.3
Day 2	8.2	8.3	8.3	8.3	8.3	8.2
Day 3	8.1	8.2	8.2	8.2	8.1	8.1
Day 4	8.3	8.2	8.2	8.2	8.2	8.2
Day 5		8.4	8.4	8.4	8.4	8.5
Day 6	8.3	8.3	8.3	8.3	8.2	8.2
Final	8.0	8.4	8.3	8.4	8.4	8.4

Temperature

Incubator °C	
Initial	25.2
Day 1	25.2
Day 2	25.1
Day 3	25.7
Day 4	24.7
Day 5	25.4
Day 6	25.2
Final	25.6

Test Results Reviewed and Approved By:

R. V. [Signature]



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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-11

Sample ID: A-11 W/ Daphnia ambigua

Aiken County

ETT#: 19114

Sample ID: January 22, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Survival and Reproduction Results

Client: WSRC/A-11
 Sample Identification: A-11 W/ Daphnia ambigua
 Test Date: January 22, 2002

County: Aiken
 NPDES#: SC
 ETT #: 19114

Reproduction at		MHSF			Control	
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	8	0	15	0	27
2	5	8	0	15	0	28
3	0	2	6	0	7	15
4	6	0	10	15	0	31
5	5	7	0	13	0	25
6	6	7	0	13	0	26
7	male	L	L	L	L	L
8	4	0	9	12	0	25
9	6	6	0	13	0	25
10	5	0	8	0	13	26

Reproduction at		6.25% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	5	9	0	13	27
2	0	5	10	0	15	30
3	4	0	7	12	0	23
4	5	0	10	10	0	25
5	2	0	8	10	0	20
6	0	0	8	13	0	21
7	0	X	X	X	X	0
8	5	0	10	13	0	28
9	0	5	9	X	X	14
10	4	0	12	15	0	31

Reproduction at		12.5% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	5	9	0	13	27
2	0	4	3	0	13	20
3	X	X	X	X	X	0
4	4	0	10	13	0	27
5	3	0	10	13	0	26
6	4	0	4	10	0	18
7	3	0	9	13	0	25
8	4	0	12	15	0	31
9	0	4	9	0	12	25
10	4	0	11	15	0	30

Reproduction at		25% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	5	10	0	9	24
2	0	0	0	0	0	0
3	0	5	9	0	10	24
4	5	0	8	X	X	13
5	0	4	11	0	13	28
6	4	0	10	15	0	29
7	4	0	12	14	0	30
8	3	0	13	15	0	31
9	0	5	11	0	12	28
10	5	0	10	15	0	30

Reproduction at		50% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	5	2	0	5	12
2	male	L	L	L	L	L
3	4	0	10	13	0	27
4	4	0	11	12	0	27
5	0	0	3	0	0	3
6	4	0	11	14	0	29
7	3	2	10	0	0	15
8	3	0	12	14	0	29
9	0	5	9	0	15	29
10	0	4	10	X	X	14

Reproduction at		100% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	2	0	9	0	11
2	4	0	11	13	0	28
3	4	0	5	11	0	20
4	4	0	8	0	0	12
5	4	5	4	12	0	25
6	0	0	10	13	2	25
7	5	0	7	12	0	24
8	4	0	8	13	0	25
9	4	0	10	13	0	27
10	3	0	9	14	0	26

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: WSRC/A-11
 Sample Identification: A-11 W/ Daphnia ambigua
 Test Date: January 22, 2002

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Initial	7.64	7.94	8.20	7.97	7.86	7.80
Day 1	7.10	7.08	7.11	7.13	7.17	7.21
Day 2	7.06	8.42	7.71	7.56	7.48	7.45
Day 3	7.08	7.36	3.34	3.32	7.30	7.31
Day 4	7.57	7.82	7.72	7.58	7.51	7.45
Day 5	7.26	7.66	7.59	7.53	7.45	7.43
Day 6	7.25	7.00	6.95	6.89	6.84	6.92

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Day 1	7.31	7.03	7.08	7.11	7.17	7.26
Day 2	7.40	8.47	8.00	7.90	7.81	7.70
Day 3	7.17	7.36	7.35	7.37	7.38	7.38
Day 4	7.74	8.10	7.99	7.93	7.81	7.78
Day 5	7.74	7.82	7.80	7.80	7.80	7.60
Day 6	7.50	7.41	7.37	7.34	7.31	7.33
Final	7.33	7.82	7.75	7.63	7.54	

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Initial	8.4	8.3	8.4	8.4	8.3	8.4
Day 1	8.0	8.4	8.4	8.4	8.4	8.4
Day 2	8.2	8.4	8.4	8.4	8.4	8.4
Day 3	8.2					
Day 4	8.0	8.4	8.4	8.4	8.5	8.5
Day 5		8.3	8.3	8.4	8.5	8.6
Day 6	8.3	8.4	8.4	8.4	8.4	8.4

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Day 1	8.0					8.3
Day 2	8.2	8.5	8.5	8.5	8.4	8.5
Day 3	8.1	8.4	8.4	8.4	8.3	8.3
Day 4	8.3	8.4	8.4	8.3	8.5	8.5
Day 5		3.2	8.3	8.4	8.4	8.4
Day 6	8.3	8.3	8.3	8.3	8.3	8.3
Final	8.0	8.4	8.4	8.5	8.3	8.5

Temperature

Incubator °C	
Initial	25.2
Day 1	25.2
Day 2	25.1
Day 3	25.7
Day 4	24.7
Day 5	25.4
Day 6	25.2
Final	25.6

Test Results Reviewed and Approved By: _____

R. E. Williams



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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/G-10
Sample ID: G-10 W/ Daphnia ambigua

Aiken County

ETT#: 19115

Sample ID: January 22, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: WSRC/G-10
 Sample Identification: G-10 W/ *Daphnia ambigua*
 Test Date: January 22, 2002

County: Aiken
 NPDES#: SC
 ETT #: 19115

Reproduction at		MHSF		Control		
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	8	0	15	0	27
2	5	8	0	15	0	28
3	0	2	6	0	7	15
4	6	0	10	15	0	31
5	5	7	0	13	0	25
6	6	7	0	13	0	26
7	male	L	L	L	L	L
8	4	0	9	12	0	25
9	6	6	0	13	0	25
10	5	0	8	0	13	26

Reproduction at		6.25% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	8	0	13	0	25
2	5	0	6	0	13	24
3	6	0	8	0	0	14
4	4	0	9	10	0	23
5	3	0	9	11	0	23
6	5	0	13	13	0	31
7	6	0	9	12	0	27
8	5	0	10	13	0	28
9	0	0	0	X	X	0
10	4	10	0	0	0	14

Reproduction at		12.5% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	7	6	0	13	0	26
2	5	0	8	12	0	25
3	4	1	8	10	0	23
4	6	0	14	15	0	35
5	4	0	10	13	0	27
6	5	0	10	13	0	28
7	6	0	10	12	0	28
8	6	0	13	13	0	32
9	5	0	10	12	0	27
10	6	0	8	12	0	26

Reproduction at		25% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	3	6	0	14	0	23
2	4	0	12	12	0	28
3	6	0	7	11	0	24
4	5	0	11	12	0	28
5	5	0	11	13	0	29
6	5	0	12	9	0	26
7	6	0	16	12	0	34
8	5	0	X	X	X	5
9	5	0	17	13	0	35
10	4	0	10	11	0	25

Reproduction at		50% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	8	7	X	X	X	15
2	4	0	7	10	0	21
3	4	0	9	12	0	25
4	6	0	7	13	0	26
5	5	0	8	13	0	26
6	7	0	10	12	0	29
7	6	1	12	13	0	32
8	4	0	9	0	0	13
9	5	0	13	13	0	31
10	3	0	7	14	0	24

Reproduction at		100% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	5	0	4	11	0	20
2	3	5	0	12	0	20
3	6	0	8	11	0	25
4	7	0	7	12	0	26
5	4	0	10	12	0	26
6	4	1	8	12	0	25
7	6	0	10	12	0	28
8	5	0	12	11	0	28
9	4	0	11	16	0	31
10	6	0	11	13	0	30

**CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry**

Client: WSRC/G-10
 Sample Identification: G-10 W/ Daphnia ambigua
 Test Date: January 22, 2002

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Initial	7.64	7.53	7.52	7.58	7.78	7.94
Day 1	7.10	7.16	7.29	7.53	7.55	7.80
Day 2	7.06	7.10	7.14	7.30	7.68	7.81
Day 3	7.08	7.15	7.23	7.36	7.55	7.78
Day 4	7.57	7.63	7.45	7.63	7.82	8.14
Day 5	7.26	7.29	7.39	7.52	7.56	
Day 6	7.25	7.24	7.22	7.29	7.61	7.89

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Day 1	7.31	7.29	7.39	7.51	7.71	7.91
Day 2	7.40	7.32	7.30	7.36	7.67	7.78
Day 3	7.17	7.31	7.45	7.59	7.72	7.99
Day 4	7.74	7.88	7.55	7.62	7.75	8.05
Day 5	7.74	7.66	7.57	7.73	7.82	
Day 6	7.50	7.43	7.37	7.38	7.55	7.91
Final	7.33	7.72	7.15	7.19	7.34	7.68

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Initial	8.4	8.3	8.2	8.2	8.2	8.2
Day 1	8.0	8.0	8.0	8.1	8.1	8.2
Day 2	8.2	8.2	8.2	8.2	8.1	8.1
Day 3	8.2	8.2	8.1	8.1	8.1	8.1
Day 4	8.0	8.3	8.2	8.2	8.2	8.2
Day 5		8.3	8.4	8.3	8.3	8.3
Day 6	8.3	8.3	8.3	8.3	8.2	8.1

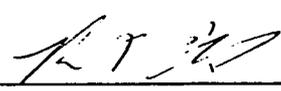
Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Day 1	8.0	8.0	8.0	7.9	7.9	7.7
Day 2	8.2	8.2	8.2	8.2	8.1	8.1
Day 3	8.1	8.1	8.1	8.0	8.0	8.0
Day 4	8.3	8.1	8.1	8.1	8.1	8.1
Day 5		8.0	8.2	8.2	8.2	8.2
Day 6	8.3	8.3	8.2	8.2	8.1	8.0
Final	8.0	8.1	8.2	8.3	8.3	8.3

Temperature

Incubator °C	
Initial	25.2
Day 1	25.2
Day 2	25.1
Day 3	25.7
Day 4	24.7
Day 5	25.4
Day 6	25.2
Final	25.6

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: *Daphnia ambigua*

Facility: WSRC
Sample ID: A-01

Aiken County

ETT#: 19175

Sample ID: February 5, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Survival and Reproduction Results

Client: WSRC
 Sample Identification: A-01
 Test Date: February 5, 2002

County: Aiken
 NPDES#: SC
 ETT #: 19175

Reproduction at		MHSF Control					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	6	0	14	13	0	33	
2	4	9	16	0	0	29	
3	5	9	0	14	0	28	
4	4	11	10	0	0	25	
5	6	0	12	14	0	32	
6	6	0	13	14	0	33	
7	5	0	12	13	0	30	
8	6	0	11	15	0	32	
9	6	0	13	16	0	35	
10	4	0	11	13	0	28	

Reproduction at		6.25% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	6	9	0	15	0	30	
2	1	12	13	0	0	26	
3	6	12	0	13	0	31	
4	4	12	10	0	0	26	
5	4	0	10	X	X	14	
6	6	0	13	14	0	33	
7	4	0	10	14	0	28	
8	5	1	12	16	0	34	
9	6	0	13	15	0	34	
10	6	0	14	14	0	34	

Reproduction at		12.5% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	4	X	X	X	X	4	
2	5	11	15	0	0	31	
3	6	12	0	15	0	33	
4	5	12	15	0	0	32	
5	X	X	X	X	X	0	
6	4	0	13	14	0	31	
7	6	0	10	15	0	31	
8	5	0	13	14	0	32	
9	5	0	10	12	0	27	
10	6	0	12	14	0	32	

Reproduction at		25% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	3	0	8	11	0	22	
2	6	9	12	0	0	27	
3	6	11	X	X	X	17	
4	5	11	13	0	0	29	
5	5	0	11	10	0	26	
6	6	0	5	14	0	25	
7	6	0	11	13	0	30	
8	5	0	14	14	0	33	
9	5	0	12	15	0	32	
10	5	10	0	12	0	27	

Reproduction at		50% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	0	12	0	0	0	12	
2	3	11	11	0	0	25	
3	4	11	0	14	0	29	
4	5	13	15	0	0	33	
5	5	0	9	12	0	26	
6	5	0	13	17	0	35	
7	6	11	0	13	0	30	
8	6	1	12	11	0	30	
9	4	0	13	14	0	31	
10	5	0	11	15	0	31	

Reproduction at		100% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	5	11	0	15	0	31	
2	4	12	15	0	0	31	
3	3	12	0	14	0	29	
4	0	0	10	13	0	23	
5	6	9	0	14	0	29	
6	5	8	0	12	0	25	
7	2	X	X	X	X	2	
8	5	0	12	15	0	32	
9	4	11	0	17	0	32	
10	6	0	11	12	0	29	

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC**
 Sample Identification: **A-01**
 Test Date: **February 5, 2002**

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	7.33	7.24	7.14	7.07	7.03	7.03
Day 1	8.27	8.01	7.89	7.69	7.66	7.63
Day 2	7.61	7.34	7.25	7.26	7.34	7.39
Day 3	6.91	6.82	7.03	7.12	7.20	7.29
Day 4	7.63	7.40	7.33	7.30	7.31	7.34
Day 5	7.69	7.61	7.50	7.47	7.39	7.32
Day 6	7.12	7.06	7.02	6.97	7.02	7.04

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.22	8.09	8.02	7.93	7.87	7.82
Day 2	7.72	7.52	7.47	7.43	7.42	7.45
Day 3	7.00	6.61	6.91	7.00	7.10	7.30
Day 4	7.79	7.50	7.48	7.39	7.38	7.41
Day 5	7.80	7.77	7.64	7.66	7.61	7.61
Day 6	7.50	7.46	7.35	7.24	7.33	7.35
Final	7.93	8.08	7.83	7.61	7.53	7.48

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	8.4	8.4	8.4	8.4	8.4	8.3
Day 1	8.4	8.4	8.4	8.4	8.4	8.4
Day 2	8.4	8.4	8.4	8.4	8.4	8.3
Day 3	8.4	8.3	8.4	8.2	8.2	8.2
Day 4	8.3	8.3	8.3	8.2	8.2	8.2
Day 5	8.4	8.3	8.3	8.3	8.3	8.3
Day 6	8.3	8.4	8.4	8.4	8.3	8.3

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.4	8.3	8.3	8.3	8.4	8.1
Day 2	8.4	8.1	8.2	8.2	8.1	8.1
Day 3	8.5	8.4	8.2	8.2	8.1	8.0
Day 4	8.4	8.4	8.3	8.2	8.3	8.1
Day 5	8.3	8.4	8.3	8.3	8.3	8.2
Day 6	8.3	8.3	8.3	8.3	8.3	8.2
Final	8.9	8.3	8.3	8.3	8.3	8.1

Temperature

Incubator °C	
Initial	24.8
Day 1	25.0
Day 2	24.6
Day 3	25.0
Day 4	25.7
Day 5	25.3
Day 6	25.7
Final	25.3

Test Results Reviewed and Approved By:

[Signature]



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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: *Daphnia ambigua*

Facility: WSRC
Sample ID: A-11

Aiken County

ETT#: 19176

Sample ID: February 5, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: **WSRC**
 Sample Identification: **A-11**
 Test Date: **February 5, 2002**

County: **Aiken**
 NPDES#: **SC**
 ETT #: **19176**

Reproduction at		MHSF		Control		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	6	0	14	13	0	33
2	4	9	16	0	0	29
3	5	9	0	14	0	28
4	4	11	10	0	0	25
5	6	0	12	14	0	32
6	6	0	13	14	0	33
7	5	0	12	13	0	30
8	6	0	11	15	0	32
9	6	0	13	16	0	35
10	4	0	11	13	0	28

Reproduction at		6.25% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	6	0	10	13	0	29	
2	4	10	16	0	0	30	
3	6	12	0	14	0	32	
4	6	12	17	0	0	35	
5	5	0	11	8	0	24	
6	5	0	12	13	0	30	
7	0	5	10	0	0	15	
8	7	L	L	L	L	L	
9	6	0	12	16	0	34	
10	1	3	14	0	0	18	

Reproduction at		12.5% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	5	0	10	19	0	34	
2	0	4	12	0	0	16	
3	6	0	12	14	0	32	
4	6	9	0	12	0	27	
5	6	1	10	0	0	17	
6	4	2	11	16	0	33	
7	6	0	10	15	0	31	
8	6	0	13	0	0	19	
9	6	0	11	0	0	17	
10	5	0	16	0	0	21	

Reproduction at		25% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	7	0	12	17	0	36	
2	5	11	15	0	0	31	
3	5	0	12	18	0	35	
4	4	12	16	0	0	32	
5	6	X	X	X	X	6	
6	4	0	11	15	0	30	
7	6	0	10	9	0	25	
8	6	0	10	0	0	16	
9	4	0	10	14	0	28	
10	0	6	13	0	0	19	

