Toxicity of Water and Sediment Samples Collected in the Vicinity of the Mixed Waste Management Facility, 1995 and 1996

by

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MIXED WASTE MANAGEMENT FACILITY, 1995-1996 (U)**

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TABLE OF CONTENTS

	Page
1.0 EXECUTIVE SUMMARY	1
2.0 INTRODUCTION	1
3.0 SAMPLING LOCATIONS AND DATES	2
4.0 METHODS	6
4.1 Sample Collection	6
4.2 Water Toxicity	6
4.3 Sediment Toxicity	6
5.0 RESULTS	8
5.1 Water Chemistry	8
5.2 Water Toxicity	11
5.3 Sediment Toxicity	13
6.0 CONCLUSIONS	15
7.0 LITERATURE CITED	16
APPENDIX A - WATER TOXICITY RESULTS, JANUARY-FEBRUARY 1995	
APPENDIX B - WATER TOXICITY RESULTS, AUGUST-SEPTEMBER 1995	
APPENDIX C - WATER TOXICITY RESULTS, FEBRUARY-APRIL 1996	
APPENDIX D - SEDIMENT TOXICITY RESULTS, AUGUST-SEPTEMBER 1995	

LIST OF TABLES

	Page
Table 1. Maximum Tritium and Volatile Organic Compound Concentrations in Shallow Wells and Bucket Samplers, March 1994	2
Table 2. Metal Concentrations at MWMF Sampling Locations, Aug.-Sept 1993	3
Table 3. Sampling Locations for Water and Sediment Toxicity Testing	3
Table 4. Test Conditions for Conducting a 7-day Definitive Water Toxicity Test with <i>Ceriodaphnia dubia</i>	7
Table 5. Test Conditions for Conducting a 10-day Sediment Toxicity Test with <i>Hyalella azteca</i>	7
Table 6. U.S. EPA Water Quality Criteria for Selected Metals	8
Table 7. Metal Concentrations at MWMF Sampling Locations, February 1996	9
Table 8. Metal Concentrations at MWMF Sampling Locations, April 1996	9
Table 9. Dissolved Oxygen, pH, Hardness, Alkalinity, and Conductivity Measurements (Range) on Water Samples Used for Toxicity Testing	10
Table 10. No Observed Effect Concentrations (NOEC's) for MWMF Toxicity Testing Locations, 1995-1996	11
Table 11. Percent Mortality in Undiluted Water from the MWMF Sampling Locations, 1995-1996	12
Table 12. Results of 10-day Whole Sediment <i>Hyalella azteca</i> Toxicity Tests	14

LIST OF FIGURES

Figure 1. MWMF Sampling Locations	4
Figure 2. Background Sampling Locations	5

1.0 EXECUTIVE SUMMARY

Three rounds of toxicity tests were conducted on water collected from eleven locations in the vicinity of the Mixed Waste Management Facility (MWMF) and four reference locations between January 1995 and April 1996. In addition, sediment toxicity tests were conducted at these same locations during the winter of 1996.

The results of the toxicity tests indicate that water from all of the sampling locations, including the four reference locations, was toxic in at least one of the three rounds of testing. No Observed Effect Concentrations (NOEC's) ranged from <6.25% to 100%. At most locations, the water was more toxic during the summer months. All of the sampling locations, including the reference sites, had potentially toxic concentrations of several metals, including aluminum, copper, iron, lead, and zinc. In addition some of the sampling locations had pH's that were low enough to cause toxicity. The observed toxicity is probably due to naturally elevated concentrations of one or more of these metals and/or low pH. Toxicity Identification Evaluations (TIE's) are being performed at several sampling locations to identify the toxicants.

All but four of the sediment toxicity tests showed evidence of toxicity. Reference sites, as well as MWMF sampling sites were toxic, which suggests that the toxicity is due to naturally occurring conditions and is not related to MWMF contaminants. The toxicity may be due to anoxic conditions in the sediments.

In conclusion, the results of the water and sediment toxicity tests conducted at sampling locations in the vicinity of the MWMF and reference sites indicate that all of the locations are toxic to some extent. However, the toxicity appears to be due to naturally occurring toxicants, and not to MWMF contaminants.

2.0 INTRODUCTION

The Mixed Waste Management Facility (MWMF) occupies approximately 194 acres on a nearly flat divide between Upper Three Runs Creek to the north and Fourmile Branch to the south, and is bounded by Road 4 to the east and Road C to the west. The MWMF was used to dispose of transuranic waste, low-level waste, and intermediate level radioactive waste. Inorganic chemical constituents known to be deposited in the MWMF include lead, mercury and cadmium. In addition, a number of organic compounds were stored in underground tanks in the MWMF or were present in buried waste and may be present in the groundwater beneath the MWMF. These compounds include naphthalene, toluene, tributylphosphate-kerosene, phenol, xylene, benzene, trimethylbenzene, and trichloroethylene.

Groundwater from the MWMF outcrops to the surface at numerous locations. Water quality surveys conducted in the vicinity of the MWMF in 1993 indicate elevated levels of tritium at numerous sampling locations and detectable concentrations of acetone, 1,2 dichloroethylene, methyl ethyl ketone, tetrachloroethylene, trichloroethylene and vinyl chloride in at least one shallow well or bucket sampling location (Dixon et al., 1994). The highest concentration of tritium or organics found during the 1994 sampling effort, as well as the location and EPA freshwater water quality criterion of each

constituent is presented in Table 1. There presently are no freshwater water quality criteria for acetone, methyl ethyl ketone, vinyl chloride, or tritium. Of the remaining three volatile organic compounds that were found in detectable concentrations in the shallow wells or MWMF outcrops, none were found in concentrations that approach the EPA freshwater water quality criteria. Therefore, volatile organic compounds and tritium present in the groundwater outcrops from the MWMF would not be expected to be toxic to freshwater organisms living in the seeps and streams in the vicinity of the MWMF.

Table 1. Maximum Tritium and Volatile Organic Compound Concentrations^a in Shallow Wells and Bucket Samplers, March 1994

Compound	Well	Bucket	EPA FW WQC ^b	
			Acute	Chronic
1,2 dichloroethylene	368	102	11,600	-
acetone			-	-
methyl ethyl ketone			-	-
tetrachloroethylene	5.33	-	5,280	840
trichloroethylene	32.4	5.36	45,000	21,900
vinyl chloride	-	23	-	-
tritium	49,900	32,800	-	-

^aAll concentrations are in µg/l, except tritium, which is reported in pCi/ml.

^bU.S. EPA Freshwater Water Quality Criteria

Analyses for 13 metals (aluminum, arsenic, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, selenium, silver, and zinc) were performed on samples collected from two background locations (BG-002 and BG-003) and five seep locations (FHB-013, FHB-014, FHB-015, FHB-018 and FHB-020 in August/September 1993 (Table 2). The results indicate that potentially toxic concentrations of iron, zinc, aluminum and/or chromium may occur at one or more sampling locations, including the uncontaminated reference locations.

In order to determine if the outcropping water poses a threat to aquatic life, toxicity tests were performed on water and sediment samples collected from 11 locations in the vicinity of the MWMF and Fourmile Branch as well as four uncontaminated reference locations.

3.0 SAMPLING LOCATIONS AND DATES

Water and sediment samples for toxicity testing were collected from a total of 15 locations, including seven seeps in the vicinity of the MWMF, three locations in the old F-Area effluent ditch, one location in Fourmile Branch, two background (uncontaminated reference) stream locations, and two background seep locations (Table 3; Figures 1 and 2). Toxicity tests on water samples were performed three times (January-February 1995, August-September 1995 and February-April 1996). It should be noted that all but four of the 1996 tests were conducted in late February. A series of rain events delayed completion of the toxicity tests at these four locations (FHB-012, FHB-013, FHB-018 and FHB-021) until mid-April. Sediment toxicity testing was conducted once at each sampling location during the winter of 1996.

Table 2. Metal Concentrations at MWMF Sampling Locations, Aug-Sept 1993

	BG-002	BG-003	FHB-013	FHB-014	FHB-018	FHB-020
Al	6060	234	<200	<200	<200	<200
As	<10	<10	<10	<10	10	<10
Cd	<5	<5	<5	<5	<5	<5
Cr	<10	<10	<10	<10	<10	16.8
Cu	<25	<25	<25	<25	<25	<25
Fe	7,690	580	5,025	565	47,100	4,510
Pb	4.6	<3	<3	<3	<3	<3
Mn	45	96	64	<15	337	33
Hg	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Se	<5	<5	<5	<5	<5	<5
Ag	<10	<10	<10	<10	<10	<10
Zn	84	22	28	36	<20	57

All concentrations are in µg/l.

Numbers in bold indicate potential for toxicity

Table 3. Sampling Locations for Water and Sediment Toxicity Testing

Location ID	Type	SRS North	SRS East
BG-003	Stream	67633	59281
BG-004	Stream	64723	68527
FHB-012	Stream	73424	53878
FHB-021	Stream	73113	53493
FHB-022	Stream	72537	53372
FMC-002H	Stream	72200	43900
BG-001	Seep	67208	59153
BG-002	Seep	67229	59363
FHB-013	Seep	73514	53840
FHB-014	Seep	73571	53729
FHB-018	Seep	73567	54024
FHB-020	Seep	73431	54011
FHB-023	Seep	73124	52954
HSP-064	Seep	71846	54768
HSP-092	Seep	72672	54129
(FHB-006)			

BG = background (reference)

FHB= near old F-Area effluent ditch

HSP = along H-Area seep line

FMC = Fourmile Branch

Old F-Area Effluent Ditch

Figure 1. MWMF Sampling Locations

Figure 2. Background Sampling Locations

4.0 METHODS

4.1 Sample Collection

Water - In accordance with EPA protocol, water samples were collected three times during a 7-day period at each location, such that the holding time of the water used for toxicity testing never exceeded 72 hours. For each collection, two 2-liter plastic bottles of water were collected, placed on ice immediately and shipped to the testing laboratory via an express carrier.

Sediments - For the sediment toxicity tests, two liters of sediment were collected at each location. At three locations at each sampling site, a garden spade was forced into the sediment to a depth of approximately 25 cm. A 1 liter sample was collected from the spade, taking care to collect sediment that had not contacted the metal blade of the spade. The three 1-liter samples were mixed together in a plastic tray and two liters of the representative sample were placed into a plastic jar, placed on ice, and shipped to the testing laboratory via an express carrier. At one of the reference sampling sites (BG004), excessive root mats that could not be cut by the spade precluded collection of a sediment sample, so no sediment toxicity test