Reproduction at		50% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	7	0	12	15	0	34	
2	0	X	X	X	X	0	
3	5	0	11	14	0	30	
4	5	0	15	12	0	32	
5	5	0	12	14	0	31	
6	6	0	11	0	0	17	
7	4	L	L	L	L	L	
8	6	0	9	X	X	15	
9	0	5	11	0	0	16	
10	0	5	11	0	0	16	

Reproduction at		100% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	5	0	12	14	0	31	
2	5	7	12	0	0	24	
3	6	0	12	10	0	28	
4	3	10	15	0	0	28	
5	7	0	11	10	0	28	
6	6	11	16	0	0	33	
7	5	L	L	L	L	L	
8	6	0	14	0	0	20	
9	7	0	12	13	0	32	
10	6	0	15	0	0	21	

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST Water Chemistry

Client: WSRC
 Sample Identification: A-11
 Test Date: February 5, 2002

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	7.33	7.08	7.07	7.11	7.15	7.15
Day 1	8.27	8.13	7.02	7.27	7.15	6.98
Day 2	7.61	7.29	7.22	7.16	7.13	7.15
Day 3	6.91	7.22	8.48	7.61	7.30	7.57
Day 4	7.63	7.32	7.30	7.24	7.20	7.14
Day 5	7.69	8.83	8.85	8.86	8.66	8.50
Day 6	7.12	7.38	7.32	7.21	7.21	7.17

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.22	7.56	7.57	7.46	7.39	7.40
Day 2	7.72	7.40	7.34	7.31	7.31	7.30
Day 3	7.00	7.38	7.18	7.18	7.08	7.28
Day 4	7.79	7.43	7.38	7.34	7.32	7.29
Day 5	7.80	8.89	9.00	9.00	8.81	8.68
Day 6	7.50	7.73	7.67	7.65	7.59	7.57
Final	7.93	7.18	6.20	7.44	7.61	7.17

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	8.4	8.4	8.3	8.3	8.3	8.3
Day 1	8.4	8.3	8.3	8.3	8.3	8.3
Day 2	8.4	8.4	8.3	8.3	8.3	8.1
Day 3	8.4	8.6	8.6	8.6	8.7	8.7
Day 4	8.3	8.5	8.5	8.5	8.5	8.5
Day 5	8.4	8.4	8.3	8.3	8.3	8.3
Day 6	8.3	8.4	8.3	8.3	8.3	8.3

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.4	8.4	8.4	8.3	8.3	8.3
Day 2	8.4	8.3	8.2	8.2	8.2	8.2
Day 3	8.5	8.5	8.6	8.7	8.7	8.7
Day 4	8.4	8.5	8.5	8.5	8.5	8.6
Day 5	8.3	8.4	8.4	8.4	8.4	8.4
Day 6	8.3	8.3	8.6	8.3	8.3	8.2
Final	8.9	8.4	8.3	8.3	8.2	8.2

Temperature

Incubator °C	
Initial	24.8
Day 1	25.0
Day 2	24.6
Day 3	25.0
Day 4	25.7
Day 5	25.3
Day 6	25.7
Final	25.3

Test Results Reviewed and Approved By:

[Handwritten Signature]

ETT
Environmental, Inc.

P.O. Box 16414, Greenville, SC 29606

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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: *Daphnia ambigua*

Facility: WSRC
Sample ID: G-10

Aiken County

ETT#: 19177

Sample ID: February 5, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: WSRC
 Sample Identification: G-10
 Test Date: February 5, 2002

County: Aiken
 NPDES#: SC
 ETT #: 19177

Reproduction at		MHSF Control				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	3	11	15	0	0	29
2	5	1	14	13	0	33
3	3	11	16	0	0	30
4	X	X	X	X	X	0
5	6	10	0	14	0	30
6	5	1	15	12	0	33
7	11	0	12	0	0	23
8	3	0	11	15	0	29
9	3	8	12	0	0	23
10	X	X	X	X	X	0

Reproduction at		6.25% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	4	1	10	14	0	29
2	5	0	10	X	X	15
3	4	1	12	15	0	32
4	5	1	12	0	0	18
5	6	0	12	15	0	33
6	3	1	11	5	X	20
7	0	4	11	0	0	15
8	5	0	12	14	0	31
9	0	3	11	X	X	14
10	0	5	12	3	0	20

Reproduction at		12.5% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	5	1	11	15	0	32
2	5	0	10	5	0	20
3	5	1	11	0	0	17
4	5	0	11	17	0	33
5	6	0	12	16	0	34
6	4	0	11	12	0	27
7	0	5	12	0	0	17
8	5	0	10	14	0	29
9	0	4	11	0	0	15
10	0	5	8	0	0	13

Reproduction at		25% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	5	0	12	14	0	31
2	5	4	13	10	0	32
3	6	0	9	X	X	15
4	5	1	12	13	0	31
5	6	0	13	15	0	34
6	4	0	12	0	0	16
7	3	0	13	0	0	16
8	3	0	14	13	0	30
9	0	6	X	X	X	6
10	0	4	13	12	0	29

Reproduction at		50% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	5	0	14	X	X	19
2	5	0	16	14	0	35
3	5	0	15	16	0	36
4	4	0	16	15	0	35
5	5	0	10	8	0	23
6	0	5	11	0	0	16
7	4	0	9	19	0	32
8	4	0	14	15	0	33
9	0	6	12	0	0	18
10	0	5	15	0	0	20

Reproduction at		100% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	5	0	11	15	0	31
2	4	0	10	14	0	28
3	3	0	13	0	0	16
4	3	0	14	0	0	17
5	4	0	14	14	0	32
6	5	0	12	15	0	32
7	2	0	15	8	0	25
8	5	0	17	X	X	22
9	0	6	15	0	0	21
10	4	0	13	14	0	31

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST Statistical Analyses

Client: WSRC
 Sample Identification: G-10
 Test Date: February 5, 2002

Test for Normality

Test Used: Kolmogorov D
 D= NA
 critical NA
 NA

Test for Homogeneity of Variance

Test Used: Bartlett's Test
 B= NA
 critical NA
 NA

Test for Differences in Reproduction

Test Type Used: Non-Linear Regression - Logistic Model
 Calculated Using JMP Software
 % Effluent

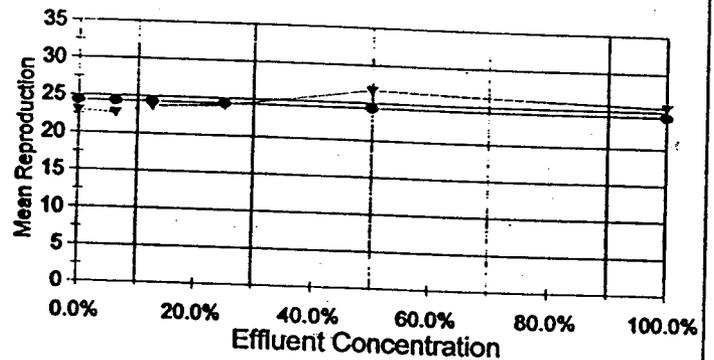
Effect	MHSF	6.3%	12.5%	25.0%	50.0%	100%	
Survival	80%	100%	100%	80%	90%	90%	
Predicted	100%	100%	100%	100%	100%	100%	
Reproduction	23.0	22.7	23.7	24.0	26.7	25.5	
Predicted	24.3	24.3	24.3	24.3	24.3	24.3	
Variance	158.67	59.12	66.01	95.11	66.68	38.50	
CV=	55%					MSD=	9.27

Test Parameters

	alpha	beta	gamma	% Reduction CTC= 100%	Pass/Fail
Survival	3.00	-200.00	0.00	0.0%	Pass
Reproduction	4.78	-200.00	24.27	0.0%	Pass

IC25= >100%

Reproduction vs. Effluent Conc.



▲ Actual Reproduction ● Predicted Reproduction

Summary

The reductions in survival and reproduction at the CTC are <25% - Pass

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC**
 Sample Identification: **G-10**
 Test Date: **February 5, 2002**

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	7.33	7.92	7.79	7.68	7.63	7.65
Day 1	8.27	7.52	7.44	7.50	7.56	7.73
Day 2	7.61	7.75	7.64	7.52	7.46	7.64
Day 3	6.91	8.34	8.34	7.95	7.91	7.94
Day 4	7.63	7.93	7.85	7.64	7.60	7.61
Day 5	7.69	8.09	7.88	7.77	7.76	7.62
Day 6	7.12	7.44	7.38	7.48	7.73	7.81

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.22	8.01	7.85	7.79	7.70	7.76
Day 2	7.72	7.91	7.79	7.70	7.62	7.61
Day 3	7.00	8.93	8.77	8.25	8.07	7.99
Day 4	7.79	8.00	7.91	7.63	7.61	7.61
Day 5	7.80	8.32	8.17	8.04	7.93	7.90
Day 6	7.50	7.59	7.45	7.51	7.79	7.92
Final	7.93	7.43	7.35	7.43	7.60	7.93

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	8.4	8.4	8.4	8.3	8.4	8.3
Day 1	8.4	8.4	8.4	8.4	8.4	8.4
Day 2	8.4	8.4	8.4	8.4	8.4	8.3
Day 3	8.4	8.5	8.4	8.4	8.4	8.4
Day 4	8.3	8.5	8.4	8.4	8.4	8.4
Day 5	8.4	8.4	8.4	8.4	8.4	8.3
Day 6	8.3	8.4	8.4	8.4	8.4	8.4

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.4	8.4	8.3	8.3	8.3	8.1
Day 2	8.4	8.3	8.3	8.4	8.3	8.2
Day 3	8.5	8.4	8.3	8.3	8.2	8.2
Day 4	8.4	8.3	8.2	8.2	8.2	8.1
Day 5	8.3	8.3	8.2	8.7	8.1	8.0
Day 6	8.3	8.3	8.3	8.2	8.2	8.1
Final	8.9	8.4	8.3	8.2	8.2	8.2

Temperature

Incubator °C	
Initial	24.8
Day 1	25.0
Day 2	24.6
Day 3	25.0
Day 4	25.7
Day 5	25.3
Day 6	25.7
Final	25.3

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: *Daphnia ambigua*

Facility: WSRC
Sample ID: A-01

Aiken County

ETT#: T19343

Sample ID: February 26, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: WSRC
 Sample Identification: A-01
 Test Date: February 26, 2002

County: Aiken
 NPDES#: SC
 ETT #: T19343

Reproduction at Control						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	5	14	X	X	19
2	7	0	10	11	0	28
3	4	0	9	13	0	26
4	0	5	10	0	14	29
5	5	0	12	X	X	17
6	5	0	14	15	0	34
7	4	0	8	11	0	23
8	6	0	13	12	0	31
9	5	0	14	12	0	31
10	4	0	10	11	0	25

Reproduction at 6.25% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	L	L	L	L	L	L
2	L	L	L	L	L	L
3	L	L	L	L	L	L
4	5	0	12	12	0	29
5	L	L	L	L	L	L
6	6	0	8	0	12	26
7	5	0	10	13	0	28
8	5	0	9	12	0	26
9	6	0	10	11	0	27
10	6	0	12	X	X	18

Reproduction at 12.5% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	6	7	0	8	21
2	L	L	L	L	L	L
3	5	0	10	12	0	27
4	6	0	13	X	X	19
5	6	0	11	13	0	30
6	L	L	L	L	L	L
7	5	0	10	13	0	28
8	L	L	L	L	L	L
9	5	0	11	12	0	28
10	5	0	8	5	0	18

Reproduction at 25% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	0	7	0	13	20
2	5	0	9	X	X	L
3	L	L	L	L	L	0
4	6	0	10	12	0	28
5	L	L	L	L	L	0
6	5	0	13	17	0	L
7	6	0	14	14	0	34
8	5	0	12	10	0	L
9	L	L	L	L	L	0
10	L	L	L	L	L	0

Reproduction at 50% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	5	0	9	13	0	27
2	5	0	11	15	0	31
3	L	L	L	L	L	L
4	4	0	10	14	0	28
5	6	0	11	0	11	28
6	6	0	12	5	0	23
7	5	0	14	11	0	30
8	6	0	13	14	0	33
9	5	0	12	X	X	17
10	5	0	10	13	0	28

Reproduction at 100% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	0	0	0	0	0
2	0	5	10	0	8	23
3	1	0	11	0	15	L
4	5	0	13	14	0	32
5	4	1	11	14	0	30
6	6	0	13	0	14	33
7	6	0	13	14	0	33
8	5	0	12	14	0	31
9	6	0	12	15	0	33
10	6	0	10	10	0	26

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST Statistical Analyses

Client: WSRC
 Sample Identification: A-01
 Test Date: February 26, 2002

Test for Normality

Test Used: Shapiro-Wilks
 W= NA
 critical NA
 NA

Test for Homogeneity of Variance

Test Used: Bartlett's Test
 B= NA
 critical NA
 NA

Test for Differences in Reproduction

Test Type Used: Non-Linear Regression - Logistic Model
 Calculated Using JMP Software

Effect	% Effluent					
	MHSF	6.3%	12.5%	25.0%	50.0%	100%
Survival	80%	100%	89%	86%	89%	100%
Predicted	100%	100%	100%	100%	100%	100%
Reproduction	26.3	25.7	24.8	26.7	27.2	26.8
Predicted	26.0	26.0	26.0	26.0	26.0	26.0
Variance	29.57	15.47	18.94	55.90	22.44	100.40

CV= 21%

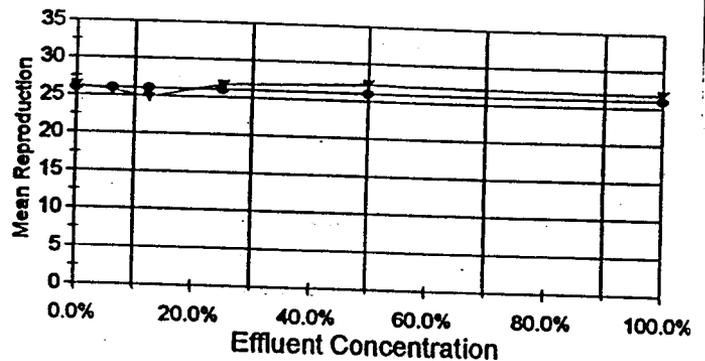
MSD= 6.72

Test Parameters

	alpha	beta	gamma	% Reduction	
				CTC= 93.4%	Pass/Fail
Survival	3.00	-200.00	0.00	0.0%	Pass
Reproduction	4.78	-48000.00	26.00	0.0%	Pass

IC25= >100%

Reproduction vs. Effluent Conc.



▲ Actual Reproduction ● Predicted Reproduction

Summary

The reductions in survival and reproduction at the CTC are <25% - Pass

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: WSRC
 Sample Identification: A-01
 Test Date: February 26, 2002

pH (After Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Initial	7.75	7.46	7.12	7.07	7.04	7.00
Day 1	8.20	8.06	7.80	7.59	7.43	7.09
Day 2	7.11	6.93	6.85	7.93	7.07	7.24
Day 3	7.01	7.15	7.02	6.98	7.04	7.13
Day 4	7.02	7.23	7.19	7.11	7.05	6.98
Day 5	7.06	7.11	7.28	7.25	7.07	7.01
Day 6	7.04	6.95	6.85	6.94	6.96	7.11

pH (Before Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Day 1	8.25	8.09	7.92	7.83	7.86	7.66
Day 2	7.36	7.34	7.22	7.18	7.31	7.64
Day 3	7.34	7.26	7.23	7.24	7.30	7.43
Day 4	7.11	7.33	7.31	7.12	7.22	7.45
Day 5	7.09	7.18	7.26	7.24	7.36	7.38
Day 6	6.95	6.88	6.95	6.87	6.84	7.07
Final	7.63	7.97		7.38	7.43	7.47

Dissolved Oxygen (After Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Initial	8.4	8.2	8.2	8.5	8.3	8.4
Day 1	8.4	8.2	8.2	8.3	8.3	8.3
Day 2	8.4	8.3	8.3	8.4	8.4	8.4
Day 3	8.4	8.2	8.2	8.3	8.4	8.4
Day 4	8.4	8.2	8.2	8.4	8.4	8.4
Day 5	8.3	8.4	8.3	8.3	8.4	8.4
Day 6	8.4	8.3	8.3	8.3	8.4	8.4

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Day 1	8.3	8.3	8.3	8.4	8.4	8.4
Day 2	8.5	8.4	8.4	8.3	8.4	8.4
Day 3	8.5	8.4	8.4	8.4	8.5	8.5
Day 4	8.5	8.4	8.5	8.5	8.5	8.5
Day 5	8.4	8.4	8.4	8.3	8.3	8.3
Day 6	8.3	8.4	8.4	8.4	8.4	8.4
Final	8.4	8.4		8.3	8.4	8.4

Temperature

Incubator °C	
Initial	25.5
Day 1	25.2
Day 2	25.2
Day 3	25.4
Day 4	25.4
Day 5	25.6
Day 6	25.4
Final	25.0

Test Results Reviewed and Approved By:

[Handwritten Signature]



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**7 Day Chronic Definitive Survival
and Reproduction Bioassay**

Method: EPA/600/4-91/002

Test Organism: *Daphnia ambigua*

Facility: WSRC
Sample ID: A-11

Aiken County

ETT#: T19344

Sample ID: February 26, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: WSRC
 Sample Identification: A-11
 Test Date: February 26, 2002

County: Aiken
 NPDES#: SC
 ETT #: T19344

Reproduction at Control						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	5	14	X	X	19
2	7	0	10	11	0	28
3	4	0	9	13	0	26
4	0	5	10	0	14	29
5	5	0	12	X	X	17
6	5	0	14	15	0	34
7	4	0	8	11	0	23
8	6	0	13	12	0	31
9	5	0	14	12	0	31
10	4	0	10	11	0	25

Reproduction at 6.25% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	4	7	0	14	25
2	5	0	10	14	0	29
3	L	L	L	L	L	L
4	L	L	L	L	L	L
5	7	0	13	X	X	20
6	6	0	8	14	0	28
7	6	0	14	14	0	34
8	6	1	14	15	0	36
9	6	0	14	X	X	20
10	0	4	12	X	X	16

Reproduction at 12.5% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	7	0	13	0	14	34
2	6	0	13	14	0	33
3	0	5	13	X	X	18
4	4	0	12	X	X	16
5	0	6	13	0	11	30
6	X	X	X	X	X	0
7	6	0	14	14	0	34
8	6	0	12	13	0	31
9	6	0	11	15	0	32
10	0	6	14	0	12	32

Reproduction at 25% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	8	0	14	14	0	36
2	5	0	13	10	0	28
3	0	5	10	0	7	22
4	7	0	13	13	0	33
5	7	0	12	0	10	29
6	0	3	0	2	10	15
7	6	0	12	13	0	31
8	7	0	13	14	0	34
9	7	0	13	14	0	34
10	0	6	11	0	12	29

Reproduction at 50% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	6	12	X	X	18
2	5	0	10	9	0	24
3	0	6	14	0	15	35
4	6	0	12	14	0	32
5	1	0	12	X	X	13
6	7	0	13	15	0	35
7	0	7	10	0	10	27
8	5	0	13	X	X	18
9	0	5	11	0	12	28
10	0	6	11	0	13	30

Reproduction at 100% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	6	0	14	X	X	20
2	0	6	13	0	12	31
3	0	6	13	0	10	29
4	L	L	L	L	L	0
5	6	0	14	0	12	32
6	5	0	15	0	12	32
7	6	0	14	14	0	34
8	4	0	12	10	0	26
9	5	0	13	X	X	18
10	0	4	10	0	13	27

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST Statistical Analyses

Client: WSRC
 Sample Identification: A-11
 Test Date: February 26, 2002

Test for Normality

Test Used: Shapiro-Wilks

W= NA
 critical NA

NA

Test for Homogeneity of Variance

Test Used: Bartlett's Test

B= NA
 critical NA

NA

Test for Differences in Reproduction

Test Type Used: Non-Linear Regression - Logistic Model
 Calculated Using JMP Software

Effect	% Effluent					
	MHSF	6.3%	12.5%	25.0%	50.0%	100%
Survival	80%	100%	70%	100%	70%	78%
Predicted	100%	100%	100%	100%	100%	100%
Reproduction	26.3	26.0	26.0	29.1	26.0	27.7
Predicted	26.6	26.6	26.6	26.6	26.6	26.6
Variance	29.57	50.00	125.56	40.54	57.78	30.75

CV= 21%

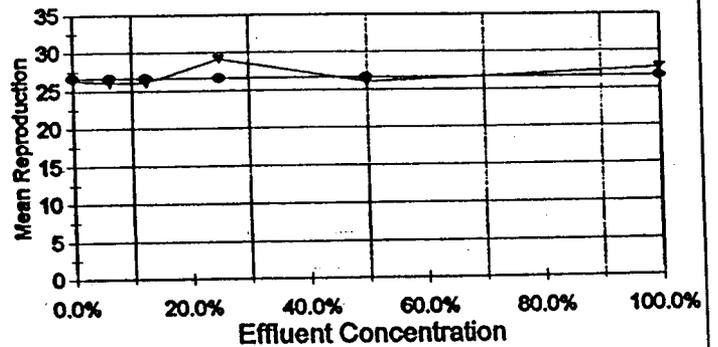
MSD= 7.75

Test Parameters

	alpha	beta	gamma	% Reduction	Pass/Fail
				CTC= 98.1%	
Survival	3.00	-200.00	0.00	0.0%	Pass
Reproduction	2.99	-5.89	26.70	0.0%	Pass

IC25= >100%

Reproduction vs. Effluent Conc.



▲ Actual Reproduction ● Predicted Reproduction

Summary

The reductions in survival and reproduction at the CTC are <25% - Pass

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: WSRC
 Sample Identification: A-11
 Test Date: February 26, 2002

pH (After Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Initial	7.75	7.64	7.41	8.38	7.32	7.29
Day 1	8.20	7.12	6.95	6.97	7.94	7.02
Day 2	7.11	6.70	6.63	6.65	6.72	6.73
Day 3	7.01	7.21	7.10	7.10	7.09	7.16
Day 4	7.02	6.99	7.23	7.24	7.21	7.19
Day 5	7.06	7.01	7.07	7.22	7.28	7.33
Day 6	7.01	7.05	7.06	6.91	6.94	7.09

pH (Before Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Day 1	8.25	7.61	7.54	7.55	7.44	7.45
Day 2	7.36	7.30	7.12	7.11	7.14	7.20
Day 3	7.34	7.43	7.37	7.33	7.30	7.31
Day 4	7.11	7.34	7.31	7.12	7.11	7.02
Day 5	7.09	7.11	7.29	7.34	7.25	7.41
Day 6	6.95	6.81	6.84	8.86	8.90	7.01
Final	7.63	7.49	7.06	7.24	7.18	7.17

Dissolved Oxygen (After Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Initial	8.4	8.2	8.3	8.2	8.2	8.2
Day 1	8.4	8.3	8.3	8.3	8.4	8.4
Day 2	8.4	8.3	8.3	8.4	8.4	8.5
Day 3	8.4	8.4	8.4	8.5	8.5	8.6
Day 4	8.4	8.4	8.4	8.4	8.4	8.4
Day 5	8.3	8.3	8.3	8.4	8.4	8.4
Day 6	8.4	8.5	8.5	8.5	8.5	8.5

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Day 1	8.4	8.3	8.3	8.1	8.4	8.4
Day 2	8.5	8.4	8.4	8.4	8.5	8.4
Day 3	8.5	8.3	8.4	8.4	8.5	8.5
Day 4	8.5	8.4	8.4	8.4	8.5	8.5
Day 5	8.4	8.4	8.4	8.4	8.4	8.3
Day 6	8.3	8.5	8.5	8.6	8.6	8.6
Final	8.4	8.5	8.6	8.6	8.5	8.5

Temperature

Incubator °C	
Initial	25.5
Day 1	25.2
Day 2	25.2
Day 3	25.4
Day 4	25.4
Day 5	25.6
Day 6	25.4
Final	25.0

Test Results Reviewed and Approved By:





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
Sample ID: G-10

Aiken County

ETT#: T19345

Sample ID: February 26, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Survival and Reproduction Results

Client: WSRC
 Sample Identification: G-10
 Test Date: February 26, 2002

County: Aiken
 NPDES#: SC
 ETT #: T19345

Reproduction at Control						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	5	14	X	X	19
2	7	0	10	11	0	28
3	4	0	9	13	0	26
4	0	5	10	0	14	29
5	5	0	12	X	X	17
6	5	0	14	15	0	34
7	4	0	8	11	0	23
8	6	0	13	12	0	31
9	5	0	14	12	0	31
10	4	0	10	11	0	25

Reproduction at 6.25% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	0	12	14	0	26
2	4	0	13	15	0	32
3	3	0	12	13	0	28
4	5	0	12	14	0	31
5	5	0	X	X	X	5
6	6	0	14	13	0	33
7	0	3	12	0	14	29
8	0	5	12	0	13	30
9	5	0	8	12	0	25
10	0	5	15	0	X	20

Reproduction at 12.5% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	0	9	10	0	23
2	0	4	9	0	12	25
3	0	6	10	X	X	16
4	X	X	X	X	X	0
5	3	0	10	10	0	23
6	5	0	14	16	0	35
7	0	5	X	X	X	5
8	0	7	15	0	13	35
9	floaters	L	L	L	L	L
10	0	7	0	11	11	29

Reproduction at 25% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	7	0	10	0	21
2	6	0	14	14	0	34
3	floaters	L	L	L	L	L
4	floaters	L	L	L	L	L
5	5	0	13	16	0	34
6	0	4	X	X	X	4
7	4	0	X	X	X	4
8	0	6	13	0	13	32
9	floaters	L	L	L	L	L
10	0	7	13	0	14	34

Reproduction at 50% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	7	X	X	X	7
2	6	0	15	16	0	37
3	lost	L	L	L	L	L
4	7	0	14	13	0	34
5	5	0	10	13	0	28
6	5	0	12	12	0	29
7	0	6	12	0	15	33
8	0	4	15	0	13	32
9	3	0	14	15	0	32
10	0	4	10	0	10	24

Reproduction at 100% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	3	0	11	13	0	27
2	5	0	12	14	0	31
3	0	0	13	10	0	23
4	4	0	10	15	0	29
5	1	2	12	13	0	28
6	1	0	13	13	0	27
7	0	4	11	0	14	29
8	4	3	13	7	0	27
9	6	0	14	15	0	35
10	0	4	12	0	12	28

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: WSRC
 Sample Identification: G-10
 Test Date: February 26, 2002

pH (After Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Initial	6.92	7.17	7.36	7.67	7.72	8.02
Day 1	7.79	7.50	7.56	7.57	7.72	8.20
Day 2	7.10	7.14	7.34	7.59	7.85	8.07
Day 3	7.63	7.53	7.38	7.64	7.72	7.89
Day 4		7.73	7.89	7.88	7.92	8.02
Day 5	7.17	7.33	7.56	7.78	7.99	8.01
Day 6	7.03	7.10	7.19	7.26	7.66	7.78

pH (Before Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Day 1	8.34	7.78	7.66	7.73	7.81	8.22
Day 2	7.47	7.61	7.65	7.79	8.08	8.38
Day 3	7.40	7.81	7.89	7.93	7.99	8.05
Day 4	7.53	7.72	7.74	7.92	8.09	8.11
Day 5	7.31	7.54	7.66	7.89	7.99	8.10
Day 6	6.87	6.98	7.15	7.21	7.54	7.66
Final	7.25	7.29	7.34	7.44	7.52	7.72

Dissolved Oxygen (After Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Initial	8.2	8.2	8.3	8.2	8.2	8.3
Day 1	8.3	8.2	8.2	8.2	8.2	8.2
Day 2	8.4	8.4	8.4	8.5	8.5	8.5
Day 3	8.4	8.3	8.3	8.4	8.4	8.5
Day 4		8.4	8.4	8.4	8.4	8.4
Day 5	8.4	8.3	8.3	8.4	8.4	8.4
Day 6	8.4	8.4	8.4	8.4	8.4	8.4

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Day 1	8.3	8.4	8.4	8.4	8.4	8.5
Day 2	8.5	8.4	8.4	8.5	8.5	8.6
Day 3	8.5	8.4	8.4	8.4	8.4	8.6
Day 4		8.6	8.3	8.5	8.6	8.6
Day 5	8.4	8.4	8.4	8.4	8.4	8.4
Day 6	8.3	8.4	8.4	8.4	8.5	8.5
Final	8.4	8.4	8.4	8.4	8.5	8.6

Temperature

Incubator °C	
Initial	25.5
Day 1	25.2
Day 2	25.2
Day 3	25.4
Day 4	25.4
Day 5	25.6
Day 6	25.4
Final	25.0

Test Results Reviewed and Approved By: _____

R. E. J.

**7 Day Chronic Definitive Survival
and Reproduction Bioassay**

Method: EPA/600/4-91/002

Test Organism: *Daphnia ambigua*

Facility: WSRC
Sample ID: A-01

Aiken County

ETT#: 19621

Sample ID: April 9, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Survival and Reproduction Results

Client: WSRC
 Sample Identification: A-01
 Test Date: April 9, 2002

County: Aiken
 NPDES#: SC
 ETT #: 19621

Reproduction at		MHSF Control				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	6	0	4	0	12	22
2	5	0	3	7	0	15
3	6	0	6	14	0	26
4	4	0	9	14	0	27
5	7	0	10	13	0	30
6	6	0	11	15	0	32
7	0	6	10	0	0	16
8	0	4	12	0	11	27
9	0	8	12	0	12	32
10	0	5	8	0	13	26

Reproduction at		6.2% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	0	8	0	12	24
2	6	0	10	0	11	27
3	5	7	1	0	16	29
4	4	0	10	X	X	14
5	5	0	12	0	15	32
6	5	0	13	0	15	33
7	4	X	X	X	X	4
8	0	3	10	0	15	28
9	0	5	11	0	12	28
10	0	7	13	0	12	32

Reproduction at		12.5% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	5	7	0	16	0	28
2	6	0	10	0	12	28
3	4	0	8	0	16	28
4	4	0	11	0	13	28
5	5	0	9	0	14	28
6	3	0	10	X	X	13
7	0	7	8	0	11	26
8	0	5	10	0	0	15
9	0	5	8	0	11	24
10	0	5	9	0	15	29

Reproduction at		25% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	0	10	0	14	28
2	5	0	12	0	16	33
3	6	0	10	0	15	31
4	4	0	11	0	17	32
5	7	0	11	0	16	34
6	5	0	11	0	14	30
7	3	0	10	0	13	26
8	0	X	X	X	X	0
9	0	3	10	0	11	24
10	0	5	7	0	14	26

Reproduction at		50% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	0	10	0	14	28
2	5	0	8	0	16	29
3	5	0	0	0	16	21
4	6	0	10	0	15	31
5	5	0	11	0	16	32
6	6	0	8	0	12	26
7	0	5	10	0	16	31
8	0	6	9	0	10	25
9	0	3	11	0	11	25
10	5	0	9	0	13	27

Reproduction at		100% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	0	4	0	12	20
2	3	0	8	0	11	22
3	5	0	3	0	6	14
4	6	0	7	0	18	31
5	4	0	10	0	16	30
6	4	0	12	0	17	33
7	0	7	10	0	15	32
8	0	3	9	0	11	23
9	0	6	12	0	17	35
10	4	0	12	0	15	31



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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: *Daphnia ambigua*

Facility: WSRC
Sample ID: A-11

Aiken County

ETT#: 19622

Sample ID: April 9, 2002

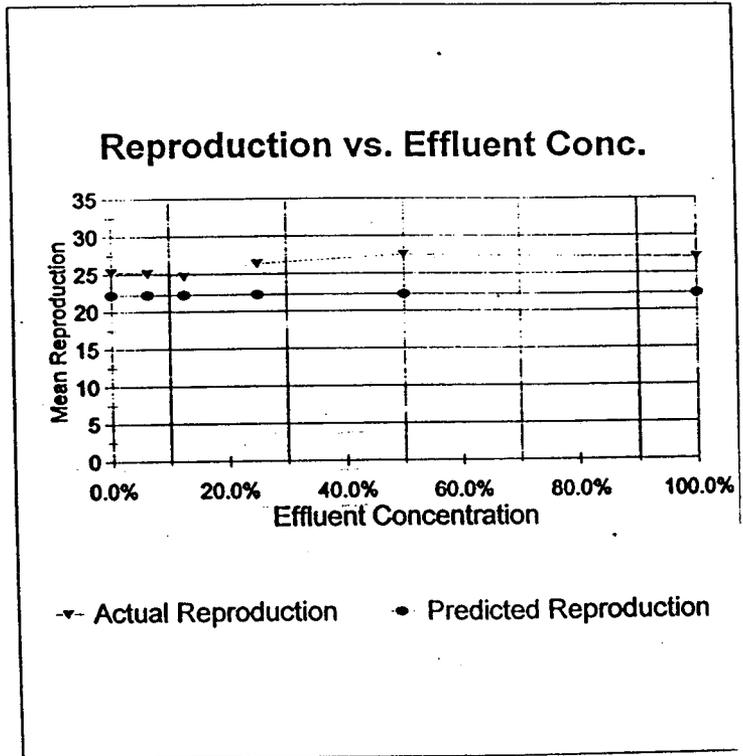
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST Statistical Analyses

Client: WSRC
 Sample Identification: A-01
 Test Date: April 9, 2002

Test for Normality	
Test Used: Kolmogorov D	D= NA critical NA
NA	

Test for Homogeneity of Variance	
Test Used: Bartlett's Test	B= NA critical NA
NA	

Test for Differences in Reproduction						
Test Type Used: Non-Linear Regression - Logistic Model						
Calculated Using JMP Software						
% Effluent						
Effect	MHSF	6.2%	12.5%	25.0%	50.0%	100%
Survival	100%	100%	90%	90%	100%	100%
Predicted	100%	100%	100%	100%	100%	100%
Reproduction	25.3	25.1	24.7	26.4	27.5	27.1
Predicted	22.2	22.2	22.2	22.2	22.2	22.2
Variance	35.79	84.77	34.01	96.93	11.61	47.21
CV= 24%		MSD= 7.43				
Test Parameters						
	alpha	beta	gamma	% Reduction CTC= 93.4%		Pass/Fail
Survival	3.00	-200.00	0.00	0.0%		Pass
Reproduction	4.78	-199.00	26.02	0.0%		Pass
IC25= >100%						



Summary
 The reductions in survival and reproduction at the CTC are <25% - Pass

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Survival and Reproduction Results

Client: WSRC
 Sample Identification: A-11
 Test Date: April 9, 2002

County: Aiken
 NPDES#: SC
 ETT #: 19622

Reproduction at		MHSF Control				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	6	0	4	0	12	22
2	5	0	3	7	0	15
3	6	0	6	14	0	26
4	4	0	9	14	0	27
5	7	0	10	13	0	30
6	6	0	11	15	0	32
7	0	6	10	0	0	16
8	0	4	12	0	11	27
9	0	8	12	0	12	32
10	0	5	8	0	13	26

Reproduction at		6.2% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	6	7	0	14	0	27
2	4	0	10	13	0	27
3	4	0	12	0	16	32
4	4	0	11	0	12	27
5	4	0	5	0	6	15
6	2	0	9	0	15	26
7	0	5	9	0	15	29
8	5	0	6	13	0	24
9	0	5	8	0	16	29
10	3	0	10	0	12	25

Reproduction at		12.5% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	3	9	0	16	0	28
2	4	0	8	0	10	22
3	0	5	9	0	12	26
4	0	0	10	0	12	22
5	4	5	10	0	16	35
6	4	0	10	0	13	27
7	5	0	12	0	16	33
8	5	0	12	0	11	28
9	0	1	9	0	10	20
10	2	0	12	0	12	26

Reproduction at		25% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	0	12	0	14	30
2	4	0	10	0	7	21
3	0	5	8	0	13	26
4	4	0	12	0	15	31
5	3	0	10	0	12	25
6	3	0	12	0	15	30
7	3	0	13	0	12	28
8	5	0	8	0	14	27
9	0	5	11	0	15	31
10	5	6	9	0	12	32

Reproduction at		50% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	5	9	0	0	14	28
2	5	0	10	0	12	27
3	0	5	12	0	13	30
4	7	1	13	0	14	35
5	2	0	8	0	8	18
6	4	0	12	0	18	34
7	4	0	14	0	14	32
8	8	0	12	0	15	35
9	0	3	4	0	5	12
10	3	0	8	0	16	27

Reproduction at		100% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	7	0	0	0	12	19
2	0	5	12	0	20	37
3	0	3	9	0	12	24
4	0	4	11	0	14	29
5	4	0	2	X	X	6
6	3	0	10	0	10	23
7	4	0	12	0	15	31
8	5	0	11	0	17	33
9	0	4	5	0	9	18
10	0	5	8	0	15	28

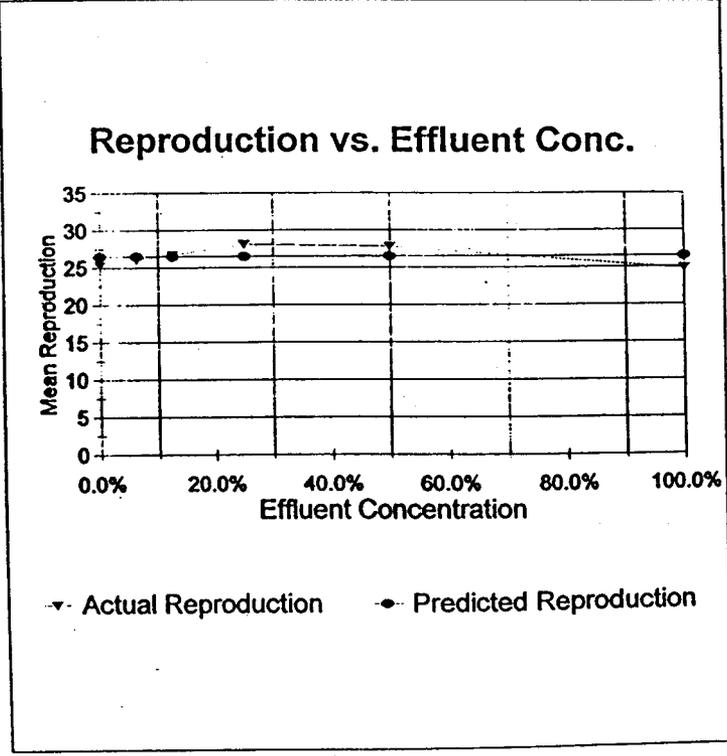
CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST Statistical Analyses

Client: WSRC
 Sample Identification: A-11
 Test Date: April 9, 2002

Test for Normality	
Test Used: Kolmogorov D	D= NA critical NA
NA	

Test for Homogeneity of Variance	
Test Used: Bartlett's Test	B= NA critical NA
NA	

Test for Differences in Reproduction						
Test Type Used: Non-Linear Regression - Logistic Model						
Calculated Using JMP Software						
		% Effluent				
Effect	MHSF	6.2%	12.5%	25.0%	50.0%	100%
Survival	100%	100%	100%	100%	100%	90%
Predicted	100%	100%	100%	100%	100%	100%
Reproduction	25.3	26.1	26.7	28.1	27.8	24.8
Predicted	26.5	26.5	26.5	26.5	26.5	26.5
Variance	35.79	20.32	22.46	11.66	56.84	79.96
CV= 24%		MSD= 6.35				
Test Parameters						
	alpha	beta	gamma	% Reduction CTC= 98.1%		Pass/Fail
Survival	3.00	-200.00	0.00	0.0%		Pass
Reproduction	4.78	-200.00	26.47	0.0%		Pass
IC25= >100%						



Summary
 The reductions in survival and reproduction at the CTC are <25% - Pass



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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: *Daphnia ambigua*

Facility: WSRC
Sample ID: G-10

Aiken County

ETT#: 19674

Sample ID: April 16, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Survival and Reproduction Results

Client: WSRC
 Sample Identification: G-10
 Test Date: April 16, 2002

County: Aiken
 NPDES#: SC
 ETT #: 19674

Reproduction at		MHSF Control					
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total	
1	5	X	X	X	X	5	
2	5	0	12	13	0	30	
3	5	0	10	14	0	29	
4	5	0	13	13	0	31	
5	5	10	0	15	0	30	
6	4	0	8	8	0	20	
7	5	0	11	13	0	29	
8	5	0	11	12	0	28	
9	5	7	0	11	0	23	
10	6	0	13	X	X	19	

Reproduction at		6.25% Concentration					
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total	
1	4	0	11	13	0	28	
2	4	0	12	15	0	31	
3	5	0	10	10	0	25	
4	4	0	9	X	X	13	
5	4	0	12	14	0	30	
6	6	0	10	11	0	27	
7	4	0	13	12	0	29	
8	3	2	11	X	X	16	
9	5	0	8	12	0	25	
10	4	0	8	12	0	24	

Reproduction at		12.5% Concentration					
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total	
1	5	0	11	15	0	31	
2	5	0	13	9	0	27	
3	5	0	12	10	0	27	
4	4	0	13	15	0	32	
5	5	0	12	11	0	28	
6	4	0	12	12	0	28	
7	4	0	11	8	0	23	
8	4	0	10	11	0	25	
9	5	8	0	14	0	27	
10	4	0	8	12	0	24	

Reproduction at		25% Concentration					
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total	
1	4	0	13	X	X	17	
2	4	0	8	7	0	19	
3	3	2	7	4	0	16	
4	5	0	12	14	0	31	
5	3	0	13	12	0	28	
6	5	0	12	14	0	31	
7	5	0	12	X	X	17	
8	5	0	13	13	0	31	
9	4	X	X	X	X	4	
10	5	0	13	11	0	29	

Reproduction at		50% Concentration					
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total	
1	5	0	13	10	0	28	
2	6	0	10	12	0	28	
3	5	0	13	X	X	18	
4	4	0	12	15	0	31	
5	3	0	13	5	0	21	
6	3	0	10	X	X	13	
7	4	X	X	X	X	4	
8	4	0	12	11	0	27	
9	4	10	0	8	0	22	
10	6	0	11	10	0	27	

Reproduction at		100% Concentration					
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total	
1	5	0	14	X	X	19	
2	6	0	13	X	X	19	
3	0	0	11	11	0	22	
4	5	0	12	10	0	27	
5	4	7	0	14	0	25	
6	5	0	4	12	0	21	
7	4	0	X	X	X	4	
8	5	0	13	11	0	29	
9	4	9	3	X	X	16	
10	4	8	0	11	0	23	

**CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry**

Client: WSRC
 Sample Identification: G-10
 Test Date: April 16, 2002

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Initial		7.65	7.47	7.43	7.58	7.70
Day 1	7.19		7.17	7.34	7.40	7.58
Day 2	7.31	7.23	7.24	7.43	7.61	7.79
Day 3	7.60	7.36	7.29	7.33	7.50	7.66
Day 4	7.42	7.25	7.31	7.33	7.59	7.75
Day 5	8.11	8.04	7.81	7.66	7.65	7.74
Day 6	7.72	7.50	7.37	7.36	7.50	7.76

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Day 1	7.37		7.27	7.33	7.38	7.61
Day 2	7.25	7.32	7.46	7.72		
Day 3	7.89	7.62	7.51	7.54	7.64	7.92
Day 4	7.36	7.43	7.51	7.61	7.65	7.79
Day 5	8.10	8.03	7.90	7.29	7.72	7.78
Day 6	7.95	7.77	7.66	7.52	7.66	7.87
Final	6.99	7.13	7.21	7.51	7.65	8.07

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Initial	8.1	8.1	8.2	8.2	8.2	8.2
Day 1	8.7	8.7	8.2	8.2	8.2	8.3
Day 2	8.4	8.4	8.3	8.3	8.2	8.2
Day 3	8.2	8.2	8.2	8.2	8.3	8.3
Day 4	8.2	8.2	8.2	8.3	8.3	8.3
Day 5	8.2	8.2	8.2	8.2	8.3	8.3
Day 6	8.1	8.1	8.1	8.1	8.2	8.3

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Day 1	8.2	8.2	8.3	8.3	8.3	8.3
Day 2	8.1	8.0	8.0	8.0		
Day 3	8.3	8.3	8.3	8.3	8.3	8.3
Day 4	8.2	8.2	8.2	8.3	8.3	8.3
Day 5	8.2	8.3	8.3	8.3	8.3	8.6
Day 6	8.3	8.4	8.4	8.6	8.6	8.7
Final	8.3	8.2	8.2	8.2	8.2	8.2

Temperature

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

Test Results Reviewed and Approved By:



**7 Day Chronic Definitive Survival
and Reproduction Bioassay**

Method: EPA/600/4-91/002

Test Organism: *Daphnia ambigua*

**Facility: WSRC
Sample ID: A-01**

Aiken County

ETT#: 19800

Sample ID: May 7, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Survival and Reproduction Results

Client: WSRC
 Sample Identification: A-01
 Test Date: May 7, 2002

County: Aiken
 NPDES#: SC
 ETT #: 19800

Reproduction at		MHSF		Control		
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	0	8	13	0	25
2	8	0	10	11	0	29
3	5	X	X	X	X	5
4	4	11	11	0	0	26
5	4	0	10	12	0	26
6	3	10	11	0	0	24
7	5	0	12	16	0	33
8	4	9	10	0	0	23
9	5	0	11	16	0	32
10	5	0	10	17	0	32

Reproduction at		6.25% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	6	0	12	16	0	34
2	9	11	14	0	0	34
3	6	10	0	17	0	33
4	4	6	13	0	0	23
5	5	0	11	16	0	32
6	9	0	4	9	0	22
7	4	0	10	16	0	30
8	0	0	5	10	0	15
9	6	0	9	13	0	28
10	6	0	11	14	0	31

Reproduction at		12.5% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	5	0	11	15	0	31
2	4	11	14	0	0	29
3	4	0	12	15	0	31
4	3	9	15	0	0	27
5	4	0	11	15	0	30
6	4	10	11	0	0	25
7	6	0	11	15	0	32
8	6	0	12	14	0	32
9	5	0	10	14	0	29
10	5	0	11	17	0	33

Reproduction at		25% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	5	0	9	12	0	26
2	4	8	7	0	0	19
3	6	0	12	16	0	34
4	4	12	14	0	0	30
5	5	0	14	17	0	36
6	5	9	13	0	0	27
7	4	0	14	7	0	25
8	4	0	3	17	0	24
9	4	0	14	19	0	37
10	5	0	10	19	0	34

Reproduction at		50% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	0	7	18	0	29
2	3	0	0	2	0	5
3	3	0	8	14	0	25
4	4	9	12	0	0	25
5	6	0	13	18	0	37
6	4	11	13	0	0	28
7	5	0	2	16	0	23
8	5	0	10	17	0	32
9	6	0	15	17	0	38
10	5	0	8	17	0	30

Reproduction at		100% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	5	0	10	15	0	30
2	3	X	X	X	X	3
3	5	0	13	16	0	34
4	4	12	15	0	0	31
5	4	9	0	16	0	29
6	4	8	14	0	0	26
7	5	0	9	12	0	26
8	5	12	0	18	0	35
9	5	10	0	17	0	32
10	5	0	10	18	0	33

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: WSRC
 Sample Identification: A-01
 Test Date: May 7, 2002

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Initial	7.22	7.25	7.21	7.13	7.09	7.09
Day 1	7.24	7.27	7.10	7.98	7.01	6.98
Day 2	7.96	7.17	7.12	7.10	7.06	7.12
Day 3	7.48	7.96	6.86	6.86	6.76	6.69
Day 4	7.99	7.70	7.45	7.37	7.37	7.38
Day 5	7.43	7.40	7.22	7.20	7.25	
Day 6	6.92	6.90	6.84	6.92	6.92	7.16

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Day 1	7.29	7.32		6.96	7.03	7.16
Day 2	7.85	7.19	7.14	7.12	7.12	7.24
Day 3	7.72	8.21	7.17	7.16	7.19	7.23
Day 4	8.10	7.92	7.60	7.58	7.52	7.51
Day 5	7.74	7.65	7.63	7.47	7.48	
Day 6	7.11	7.38	7.40	7.21	7.16	7.15
Final	7.61	7.85	7.22	7.21		

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Initial	8.2	8.1	8.1	8.1	8.2	8.1
Day 1	8.2	8.4	8.6	8.6	8.7	8.7
Day 2	8.3	8.2	8.3	8.3	8.4	8.4
Day 3	8.2	8.2	8.3	8.3	8.3	8.3
Day 4	8.3	8.3	8.4	8.4	8.4	8.4
Day 5	8.4	8.4	8.4	8.2	8.3	8.4
Day 6	8.5	8.8	8.9	8.9	8.9	8.9

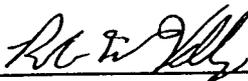
Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Day 1	7.5	7.0		7.7	7.6	7.8
Day 2	8.1	8.2	8.2	8.2	8.2	8.7
Day 3	8.2	8.2	8.2	8.2	8.3	8.5
Day 4	8.3	8.4	8.4	8.4	8.5	
Day 5	8.2	8.2	8.3	8.3	8.3	
Day 6	8.1	8.2	8.2	8.2	8.2	8.0
Final	8.2	8.2	8.1	8.2		

Temperature

Incubator °C	
Initial	24.8
Day 1	24.7
Day 2	24.8
Day 3	25.0
Day 4	24.9
Day 5	24.8
Day 6	24.8
Final	24.8

Test Results Reviewed and Approved By:



7 Day Chronic Definitive Survival and Reproduction Bioassay

Method: EPA/600/4-91/002

Test Organism: *Daphnia ambigua*

Facility: WSRC
Sample ID: A-11

Aiken County

ETT#: 19801

Sample ID: May 7, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST Survival and Reproduction Results

Client: WSRC
 Sample Identification: A-11
 Test Date: May 7, 2002

County: Aiken
 NPDES#: SC
 ETT #: 19801

Reproduction at		MHSF		Control		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	4	0	8	13	0	25
2	8	0	10	11	0	29
3	5	X	X	X	X	5
4	4	11	11	0	0	26
5	4	0	10	12	0	26
6	3	10	11	0	0	24
7	5	0	12	16	0	33
8	4	9	10	0	0	23
9	5	0	11	16	0	32
10	5	0	10	17	0	32

Reproduction at		6.25% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	4	0	2	X	X	6
2	5	0	13	16	0	34
3	6	9	10	0	0	25
4	4	8	10	0	0	22
5	5	0	11	14	0	30
6	3	10	14	0	0	27
7	5	7	15	0	0	27
8	4	11	0	13	0	28
9	5	0	13	13	0	31
10	4	0	8	10	0	22

Reproduction at		12.5% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	4	0	12	11	0	27
2	4	10	0	5	0	19
3	5	0	12	15	0	32
4	0	8	0	10	0	18
5	9	0	12	11	0	32
6	4	10	15	0	0	29
7	3	X	X	X	X	3
8	1	0	7	12	0	20
9	5	0	13	16	0	34
10	4	0	6	14	0	24

Reproduction at		25% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	5	0	14	13	0	32
2	3	9	12	0	0	24
3	5	0	12	12	0	29
4	4	8	13	0	0	25
5	5	0	10	10	0	25
6	3	7	13	0	0	23
7	3	10	13	0	0	26
8	4	0	0	14	0	18
9	5	0	11	16	0	32
10	4	0	10	13	0	27

Reproduction at		50% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	4	0	13	12	0	29
2	2	9	15	0	0	26
3	5	0	2	17	0	24
4	3	11	12	0	0	26
5	5	0	13	16	0	34
6	4	12	14	0	0	30
7	3	11	12	0	0	26
8	4	0	13	15	0	32
9	male	L	L	L	L	L
10	5	0	12	12	0	29

Reproduction at		100% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	5	0	2	0	0	7
2	3	10	14	0	0	27
3	2	0	6	13	0	21
4	4	7	7	0	0	18
5	4	0	5	17	0	26
6	4	3	0	7	0	14
7	4	5	7	0	0	16
8	2	0	7	8	0	17
9	5	0	13	14	0	32
10	4	0	9	16	0	29

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: WSRC
 Sample Identification: A-11
 Test Date: May 7, 2002

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Initial	7.22	7.84	7.64	7.53	7.49	7.38
Day 1	7.24	6.85	6.81	6.78	6.80	6.83
Day 2	7.96	6.52	6.86	6.80	6.81	6.86
Day 3	7.48	6.86	6.83	6.79	6.79	6.81
Day 4	7.99	6.71	6.75	6.76	6.74	6.79
Day 5	7.43	7.12	7.05	7.00	7.00	7.02
Day 6	6.92	7.14	7.02	6.99	6.98	7.00

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Day 1	7.29	6.81	6.79	6.70	6.76	6.74
Day 2	7.85	6.58	6.68	6.73	6.71	6.76
Day 3	7.72	6.78	6.73	6.72	6.73	6.75
Day 4	8.10	6.63	6.71	6.74	6.72	6.73
Day 5	7.74	7.27	7.25	7.21	7.19	7.19
Day 6	7.11	7.05	7.02	7.00	6.95	6.99
Final	7.61	8.03	7.28	6.99	6.98	7.07

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Initial	8.2	8.1	8.2	8.2	8.2	8.2
Day 1	8.2	8.2	8.7	8.7	8.7	8.9
Day 2	8.3	8.2	8.2	8.3	8.4	8.4
Day 3	8.2	8.3	8.3	8.3	8.3	8.5
Day 4	8.3	8.3	8.3	8.3	8.4	8.4
Day 5	8.4	8.4	8.4	8.5	8.5	8.4
Day 6	8.5	9.0	9.0	9.0	9.0	9.0

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Day 1	7.5	7.6	7.4	7.7	7.4	7.4
Day 2	8.1	8.4	8.4	8.3	8.3	8.3
Day 3	8.2	8.2	8.3	8.3	8.3	8.4
Day 4	8.3	8.3	8.3	8.4	8.4	8.5
Day 5	8.2	8.3	8.4	8.3	8.3	8.4
Day 6	8.1	8.1	8.1	8.1	8.1	8.1
Final	8.2	8.2	8.1	8.1	8.2	8.2

Temperature

Incubator °C	
Initial	24.8
Day 1	24.7
Day 2	24.8
Day 3	25.0
Day 4	24.9
Day 5	24.8
Day 6	24.8
Final	24.8

Test Results Reviewed and Approved By:

R. V. Kelly

**7 Day Chronic Definitive Survival
and Reproduction Bioassay**
Method: EPA/600/4-91/002

Test Organism: *Daphnia ambigua*

Facility: WSRC
Sample ID: G-10

Aiken County

ETT#: 19850

Sample ID: May 14, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: WSRC/ G-10
 Sample Identification: G-10
 Test Date: May 14, 2002

County: Aiken
 NPDES#: SC
 ETT #: 19850

Reproduction at		MHSF		Control		
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	3	6	0	11	0	20
2	3	7	0	10	0	20
3	3	8	0	15	0	26
4	4	9	14	0	0	27
5	3	9	0	13	0	25
6	4	7	0	12	0	23
7	4	11	0	14	0	29
8	0	5	12	8	0	25
9	4	8	0	14	0	26
10	5	10	0	14	0	29

Reproduction at		6.25%		Concentration		
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	3	0	9	13	0	25
2	5	10	15	0	0	30
3	5	8	0	15	0	28
4	5	8	0	13	0	26
5	4	5	0	11	0	20
6	3	6	0	14	0	23
7	3	10	0	14	0	27
8	0	6	11	0	0	17
9	4	0	9	13	0	26
10	5	8	0	13	0	26

Reproduction at		12.5%		Concentration		
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	8	0	12	0	24
2	0	10	10	1	0	21
3	4	8	0	13	0	25
4	0	7	12	0	0	19
5	4	10	0	12	0	26
6	5	12	0	11	0	28
7	5	10	0	13	0	28
8	0	6	12	0	0	18
9	3	7	0	12	0	22
10	5	9	0	15	0	29

Reproduction at		25%		Concentration		
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	8	0	12	0	20
2	0	8	14	0	0	22
3	3	7	0	13	0	23
4	2	X	X	X	X	2
5	4	9	0	15	0	28
6	5	10	0	15	0	30
7	4	9	0	14	0	27
8	0	6	10	9	0	25
9	0	7	0	10	0	17
10	5	0	9	13	0	27

Reproduction at		50%		Concentration		
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	1	3	0	0	4
2	5	6	15	0	0	26
3	X	X	X	X	X	0
4	4	8	14	0	0	26
5	5	13	0	14	0	32
6	4	10	0	13	0	27
7	4	8	0	16	0	28
8	0	4	11	0	0	15
9	2	0	8	10	0	20
10	4	0	9	12	0	25

Reproduction at		100%		Concentration		
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	2	9	0	12	0	23
2	0	6	17	0	0	23
3	4	11	2	11	0	28
4	4	6	0	12	0	22
5	4	10	0	11	0	25
6	5	10	0	14	0	29
7	2	0	9	12	0	23
8	0	4	7	0	0	11
9	4	0	8	0	0	12
10	5	7	0	14	0	26

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST Statistical Analyses

Client: WSRC/ G-10
 Sample Identification: G-10
 Test Date: May 14, 2002

Test for Normality

Test Used: Kolmogorov D

D= NA
 critical NA

NA

Test for Homogeneity of Variance

Test Used: Bartlett's Test

B= NA
 critical NA

NA

Test for Differences in Reproduction

Test Type Used: Non-Linear Regression - Logistic Model
 Calculated Using JMP Software

Effect	% Effluent					
	MHSF	6.3%	12.5%	25.0%	50.0%	100%
Survival	100%	100%	100%	90%	90%	100%
Predicted	100%	100%	100%	100%	100%	100%
Reproduction	25.0	24.8	24.0	22.1	20.3	22.2
Predicted	25.3	23.9	23.4	22.8	22.0	21.0
Variance	10.22	14.84	15.11	65.43	114.90	37.07

CV= 13%

MSD= 6.76

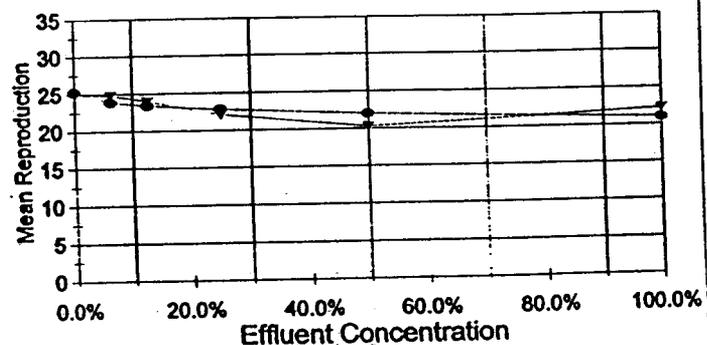
Test Parameters

	alpha	beta	gamma	% Reduction @ CTC		Pass/Fail
				19%	100%	
Survival	3.00	-200.00	0.00	0.0%	0.0%	Pass
Reproduction	26.00	-196.00	24.30	8.8%	16.9%	Pass

IC25= >100%

NOEC= >100%

Reproduction vs. Effluent Conc.



○ Actual Reproduction ● Predicted Reproduction

Summary

The reductions in survival and reproduction at the CTC are <25% - Pass

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: WSRC/ G-10
 Sample Identification: G-10
 Test Date: May 14, 2002

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Initial	7.02	7.00	7.06	7.15	7.31	7.48
Day 1	6.79	6.84	6.94	7.11	7.38	7.59
Day 2	7.20	7.08	7.07	7.18	7.40	7.58
Day 3	7.37	7.17	7.14	7.22	7.36	7.58
Day 4	7.39	7.03	7.11	7.28	7.39	7.39
Day 5	7.45	7.09	7.15	7.31	7.42	7.41
Day 6	7.91	7.24	7.13	7.20	7.33	7.44

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Day 1	6.80	6.81	7.10	7.16	7.41	7.62
Day 2	7.30	7.22	7.08	7.25	7.38	7.76
Day 3	7.54	7.42	7.34	7.38	7.58	
Day 4	7.45	7.36	7.27	4.14	7.23	7.31
Day 5	7.53	7.43	7.31	7.20	7.25	7.32
Day 6	7.56	7.54	7.45	7.40	7.51	7.63
Final	7.14	7.31	7.10	7.08	7.42	7.58

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Initial	8.1	8.1	8.1	8.2	8.2	8.2
Day 1	8.1	8.1	8.2	8.3	8.3	8.2
Day 2	8.0	8.3	8.4	8.6	8.6	8.6
Day 3	8.2	8.2	8.2	8.3	8.3	8.4
Day 4	8.1	8.1	8.1	8.3	8.2	8.3
Day 5	8.1	8.1	8.2	8.2	8.3	8.4
Day 6	8.1	8.2	8.2	8.3	8.3	8.4

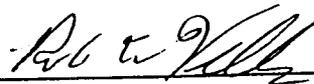
Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Day 1	8.2	8.2	5.3	8.3	8.3	8.3
Day 2	8.1	8.1	8.2	8.3	8.4	8.4
Day 3	8.1	8.0	8.0	8.0	8.0	
Day 4	8.0	8.1	8.1	8.2	8.2	8.3
Day 5	8.1	8.2	8.3	8.4	8.4	8.6
Day 6	8.2	8.3	8.4	8.4	8.5	8.5
Final	8.4	8.4	8.4	8.4	8.3	8.3

Temperature

Incubator °C	
Initial	24.8
Day 1	24.8
Day 2	24.6
Day 3	24.7
Day 4	24.6
Day 5	24.5
Day 6	24.5
Final	24.3

Test Results Reviewed and Approved By:



**7 Day Chronic Definitive Survival
and Reproduction Bioassay**
Method: EPA/600/4-91/002

Test Organism: *Daphnia ambigua*

Facility: WSRC
Sample ID: A-01

Aiken County

ETT#: 19985

Sample ID: June 4, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Survival and Reproduction Results

Client: WSRC
 Sample Identification: A-01
 Test Date: June 4, 2002

County: Aiken
 NPDES#: SC
 ETT #: 19985

Reproduction at Control						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	6	8	0	12	26
2	0	6	10	0	8	24
3	0	4	10	0	14	28
4	0	5	12	0	6	23
5	0	4	8	X	X	12
6	0	5	13	0	8	26
7	0	3	9	0	10	22
8	0	3	11	0	6	20
9	0	5	0	11	2	18
10	0	6	X	X	X	6

Reproduction at 6.25% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	4	X	X	X	4
2	0	6	10	0	12	28
3	0	3	9	0	9	21
4	L	L	L	L	L	L
5	3	0	6	12	0	21
6	0	5	10	0	14	29
7	0	5	11	0	0	16
8	0	4	10	0	8	22
9	5	0	8	8	0	21
10	0	5	7	0	14	26

Reproduction at 12.5% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	male	L	L	L	L	L
2	0	7	12	2	X	21
3	male	L	L	L	L	L
4	0	7	X	X	X	7
5	0	4	9	0	5	18
6	0	5	12	0	14	31
7	0	5	0	14	10	29
8	0	4	X	X	X	4
9	3	0	8	0	10	21
10	0	6	11	0	11	28

Reproduction at 25% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	4	10	0	11	25
2	0	7	12	0	11	30
3	3	0	10	12	0	25
4	0	5	7	0	10	22
5	male	L	L	L	L	L
6	0	5	9	0	15	29
7	0	4	0	9	13	26
8	0	5	11	0	12	28
9	0	4	11	0	14	29
10	0	6	12	0	11	29

Reproduction at 50% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	X	X	X	X	0
2	0	6	14	10	0	30
3	male	L	L	L	L	L
4	0	5	8	0	16	29
5	male	L	L	L	L	L
6	0	4	11	0	14	29
7	0	5	11	0	14	30
8	0	5	9	0	5	19
9	4	0	9	7	0	20
10	0	4	12	0	13	29

Reproduction at 100% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	4	8	0	15	27
2	0	5	8	11	0	24
3	male	L	L	L	L	L
4	0	4	8	0	15	27
5	male	L	L	L	L	L
6	0	5	12	0	6	23
7	0	4	13	0	16	33
8	0	4	12	0	15	31
9	0	X	X	X	X	0
10	0	3	14	0	16	33

**CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry**

Client: **WSRC**
 Sample Identification: **A-01**
 Test Date: **June 4, 2002**

pH (After Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Initial	7.21	7.03	6.95	6.90	6.88	6.79
Day 1	6.82	6.81	6.80	6.82	6.83	6.91
Day 2	6.92	6.90	6.84	6.90	7.00	7.07
Day 3	7.40	7.27	7.24	7.15	7.11	7.05
Day 4	7.00	6.95	6.93	6.90	7.01	7.03
Day 5	7.33	7.09	7.00	6.94	6.90	6.83
Day 6	6.96	7.25	6.97	6.97	6.82	6.77

pH (Before Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Day 1	6.82	6.84	6.83	6.85	6.90	7.04
Day 2	7.15	7.11	7.11	7.11	7.13	7.20
Day 3	7.45	7.49	7.27	7.22	7.20	7.23
Day 4	7.20	7.15	7.13	7.13	7.23	7.25
Day 5	7.38	7.56	7.38	7.09	7.00	6.99
Day 6	6.78	6.90	6.88	6.94	7.03	7.00
Final	7.31	7.63	7.60	7.50	7.41	7.42

Dissolved Oxygen (After Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Initial	8.1	8.0	8.0	8.0	8.0	7.9
Day 1	8.0	8.1	8.2	8.2	8.2	8.3
Day 2	8.1	8.0	8.0	8.0	8.1	8.1
Day 3	8.2	8.1	8.1	8.1	8.1	8.2
Day 4	8.3	8.1	8.1	8.1	8.1	8.1
Day 5	8.4	8.4	8.3	8.3	8.3	8.1
Day 6	8.4	8.4	8.5	8.5	8.5	8.5

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Day 1	6.8	7.0	7.2	7.0	7.0	7.2
Day 2	7.9	8.0	8.0	8.2	8.3	8.3
Day 3	8.1	8.0	8.0	8.1	8.1	8.2
Day 4	8.1	8.0	8.1	8.1	8.1	8.2
Day 5	8.2	8.0	8.0	8.0	8.0	8.0
Day 6	8.4	8.1	8.5	8.5	8.4	8.4
Final	8.1	8.0	7.9	7.8	7.8	7.6

Temperature

Incubator °C	
Initial	25.1
Day 1	24.3
Day 2	24.5
Day 3	24.4
Day 4	24.5
Day 5	24.2
Day 6	24.4
Final	24.5

Test Results Reviewed and Approved By:



**7 Day Chronic Definitive Survival
and Reproduction Bioassay**
Method: EPA/600/4-91/002

Test Organism: *Daphnia ambigua*

Facility: WSRC
Sample ID: A-11

Aiken County

ETT#: 19986

Sample ID: June 4, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: WSRC
 Sample Identification: A-11
 Test Date: June 4, 2002

County: Aiken
 NPDES#: SC
 ETT #: 19986

Reproduction at Control						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	6	8	0	12	26
2	0	6	10	0	8	24
3	0	4	10	0	14	28
4	0	5	12	0	6	23
5	0	4	8	X	X	12
6	0	5	13	0	8	26
7	0	3	9	0	10	22
8	0	3	11	0	6	20
9	0	5	0	11	2	18
10	0	6	X	X	X	6

Reproduction at 6.25% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	5	8	0	9	22
2	0	0	0	3	4	7
3	male	L	L	L	L	L
4	0	4	12	X	X	16
5	male	L	L	L	L	L
6	0	5	8	0	15	28
7	0	5	11	0	15	31
8	0	4	9	0	11	24
9	4	0	9	12	0	25
10	0	5	9	0	12	26

Reproduction at 12.5% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	5	10	11	0	26
2	0	7	13	X	X	20
3	male	L	L	L	L	L
4	0	4	7	0	5	16
5	0	6	10	10	0	26
6	0	4	10	0	13	27
7	0	6	14	0	13	33
8	0	5	11	X	X	16
9	4	0	9	12	0	25
10	0	5	10	0	10	25

Reproduction at 25% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	5	13	0	12	30
2	0	4	8	0	15	27
3	male	L	L	L	L	L
4	0	4	10	0	12	26
5	0	5	12	0	11	28
6	0	5	10	0	14	29
7	0	4	8	0	14	26
8	0	3	13	1	X	17
9	4	0	11	12	0	27
10	0	4	9	0	9	22

Reproduction at 50% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	4	8	10	0	22
2	0	7	10	0	9	26
3	0	5	8	0	4	17
4	0	6	10	0	16	32
5	male	L	L	L	L	L
6	0	6	11	0	4	21
7	0	6	12	0	11	29
8	0	6	11	0	10	27
9	4	0	10	12	0	26
10	0	3	11	0	6	20

Reproduction at 100% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	4	10	0	9	23
2	0	5	12	0	6	23
3	male	L	L	L	L	L
4	0	7	11	X	X	18
5	male	L	L	L	L	L
6	0	4	8	0	11	23
7	0	4	13	0	5	22
8	0	5	10	0	13	28
9	4	0	10	4	0	18
10	0	3	10	0	12	25

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: WSRC
 Sample Identification: A-11
 Test Date: June 4, 2002

pH (After Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Initial	7.21	7.28	7.15	7.11	7.09	7.13
Day 1	6.82	6.87	6.81	6.80	6.81	6.87
Day 2	6.92	7.04	7.00	6.99	6.93	6.96
Day 3	7.40	7.00	7.00	6.94	6.91	6.83
Day 4	7.00	7.05	7.03	7.00	6.95	6.93
Day 5	7.33	6.99	6.94	6.83	6.81	6.80
Day 6	6.96	8.02	8.42	8.33	8.29	8.07

pH (Before Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Day 1	6.82	6.95	6.90	6.88	6.88	6.90
Day 2	7.15	7.26	7.23	7.23	7.22	7.24
Day 3	7.45	7.00	6.95	6.91	6.83	6.89
Day 4	7.20	7.31	7.25	7.25	7.20	7.19
Day 5	7.38	6.95	6.93	6.89	6.84	6.71
Day 6	6.78	7.93	8.52	8.48	8.30	8.19
Final	7.31	7.26	7.15	7.13	7.09	7.14

Dissolved Oxygen (After Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Initial	8.1	8.5	8.3	8.2	8.1	8.0
Day 1	8.0	8.6	8.6	8.6	8.6	8.6
Day 2	8.1	8.6	8.6	8.7	8.6	8.6
Day 3	8.2	8.5	8.5	8.4	8.4	8.4
Day 4	8.3	8.4	8.4	8.5	8.6	8.6
Day 5	8.4	8.5	8.5	8.5	8.6	8.7
Day 6	8.4	8.5	8.5	8.5	8.5	8.5

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Day 1	6.8	7.6	7.6	7.4	7.4	7.2
Day 2	7.9	8.2	8.3	8.3	8.4	8.6
Day 3	8.1	8.3	8.3	8.3	8.3	8.3
Day 4	8.1	8.6	8.6	8.6	8.6	8.0
Day 5	8.2	8.6	8.6	8.6	8.7	8.7
Day 6	8.4	8.5	8.5	8.5	8.4	8.4
Final	8.1	8.4	8.4	8.4	8.3	8.3

Temperature

Incubator °C	
Initial	25.1
Day 1	24.3
Day 2	24.5
Day 3	24.4
Day 4	24.5
Day 5	24.2
Day 6	24.4
Final	24.5

Test Results Reviewed and Approved By: _____



**7 Day Chronic Definitive Survival
and Reproduction Bioassay**
Method: EPA/600/4-91/002

Test Organism: *Daphnia ambigua*

Facility: WSRC
Sample ID: G-10

Aiken County

ETT#: 19987

Sample ID: June 4, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: WSRC
 Sample Identification: G-10
 Test Date: June 4, 2002

County: Aiken
 NPDES#: SC
 ETT #: 19987

Reproduction at Control Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	6	8	0	12	26
2	0	6	10	0	8	24
3	0	4	10	0	14	28
4	0	5	12	0	6	23
5	0	4	8	X	X	12
6	0	5	13	0	8	26
7	0	3	9	0	10	22
8	0	3	11	0	6	20
9	0	5	0	11	2	18
10	0	6	X	X	X	6

Reproduction at 6.25% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	5	12	0	13	30
2	0	4	11	0	6	21
3	3	0	10	11	0	24
4	0	6	12	X	X	18
5	0	5	13	0	9	27
6	0	6	11	0	8	25
7	0	7	10	0	9	26
8	0	4	9	0	12	25
9	0	4	11	0	12	27
10	5	0	12	12	0	29

Reproduction at 12.5% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	0	12	12	0	28
2	0	4	15	0	2	21
3	4	0	14	13	0	31
4	0	6	13	0	11	30
5	0	3	12	0	10	25
6	0	4	13	0	12	29
7	0	6	12	0	14	32
8	0	2	10	0	4	16
9	0	4	9	0	0	13
10	0	5	11	0	3	19

Reproduction at 25% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	5	9	12	0	26
2	0	6	11	0	9	26
3	5	0	12	10	0	27
4	0	2	12	0	7	21
5	0	5	10	X	X	15
6	0	4	9	0	8	21
7	0	3	12	0	11	26
8	0	6	11	0	14	31
9	0	4	11	0	11	26
10	male	L	L	L	L	L

Reproduction at 50% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	6	9	0	13	28
2	4	0	7	13	0	24
3	3	0	8	12	0	23
4	0	5	8	0	5	18
5	0	4	5	0	11	20
6	0	5	11	0	10	26
7	0	0	12	0	9	21
8	0	3	11	0	7	21
9	0	6	12	0	11	29
10	4	0	10	10	0	24

Reproduction at 100% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	X	X	X	X	X	0
2	0	4	9	0	10	23
3	3	0	9	12	0	24
4	0	3	8	0	10	21
5	0	2	10	0	12	24
6	0	6	11	0	10	27
7	0	5	7	0	13	25
8	X	X	X	X	X	0
9	0	5	8	0	10	23
10	male	L	L	L	L	L

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST Statistical Analyses

Client: WSRC
 Sample Identification: G-10
 Test Date: June 4, 2002

Test for Normality

Test Used: Kolmogorov D

D= NA
 critical NA

NA

Test for Homogeneity of Variance

Test Used: Bartlett's Test

B= NA
 critical NA

NA

Test for Differences in Reproduction

Test Type Used: Non-Linear Regression - Logistic Model
 Calculated Using JMP Software

Effect	% Effluent					
	MHSF	6.3%	12.5%	25.0%	50.0%	100%
Survival	80%	100%	100%	89%	100%	78%
Predicted	100%	100%	100%	100%	100%	100%
Reproduction	20.5	25.2	24.4	24.3	23.4	18.6
Predicted	23.6	23.6	23.6	23.6	23.4	18.6
Variance	47.39	12.84	45.38	21.50	12.49	113.28

CV= 34%

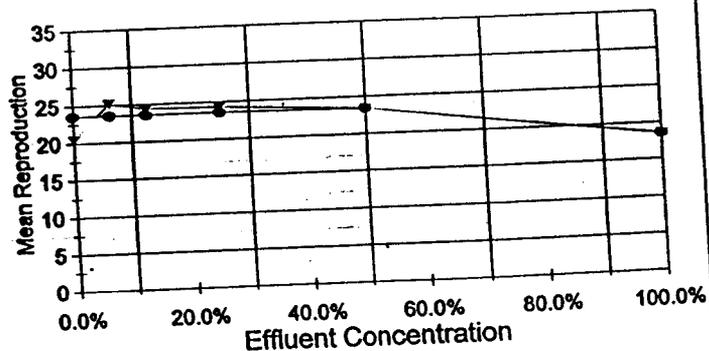
MSD= 6.62

Test Parameters

	alpha	beta	gamma	% Reduction		Pass/Fail
				CTC= 19%	CTC=100%	
Survival	3.00	-200.00	0.00	0.0%	0.0%	Pass
Reproduction	2.10	-12.48	23.58	0.0%	21.1%	Pass

IC25= >100%

Reproduction vs. Effluent Conc.



— Actual Reproduction ● Predicted Reproduction

Summary

The reductions in survival and reproduction at the CTC are <25% - Pass

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST Water Chemistry

Client: WSRC
 Sample Identification: G-10
 Test Date: June 4, 2002

pH (After Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Initial	7.21	7.05	7.06	7.01	7.06	7.06
Day 1	6.82	6.83	6.85	6.91	7.03	7.15
Day 2	6.92	7.19	6.97	6.90	6.98	6.99
Day 3	7.40	7.15	7.16	7.04	7.04	7.15
Day 4	7.00	7.21	7.03	7.00	6.98	7.00
Day 5	7.33	7.19	7.17	7.09	7.03	7.00
Day 6	6.96	7.40	7.36	7.31	7.26	7.22

pH (Before Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Day 1	6.82	6.93	6.90	6.95	7.06	7.17
Day 2	7.15	7.37	7.21	7.13	7.13	7.19
Day 3	7.45	7.11	7.03	7.03	6.99	7.11
Day 4	7.20	7.40	7.39	7.33	7.30	7.18
Day 5	7.38	7.20	7.19	7.15	7.06	7.04
Day 6	6.78	7.88	7.89	7.72	7.62	7.62
Final	7.31	7.03	7.06	7.13	7.35	7.44

Dissolved Oxygen (After Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Initial	8.1	8.1	8.1	8.1	8.1	8.7
Day 1	8.0	8.3	8.2	8.2	8.0	7.8
Day 2	8.1	8.1	8.1	8.1	8.1	8.1
Day 3	8.2	8.3	8.3	8.2	8.2	8.2
Day 4	8.3	8.3	8.3	8.3	8.3	8.2
Day 5	8.4	8.3	8.3	8.3	8.2	8.2
Day 6	8.4	8.3	8.3	8.2	8.2	8.1

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Day 1	6.8	7.9	7.8	7.6	7.4	7.2
Day 2	7.9	8.0	8.0	8.0	7.9	7.9
Day 3	8.1	8.3	8.2	8.2	8.1	8.1
Day 4	8.1	8.3	8.3	8.3	8.2	8.2
Day 5	8.2	8.3	8.3	8.3	8.2	8.2
Day 6	8.4	8.6	8.6	8.6	8.5	8.2
Final	8.1	7.1	7.1	7.1	7.2	7.2

Temperature Incubator °C

Initial	25.1
Day 1	24.3
Day 2	24.5
Day 3	24.4
Day 4	24.5
Day 5	24.2
Day 6	24.4
Final	24.5

Test Results Reviewed and Approved By: _____

[Handwritten Signature]

7 Day Chronic Definitive Survival and Reproduction Bioassay

Method: EPA/600/4-91/002

Test Organism: *Daphnia ambigua*

Facility: WSRC
Sample ID: A-01

Aiken County

ETT#: 20212

Sample ID: July 16, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: WSRC
 Sample Identification: A-01
 Test Date: July 16, 2002

County: Aiken
 NPDES#: SC
 ETT #: 20212

Reproduction at		MHSF		Control		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	3	0	9	16	0	28
2	4	0	13	0	12	29
3	0	5	10	0	11	26
4	5	0	9	12	0	26
5	0	5	9	0	11	25
6	4	0	8	4	7	23
7	4	0	8	0	12	24
8	4	0	4	13	0	21
9	0	0	9	0	12	21
10	0	2	8	0	14	24

Reproduction at		6.25% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	4	0	11	14	0	29	
2	3	0	9	15	0	27	
3	0	6	9	0	12	27	
4	2	0	7	13	0	22	
5	0	5	9	0	11	25	
6	4	1	9	14	0	28	
7	4	0	10	9	0	23	
8	5	0	11	14	0	30	
9	0	5	12	0	14	31	
10	0	5	13	0	13	31	

Reproduction at		12.5% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	4	0	12	13	0	29	
2	5	0	8	15	0	28	
3	0	5	14	0	10	29	
4	5	0	12	10	0	27	
5	3	0	14	14	0	31	
6	4	0	7	14	0	25	
7	3	0	9	15	0	27	
8	4	0	X	X	X	4	
9	0	5	12	0	14	31	
10	0	6	10	12	0	28	

Reproduction at		25% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	4	0	8	16	0	28	
2	5	0	12	16	0	33	
3	0	5	10	0	14	29	
4	7	0	8	X	X	15	
5	0	3	10	0	13	26	
6	5	0	12	15	0	32	
7	3	0	9	16	0	28	
8	7	0	10	14	0	31	
9	0	5	11	0	11	27	
10	0	4	12	0	13	29	

Reproduction at		50% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	4	0	9	15	0	28	
2	4	0	11	17	0	32	
3	0	5	10	11	0	26	
4	3	0	13	14	0	30	
5	0	5	10	0	15	30	
6	4	0	12	14	0	30	
7	4	0	11	16	0	31	
8	4	0	8	14	0	26	
9	0	7	11	0	15	33	
10	0	4	8	0	14	26	

Reproduction at		100% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	4	0	12	16	0	32	
2	4	0	11	13	0	28	
3	0	4	9	14	0	27	
4	0	7	14	15	0	36	
5	4	0	13	15	0	32	
6	4	0	14	16	0	34	
7	0	5	12	0	13	30	
8	0	3	9	14	0	26	
9	0	5	13	0	15	33	
10	0	6	12	0	14	32	

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Statistical Analyses

Client: WSRC
 Sample Identification: A-01
 Test Date: July 16, 2002

Test for Normality

Test Used: Kolmogorov D

D= NA
 critical NA

NA

Test for Homogeneity of Variance

Test Used: Bartlett's Test

B= NA
 critical NA

NA

Test for Differences in Reproduction

Test Type Used: Non-Linear Regression - Logistic Model
 Calculated Using JMP Software

Effect	% Effluent					
	MHSF	6.3%	12.5%	25.0%	50.0%	100%
Survival	100%	100%	90%	90%	100%	100%
Predicted	100%	100%	100%	100%	100%	100%
Reproduction	24.7	27.3	25.9	27.8	29.2	31.0
Predicted	27.7	27.7	27.7	27.7	27.7	27.7
Variance	7.12	10.01	62.54	25.07	6.62	10.22

CV= 11%

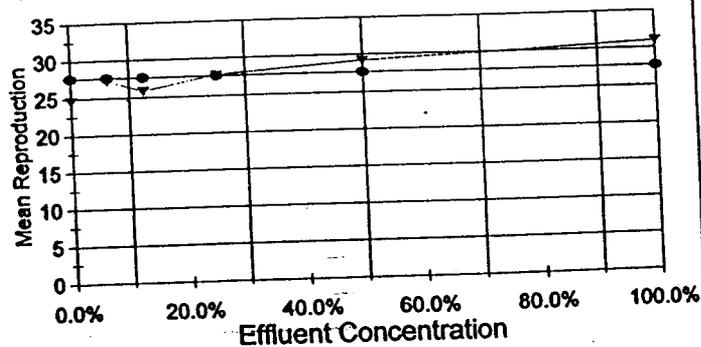
MSD= 4.65

Test Parameters

	alpha	beta	gamma	% Reduction	
				CTC= 93.40%	Pass/Fail
Survival	3.00	-200.00	0.00	0.0%	Pass
Reproduction	17.10	-199.00	27.65	0.0%	Pass

IC25= >100%

Reproduction vs. Effluent Conc.



▼ Actual Reproduction ● Predicted Reproduction

Summary

The reductions in survival and reproduction at the CTC are <25% - Pass

**7 Day Chronic Definitive Survival
and Reproduction Bioassay**
Method: EPA/600/4-91/002

Test Organism: *Ceriodaphnia dubia*

Facility: WSRC
Sample ID: A-11

Aiken County

ETT#: 20260

Sample ID: July 23, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: WSRC
 Sample Identification: A-11
 Test Date: July 23, 2002

County: Aiken
 NPDES#: SC
 ETT #: 20260

Reproduction at		MHSF Control				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	0	3	9	0	10	22
2	0	2	6	0	9	17
3	0	3	7	0	10	20
4	0	0	6	10	0	16
5	0	5	0	7	12	24
6	0	2	X	X	X	2
7	0	4	8	9	0	21
8	4	0	7	9	0	20
9	5	0	6	10	0	21
10	0	6	10	1	13	30

Reproduction at		6.25% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	0	4	14	0	13	31
2	0	3	8	0	14	25
3	0	3	8	11	0	22
4	3	0	8	13	0	24
5	0	3	X	X	X	3
6	0	5	7	0	9	21
7	4	0	9	9	0	22
8	0	4	5	0	10	19
9	0	4	9	0	10	23
10	0	2	7	0	8	17

Reproduction at		12.5% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	0	5	11	0	13	29
2	0	3	0	14	0	17
3	3	0	9	10	0	22
4	0	5	0	9	10	24
5	0	3	5	0	9	17
6	0	4	X	X	X	4
7	4	0	7	12	0	23
8	0	6	10	0	15	31
9	5	0	7	9	0	21
10	0	5	8	0	12	25

Reproduction at		25% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	0	1	7	0	12	20
2	0	3	2	0	7	12
3	0	4	7	0	12	23
4	0	X	X	X	X	0
5	0	2	6	7	0	15
6	X	X	X	X	X	0
7	0	3	8	0	0	11
8	0	0	4	10	13	27
9	0	0	4	X	X	4
10	0	4	0	12	13	29

Reproduction at		50% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	3	0	7	15	0	25
2	0	5	8	12	0	25
3	0	4	7	0	11	22
4	0	0	4	10	0	14
5	0	3	5	X	X	8
6	0	4	0	9	0	13
7	3	0	8	11	0	22
8	0	3	5	0	11	19
9	4	0	8	10	0	22
10	0	5	0	12	13	30

Reproduction at		100% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	0	4	8	10	0	22
2	0	2	5	0	10	17
3	0	4	7	9	0	20
4	0	0	8	0	14	22
5	0	0	3	9	0	12
6	0	3	8	0	10	21
7	0	0	5	9	0	14
8	0	3	0	8	0	11
9	0	5	9	0	12	26
10	0	4	10	7	0	21

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Statistical Analyses

Client: WSRC
 Sample Identification: A-11
 Test Date: July 23, 2002

Test for Normality

Test Used: Kolmogorov-D

D= NA
critical NA

NA

Test for Homogeneity of Variance

Test Used: Bartlett's Test

B= NA
critical NA

NA

Test for Differences in Reproduction

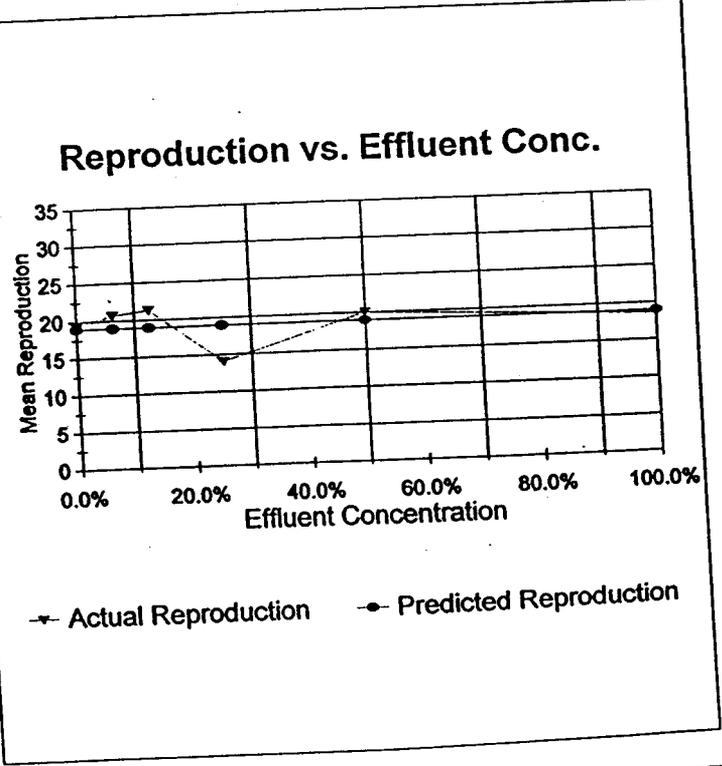
Test Type Used: Non-Linear Regression - Logistic Model
 Calculated Using JMP Software

Effect	% Effluent						
	MHSF	6.3%	12.5%	25.0%	50.0%	100%	
Survival	100%	100%	90%	70%	90%	100%	
Predicted	100%	100%	100%	100%	100%	100%	
Reproduction	19.3	20.7	21.3	14.1	20.0	18.6	
Predicted	19.0	19.0	19.0	19.0	19.0	19.0	
Variance	51.79	52.68	57.12	112.99	43.56	24.04	
CV= 37%		MSD= 7.80					

Test Parameters

	alpha	beta	gamma	% Reduction	
				CTC= 98.1%	Pass/Fail
Survival	3.00	-200.00	0.00	0.0%	Pass
Reproduction	4.78	-200.00	19.00	0.0%	Pass

IC25= >100%



Summary
 The reductions in survival and reproduction at the CTC are <25% - Pass

**7 Day Chronic Definitive Survival
and Reproduction Bioassay**
Method: EPA/600/4-91/002

Test Organism: *Ceriodaphnia dubia*

Facility: WSRC
Sample ID: G-10

Aiken County

ETT#: 20242

Sample ID: July 18, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: **WSRC**
 Sample Identification: **G-10**
 Test Date: **July 18, 2002**

County: **Aiken**
 NPDES#: **SC**
 ETT #: **20242**

Reproduction at		MHSF			Control		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	0	6	9	0	15	30	
2	0	5	5	0	10	20	
3	4	0	11	12	0	27	
4	5	0	9	12	0	26	
5	4	0	12	14	0	30	
6	0	6	11	0	13	30	
7	4	1	9	13	0	27	
8	0	5	10	0	14	29	
9	5	0	9	15	0	29	
10	0	6	11	0	5	22	

Reproduction at		6.25% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	0	4	10	0	11	25	
2	0	6	12	0	13	31	
3	0	4	0	14	9	27	
4	4	0	10	10	0	24	
5	X	X	X	X	X	0	
6	0	6	9	0	13	28	
7	X	X	X	X	X	0	
8	0	6	11	0	13	30	
9	4	0	8	1	0	13	
10	0	6	10	0	10	26	

Reproduction at		12.5% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	0	6	9	0	14	29	
2	0	3	9	0	11	23	
3	0	7	8	0	16	31	
4	3	0	8	14	0	25	
5	6	0	10	0	15	31	
6	0	6	12	0	15	33	
7	4	0	8	12	0	24	
8	X	X	X	X	X	0	
9	4	0	9	13	0	26	
10	0	4	9	0	12	25	

Reproduction at		25% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	0	0	13	0	13	26	
2	0	5	10	0	13	28	
3	4	0	10	12	0	26	
4	4	0	10	12	0	26	
5	0	6	9	0	14	29	
6	0	6	12	0	12	30	
7	5	1	12	9	0	27	
8	0	6	9	0	13	28	
9	X	X	X	X	X	0	
10	0	5	10	0	10	25	

Reproduction at		50% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	0	0	10	0	12	22	
2	0	5	10	0	14	29	
3	5	1	10	9	0	25	
4	4	1	9	12	0	26	
5	5	0	11	11	0	27	
6	0	5	12	0	14	31	
7	6	0	9	0	16	31	
8	0	6	12	0	5	23	
9	7	0	10	12	0	29	
10	0	0	12	0	14	26	

Reproduction at		100% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	0	4	8	0	11	23	
2	0	5	9	0	10	24	
3	4	0	10	10	0	24	
4	4	0	8	10	0	22	
5	5	0	10	7	0	22	
6	0	4	12	0	13	29	
7	0	0	2	0	3	5	
8	0	6	8	0	X	14	
9	4	0	7	15	0	26	
10	0	5	9	0	12	26	

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Statistical Analyses

Client: WSRC
 Sample Identification: G-10
 Test Date: July 18, 2002

Test for Normality

Test Used: Kolmogorov D

D= NA
 critical NA

NA

Test for Homogeneity of Variance

Test Used: Bartlett's Test

B= NA
 critical NA

NA

Test for Differences in Reproduction

Test Type Used: Non-Linear Regression - Logistic Model
 Calculated Using JMP Software

Effect	% Effluent					
	MHSF	6.3%	12.5%	25.0%	50.0%	100%
Survival	100%	100%	90%	90%	100%	90%
Predicted	100%	100%	100%	100%	100%	100%
Reproduction	27.0	25.5	24.7	24.5	26.9	21.5
Predicted	24.2	24.2	24.2	24.2	24.2	24.2
Variance	12.22	31.14	86.90	76.50	9.66	48.94

CV= 13%

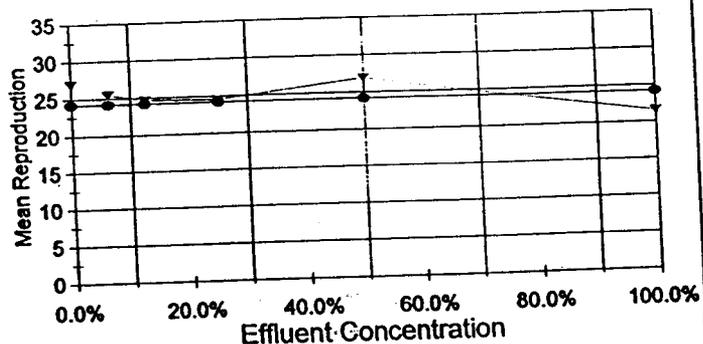
MSD= 6.90

Test Parameters

	alpha	beta	gamma	% Reduction	
				CTC= 100%	Pass/Fail
Survival	3.00	-200.00	0.00	0.0%	Pass
Reproduction	17.10	-199.00	24.20	0.0%	Pass

IC25= >100%

Reproduction vs. Effluent Conc.



▲ Actual Reproduction ● Predicted Reproduction

Summary

The reductions in survival and reproduction at the CTC are <25% - Pass



P.O. Box 16414, Greenville, SC 29606

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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: *Daphnia ambigua*

Facility: WSRC
Sample ID: A-01

Aiken County

ETT#: 20333

Sample ID: August 6, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: WSRC
 Sample Identification: A-01
 Test Date: August 6, 2002

County: Aiken
 NPDES#: SC
 ETT #: 20333

Reproduction at		MHSF		Control		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	4	0	9	0	16	29
2	0	5	11	0	15	31
3	0	4	8	0	11	23
4	0	4	9	0	14	27
5	0	6	9	0	12	27
6	0	5	10	0	13	28
7	0	3	8	0	14	25
8	0	4	10	0	12	26
9	5	0	10	X	X	15
10	2	4	12	0	0	18

Reproduction at		6.25% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	3	0	8	0	13	24	
2	0	3	10	0	12	25	
3	0	3	7	0	13	23	
4	0	5	11	0	12	28	
5	0	4	12	0	13	29	
6	0	6	10	0	14	30	
7	0	4	9	0	12	25	
8	0	0	7	0	10	17	
9	5	0	13	13	0	31	
10	0	4	10	0	9	23	

Reproduction at		12.5% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	3	1	14	12	0	30	
2	0	4	7	0	10	21	
3	0	0	9	0	11	20	
4	0	6	8	0	13	27	
5	0	4	8	0	14	26	
6	0	5	10	0	14	29	
7	4	0	12	0	13	29	
8	3	0	10	0	12	25	
9	5	0	14	15	0	34	
10	0	6	11	0	14	31	

Reproduction at		25% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	4	9	9	13	0	35	
2	male	L	L	L	L	L	
3	0	5	8	0	11	24	
4	0	5	12	0	12	29	
5	0	6	9	0	13	28	
6	0	5	13	0	12	30	
7	0	3	10	0	14	27	
8	4	0	13	0	12	29	
9	6	0	14	13	0	33	
10	4	0	10	0	12	26	

Reproduction at		50% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	4	0	9	13	0	26	
2	0	X	X	X	X	0	
3	0	3	9	0	12	24	
4	0	5	10	0	14	29	
5	0	5	12	0	15	32	
6	0	6	11	0	14	31	
7	3	0	13	0	12	28	
8	0	0	8	0	10	18	
9	5	0	14	12	0	31	
10	0	4	10	0	13	27	

Reproduction at		100% Concentration					Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	3	0	10	14	0	27	
2	0	0	8	13	0	21	
3	0	3	2	15	8	28	
4	0	4	14	0	13	31	
5	0	5	9	0	13	27	
6	0	6	12	X	X	18	
7	0	0	8	0	7	15	
8	4	0	10	12	0	26	
9	5	0	13	14	0	32	
10	3	0	12	0	15	30	

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: **WSRC**
 Sample Identification: **A-01**
 Test Date: **August 6, 2002**

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	7.16	7.03	6.94	6.90	6.94	6.90
Day 1	7.20	7.02	6.99	6.97	6.90	6.87
Day 2	7.19	6.99	6.93	6.91	6.83	6.79
Day 3	7.29	7.06	6.99	6.98	6.91	6.93
Day 4	7.25	7.03	7.00	6.97	6.95	6.91
Day 5	7.17	7.05	7.03	6.95	6.91	6.83
Day 6	8.00	7.89	7.79	7.71	7.66	

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	7.47	7.34	7.33	7.23	7.28	7.21
Day 2	7.53	7.02	7.00	6.99	6.97	6.93
Day 3	7.74	7.26	7.25	7.26	7.25	7.35
Day 4	7.39	7.19	7.17	7.16	7.11	7.15
Day 5	7.23	7.18	7.03	6.95	6.91	6.87
Day 6	8.37	8.24	8.14	8.10	8.00	
Final		8.20	6.91	6.96	6.96	7.26

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	8.4	8.4	8.5	8.8	8.6	8.7
Day 1	8.4	8.5	8.5	8.6	8.6	8.6
Day 2	8.3	8.2	8.2	8.3	8.4	8.5
Day 3	8.4	8.3	8.3	8.3	8.5	8.6
Day 4	8.6	8.3	8.4	8.6	8.6	8.7
Day 5	8.4	8.3	8.4	8.5	8.5	8.6
Day 6	8.3	8.4	8.4	8.4	8.4	8.4

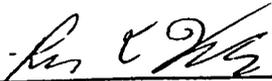
Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.4	8.4	8.4	8.5	8.5	8.6
Day 2	8.5	8.5	8.5	8.6	8.6	8.7
Day 3	8.5	8.5	8.6	8.6	8.6	8.6
Day 4	8.5	8.6	8.7	8.7	8.8	8.8
Day 5	8.6	8.7	8.7	0.7	8.8	8.8
Day 6	8.4	8.3	8.4	8.4	8.5	8.6
Final		8.2	8.1	7.9	7.8	7.7

Temperature

Incubator °C	
Initial	24.4
Day 1	24.3
Day 2	24.1
Day 3	24.3
Day 4	24.3
Day 5	24.4
Day 6	24.5
Final	25.8

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: *Daphnia ambigua*

Facility: WSRC
Sample ID: A-11

Aiken County

ETT#: 20334

Sample ID: August 6, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: **WSRC**
 Sample Identification: **A-11**
 Test Date: **August 6, 2002**

County: **Aiken**
 NPDES#: **SC**
 ETT #: **20334**

Reproduction at		MHSF			Control		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	4	0	9	0	16	29	
2	0	5	11	0	15	31	
3	0	4	8	0	11	23	
4	0	4	9	0	14	27	
5	0	6	9	0	12	27	
6	0	5	10	0	13	28	
7	0	3	8	0	14	25	
8	0	4	10	0	12	26	
9	5	0	10	X	X	15	
10	2	4	12	0	0	18	

Reproduction at		6.25%			Concentration		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	0	4	11	0	13	28	
2	0	3	10	0	15	28	
3	4	0	9	0	10	23	
4	0	5	13	0	12	30	
5	0	4	12	0	15	31	
6	0	5	11	0	14	30	
7	0	2	12	0	11	25	
8	0	5	10	0	12	27	
9	0	4	9	0	12	25	
10	0	5	8	0	11	24	

Reproduction at		12.5%			Concentration		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	4	0	13	0	10	27	
2	0	5	8	0	9	22	
3	0	4	8	0	12	24	
4	0	3	8	0	9	20	
5	0	6	10	0	10	26	
6	0	6	13	0	12	31	
7	0	6	11	0	13	30	
8	0	4	9	0	10	23	
9	2	0	9	0	13	24	
10	0	3	9	0	9	21	

Reproduction at		25%			Concentration		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	2	0	9	0	11	22	
2	0	5	11	0	11	27	
3	4	0	12	0	13	29	
4	0	4	9	0	12	25	
5	0	4	13	0	14	31	
6	0	6	13	0	14	33	
7	0	4	8	0	11	23	
8	0	4	10	0	13	27	
9	0	5	10	0	16	31	
10	4	0	11	0	12	27	

Reproduction at		50%			Concentration		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	3	0	9	0	14	26	
2	0	4	15	0	13	32	
3	4	0	9	0	13	26	
4	0	5	10	0	12	27	
5	0	7	12	0	14	33	
6	0	6	13	0	15	34	
7	0	5	8	0	14	27	
8	0	5	14	0	12	31	
9	0	4	13	0	12	29	
10	3	0	13	12	0	28	

Reproduction at		100%			Concentration		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8		
1	0	4	13	0	10	27	
2	0	5	14	0	14	33	
3	3	0	11	0	13	27	
4	2	0	13	0	12	27	
5	0	3	8	0	14	25	
6	0	5	10	0	9	24	
7	0	4	13	0	11	28	
8	0	6	10	0	9	25	
9	0	5	10	0	14	29	
10	0	5	9	0	0	14	

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: WSRC
 Sample Identification: A-11
 Test Date: August 6, 2002

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	7.16	7.10	7.02	6.94	6.99	7.00
Day 1	7.20	7.39	7.38	7.28	7.22	7.22
Day 2	7.19	7.42	7.40	7.39	7.25	7.21
Day 3	7.29	7.44	7.35	7.22	7.18	7.70
Day 4	7.25	7.30	7.53	7.51	7.49	7.30
Day 5	7.17	7.21	7.13	7.09	6.95	7.01
Day 6	8.00	7.66	7.57	7.44	7.41	7.41

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	7.47	7.59	7.61	7.55	7.52	7.51
Day 2	7.53	7.63	7.60	7.49	7.41	7.40
Day 3	7.74	7.40	7.63	7.58	7.55	7.51
Day 4	7.39	7.59	7.51	7.33	7.49	7.33
Day 5	7.23	7.69	7.63	7.59	7.60	7.61
Day 6	8.37	7.65	7.81	7.77	7.70	7.77
Final		7.65	7.54	7.43	7.45	7.43

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	8.4	8.2	8.2	8.3	8.4	8.4
Day 1	8.4	8.1	8.2	8.2	8.3	8.4
Day 2	8.3	8.0	8.3	8.3	8.4	8.4
Day 3	8.4	8.3	8.4	8.3	8.6	8.6
Day 4	8.6	8.2	8.3	8.3	8.4	8.4
Day 5	8.4	8.1	8.2	8.3	8.3	8.4
Day 6	8.3	8.2	8.2	8.3	8.3	8.3

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.4	8.2	8.2	8.4	8.4	8.4
Day 2	8.5	8.3	8.3	8.3	8.4	8.4
Day 3	8.5	8.3	8.4	8.5	8.7	8.7
Day 4	8.5	8.4	8.4	8.5	8.6	8.7
Day 5	8.6	8.3	8.4	8.4	8.6	8.7
Day 6	8.4	8.2	8.2	8.3	8.4	8.5
Final						

Temperature

Incubator °C	
Initial	24.4
Day 1	24.3
Day 2	24.1
Day 3	24.3
Day 4	24.3
Day 5	24.4
Day 6	24.5
Final	25.8

Test Results Reviewed and Approved By:

Rob V. Hill



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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: *Daphnia ambigua*

**Facility: WSRC
Sample ID: G-10**

Aiken County

ETT#: 20335

Sample ID: August 6, 2002

6	0	6	10	0	13	29
7	0	5	8	0	12	25
8	0	4	10	0	12	26
9	0	5	11	0	13	29
10	4	0	6	14	0	24

6	0	6	10	0	9	25
7	5	2	11	0	14	32
8	0	5	6	11	0	22
9	0	6	9	0	12	27
10	4	0	8	14	0	26

Reproduction at		12.5% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	5	0	7	14	0	26
2	0	4	10	0	14	28
3	5	0	11	13	0	29
4	4	0	8	0	10	22
5	0	5	10	0	14	29
6	0	6	7	0	13	26
7	0	4	7	0	11	22
8	0	4	10	0	14	28
9	0	5	7	0	11	23
10	4	0	10	14	0	28

Reproduction at		25% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	0	8	0	10	22
2	0	4	12	0	13	29
3	6	0	11	12	0	29
4	0	3	7	0	14	24
5	0	5	9	0	16	30
6	0	5	9	0	14	28
7	0	4	7	0	12	23
8	0	3	10	0	13	26
9	0	4	5	0	11	20
10	0	5	0	9	9	23

Reproduction at		50% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	4	11	0	11	26
2	0	5	9	0	13	27
3	5	0	10	15	0	30
4	4	0	11	13	0	28
5	0	4	11	0	13	28
6	0	4	11	0	13	28
7	0	5	11	0	9	25
8	0	3	X	X	X	3
9	0	4	1	9	9	23
10	4	X	X	X	X	4

Reproduction at		100% Concentration				
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	0	8	0	12	24
2	0	3	X	X	X	3
3	5	0	7	0	9	21
4	4	0	12	0	10	26
5	0	4	10	0	13	27
6	0	3	9	0	8	20
7	0	4	9	0	9	22
8	0	4	10	0	11	25
9	0	4	X	X	X	4
10	5	0	9	13	0	27

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: WSRC
 Sample Identification: G-10
 Test Date: August 6, 2002

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	6.91	7.12	7.27	7.47	7.65	8.03
Day 1	7.57	7.35	7.35	7.91	7.75	8.04
Day 2	7.49	7.29	7.31	7.42	7.45	7.53
Day 3	7.69	7.21	7.15	7.26	7.27	7.39
Day 4	7.51	7.36	7.33	7.31	7.29	7.19
Day 5	7.23	7.35	7.36	7.39	7.41	7.55
Day 6	9.23	8.13	7.90	7.78	7.76	7.88

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	7.60	7.53	7.43	7.50	7.89	8.14
Day 2	7.59	7.47	7.54	7.69	7.77	7.81
Day 3	7.86	7.63	7.60	7.63	7.67	7.71
Day 4	7.91	7.51	7.49	7.43	7.39	7.46
Day 5	7.51	7.45	7.83	7.89	7.89	8.09
Day 6	7.43	7.36	7.93	7.53	7.51	7.79
Final	7.26	7.02	6.99	7.14	7.38	7.64

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	8.0	8.2	8.2	8.3	8.3	8.4
Day 1	8.3	8.2	8.2	8.0	8.3	8.5
Day 2	8.2	8.6	8.3	8.4	8.5	8.6
Day 3	8.3	8.2	8.2	8.3	8.3	8.4
Day 4	8.2	8.3	8.4	8.5	8.5	8.5
Day 5	8.3	8.3	8.3	8.3	8.3	8.4
Day 6	8.0	8.2	8.3	8.3	8.4	8.6

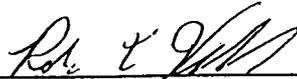
Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.2	8.2	8.2	8.2	8.3	8.4
Day 2	8.1	8.5	8.3	8.4	8.4	8.5
Day 3	8.1	8.2	8.2	8.3	8.4	8.5
Day 4	8.4	8.3	8.3	8.3	8.4	8.4
Day 5	8.2	8.3	8.3	8.4	8.4	8.5
Day 6	8.2	8.1	8.2	8.2	8.3	8.3
Final	7.8	7.8	7.7	7.7	7.7	7.8

Temperature

Incubator °C	
Initial	24.4
Day 1	24.3
Day 2	24.1
Day 3	24.3
Day 4	24.3
Day 5	24.4
Day 6	24.5
Final	25.8

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: *Daphnia ambigua*

Facility: WSRC
Sample ID: A-01

County

ETT#: 20569

Sample ID: September 10, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Survival and Reproduction Results

Client: WSRC
 Sample Identification: A-01 with Daphnia ambigua
 Test Date: September 10, 2002

County: SC
 NPDES#: 20569
 ETT #:

Reproduction at		MHSF Control				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	5	8	0	10	23
2	0	3	7	0	12	22
3	0	5	5	0	11	21
4	0	4	5	0	13	22
5	4	0	5	9	0	18
6	0	5	0	9	13	27
7	5	0	6	11	0	22
8	0	4	0	7	10	21
9	0	4	0	7	11	22
10	0	4	7	0	13	24

Reproduction at		6.25% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	3	0	9	12	0	24
2	0	4	6	0	11	21
3	4	0	8	14	0	26
4	0	2	6	0	13	21
5	2	0	5	8	0	15
6	0	4	5	0	12	21
7	3	0	9	15	0	27
8	0	3	7	0	13	23
9	0	0	5	10	0	15
10	0	4	5	0	12	21

Reproduction at		12.5% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	3	0	7	12	0	22
2	4	0	8	10	0	22
3	5	0	7	8	0	20
4	0	4	5	0	12	21
5	3	0	6	10	0	19
6	0	5	6	0	13	24
7	0	5	1	10	14	30
8	0	4	8	0	14	26
9	3	0	8	10	0	21
10	0	5	9	0	13	27

Reproduction at		25% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	0	7	12	0	23
2	0	3	7	0	10	20
3	3	0	7	0	12	22
4	0	4	8	X	X	12
5	4	0	7	11	0	22
6	3	0	7	11	0	21
7	4	0	5	13	0	22
8	0	3	3	0	12	18
9	0	5	9	0	11	25
10	0	5	7	0	12	24

Reproduction at		50% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	3	0	7	11	0	21
2	4	1	6	12	0	23
3	1	5	5	0	13	24
4	0	3	0	0	12	15
5	4	0	8	12	0	24
6	3	0	5	13	0	21
7	3	0	6	14	0	23
8	0	5	7	0	12	24
9	0	3	7	0	14	24
10	0	5	8	0	13	26

Reproduction at		100% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	3	0	9	13	0	25
2	0	2	7	0	14	23
3	0	6	7	0	13	26
4	0	3	8	0	12	23
5	1	0	5	8	2	16
6	3	0	7	10	0	20
7	3	0	8	13	0	24
8	0	4	5	0	13	22
9	3	0	7	13	0	23
10	0	5	8	0	10	23



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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: *Daphnia ambigua*

Facility: WSRC
Sample ID: A-11

County

ETT#: 20570

Sample ID: September 10, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Survival and Reproduction Results

Client: WSRC
 Sample Identification: A-11 with Daphnia ambigua
 Test Date: September 10, 2002

County: SC
 NPDES#: 20570
 ETT #:

Reproduction at		MHSF Control				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	0	5	8	0	10	23
2	0	3	7	0	12	22
3	0	5	5	0	11	21
4	0	4	5	0	13	22
5	4	0	5	9	0	18
6	0	5	0	9	13	27
7	5	0	6	11	0	22
8	0	4	0	7	10	21
9	0	4	0	7	11	22
10	0	4	7	0	13	24

Reproduction at		6.25% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	4	0	8	14	0	26
2	0	4	7	0	9	20
3	5	0	10	12	0	27
4	0	4	8	0	11	23
5	0	1	5	9	0	15
6	4	0	9	13	0	26
7	3	0	9	13	0	25
8	0	3	7	0	9	19
9	0	4	1	10	12	27
10	0	4	5	0	10	19

Reproduction at		12.5% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	4	0	8	10	0	22
2	4	0	7	13	0	24
3	0	4	5	0	12	21
4	0	5	5	0	13	23
5	3	1	4	11	0	19
6	0	0	4	8	0	12
7	4	0	7	12	0	23
8	0	4	5	0	9	18
9	0	0	4	8	0	12
10	0	1	7	0	10	18

Reproduction at		25% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	3	0	8	13	0	24
2	4	0	2	9	1	16
3	4	0	9	12	0	25
4	0	5	7	0	12	24
5	4	0	7	14	0	25
6	0	6	10	0	13	29
7	3	0	7	11	0	21
8	0	3	5	0	8	16
9	4	0	8	13	0	25
10	0	5	8	0	10	23

Reproduction at		50% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	3	0	8	12	0	23
2	0	0	1	0	0	1
3	4	0	7	13	0	24
4	0	0	7	0	10	17
5	3	0	5	12	0	20
6	4	0	9	9	0	22
7	5	0	7	14	0	26
8	0	4	7	0	13	24
9	0	6	6	0	10	22
10	0	4	7	0	10	21

Reproduction at		100% Concentration				Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	3	0	7	13	0	23
2	1	X	X	X	X	1
3	4	0	8	12	0	24
4	0	4	7	0	11	22
5	0	5	8	0	10	23
6	3	0	8	10	0	21
7	2	0	7	13	0	22
8	0	3	5	0	8	16
9	0	5	8	0	12	25
10	0	4	7	0	13	24



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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: *Daphnia ambigua*

Facility: WSRC
Sample ID: G-10

County

ETT#: 20571

Sample ID: September 10, 2002

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Survival and Reproduction Results

Client: WSRC
Sample Identification: G-10 with *Daphnia ambigua*
Test Date: September 10, 2002

County: SC
NPDES#: 20571
ETT #:

Reproduction at		MHSF		Control		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	0	5	9	0	12	26
2	0	4	9	0	12	25
3	3	0	5	9	0	17
4	3	0	6	0	11	20
5	0	0	7	0	12	19
6	0	0	6	0	13	19
7	0	5	8	0	12	25
8	0	6	6	0	13	25
9	5	0	6	9	0	20
10	4	0	8	12	0	24

Reproduction at		6.25%		Concentration		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	0	5	6	0	13	24
2	0	6	7	0	10	23
3	5	0	9	12	0	26
4	0	4	X	X	X	4
5	6	0	8	10	0	24
6	0	6	8	0	13	27
7	0	5	7	0	0	12
8	4	0	8	9	0	21
9	0	5	6	0	11	22
10	3	0	9	13	0	25

Reproduction at		12.5%		Concentration		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	0	5	11	0	13	29
2	0	5	7	0	13	25
3	4	0	8	12	0	24
4	0	6	6	12	0	24
5	4	0	9	12	0	25
6	0	5	10	0	12	27
7	0	5	7	0	10	22
8	0	4	6	0	13	23
9	4	0	7	10	0	21
10	5	0	9	13	0	27

Reproduction at		25%		Concentration		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	0	4	7	0	11	22
2	0	5	8	10	0	23
3	0	0	7	7	2	16
4	0	5	7	0	13	25
5	0	5	6	13	0	24
6	0	6	8	0	12	26
7	0	4	8	0	13	25
8	0	3	7	0	13	23
9	3	0	6	10	0	19
10	3	0	7	8	0	18

Reproduction at		50%		Concentration		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	4	0	7	14	0	25
2	0	6	8	0	13	27
3	6	0	4	13	0	23
4	3	0	6	12	0	21
5	0	5	7	13	0	25
6	0	4	9	0	13	26
7	0	5	8	0	9	22
8	0	5	7	13	0	25
9	0	5	5	0	9	19
10	3	0	7	14	0	24

Reproduction at		100%		Concentration		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	0	4	9	0	13	26
2	0	4	7	0	10	21
3	4	0	8	12	0	24
4	3	0	4	14	0	21
5	0	5	7	0	8	20
6	0	6	8	0	11	25
7	0	4	3	X	X	7
8	0	3	5	0	11	19
9	3	0	3	12	0	18
10	4	0	5	14	0	23

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Survival and Reproduction Results

Client: WSRC
 Sample Identification: G-10 with *Daphnia ambigua*
 Test Date: September 10, 2002

County: SC
 NPDES#: 20571
 ETT #:

Reproduction at		MHSF		Control		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	0	5	9	0	12	26
2	0	4	9	0	12	25
3	3	0	5	9	0	17
4	3	0	6	0	11	20
5	0	0	7	0	12	19
6	0	0	6	0	13	19
7	0	5	8	0	12	25
8	0	6	6	0	13	25
9	5	0	6	9	0	20
10	4	0	8	12	0	24

Reproduction at		6.25%		Concentration		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	0	5	6	0	13	24
2	0	6	7	0	10	23
3	5	0	9	12	0	26
4	0	4	X	X	X	4
5	6	0	8	10	0	24
6	0	6	8	0	13	27
7	0	5	7	0	0	12
8	4	0	8	9	0	21
9	0	5	6	0	11	22
10	3	0	9	13	0	25

Reproduction at		12.5%		Concentration		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	0	5	11	0	13	29
2	0	5	7	0	13	25
3	4	0	8	12	0	24
4	0	6	6	12	0	24
5	4	0	9	12	0	25
6	0	5	10	0	12	27
7	0	5	7	0	10	22
8	0	4	6	0	13	23
9	4	0	7	10	0	21
10	5	0	9	13	0	27

Reproduction at		25%		Concentration		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	0	4	7	0	11	22
2	0	5	8	10	0	23
3	0	0	7	7	2	16
4	0	5	7	0	13	25
5	0	5	6	13	0	24
6	0	6	8	0	12	26
7	0	4	8	0	13	25
8	0	3	7	0	13	23
9	3	0	6	10	0	19
10	3	0	7	8	0	18

Reproduction at		50%		Concentration		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	4	0	7	14	0	25
2	0	6	8	0	13	27
3	6	0	4	13	0	23
4	3	0	6	12	0	21
5	0	5	7	13	0	25
6	0	4	9	0	13	26
7	0	5	8	0	9	22
8	0	5	7	13	0	25
9	0	5	5	0	9	19
10	3	0	7	14	0	24

Reproduction at		100%		Concentration		Total
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	
1	0	4	9	0	13	26
2	0	4	7	0	10	21
3	4	0	8	12	0	24
4	3	0	4	14	0	21
5	0	5	7	0	8	20
6	0	6	8	0	11	25
7	0	4	3	X	X	7
8	0	3	5	0	11	19
9	3	0	3	12	0	18
10	4	0	5	14	0	23

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST
Water Chemistry

Client: WSRC
 Sample Identification: A-01
 Test Date: February 26, 2002

pH (After Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Initial	7.75	7.46	7.12	7.07	7.04	7.00
Day 1	8.20	8.06	7.80	7.59	7.43	7.09
Day 2	7.11	6.93	6.85	7.93	7.07	7.24
Day 3	7.01	7.15	7.02	6.98	7.04	7.13
Day 4	7.02	7.23	7.19	7.11	7.05	6.98
Day 5	7.06	7.11	7.28	7.25	7.07	7.01
Day 6	7.04	6.95	6.85	6.94	6.96	7.11

pH (Before Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Day 1	8.25	8.09	7.92	7.83	7.86	7.66
Day 2	7.36	7.34	7.22	7.18	7.31	7.64
Day 3	7.34	7.26	7.23	7.24	7.30	7.43
Day 4	7.11	7.33	7.31	7.12	7.22	7.45
Day 5	7.09	7.18	7.26	7.24	7.36	7.38
Day 6	6.95	6.88	6.95	6.87	6.84	7.07
Final	7.63	7.97		7.38	7.43	7.47

Dissolved Oxygen (After Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Initial	8.4	8.2	8.2	8.5	8.3	8.4
Day 1	8.4	8.2	8.2	8.3	8.3	8.3
Day 2	8.4	8.3	8.3	8.4	8.4	8.4
Day 3	8.4	8.2	8.2	8.3	8.4	8.4
Day 4	8.4	8.2	8.2	8.4	8.4	8.4
Day 5	8.3	8.4	8.3	8.3	8.4	8.4
Day 6	8.4	8.3	8.3	8.3	8.4	8.4

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	control	6.25%	12.5%	25%	50%	100%
Day 1	8.3	8.3	8.3	8.4	8.4	8.4
Day 2	8.5	8.4	8.4	8.3	8.4	8.4
Day 3	8.5	8.4	8.4	8.4	8.5	8.5
Day 4	8.5	8.4	8.5	8.5	8.5	8.5
Day 5	8.4	8.4	8.4	8.3	8.3	8.3
Day 6	8.3	8.4	8.4	8.4	8.4	8.4
Final	8.4	8.4		8.3	8.4	8.4

Temperature

Incubator °C	
Initial	25.5
Day 1	25.2
Day 2	25.2
Day 3	25.4
Day 4	25.4
Day 5	25.6
Day 6	25.4
Final	25.0

Test Results Reviewed and Approved By:

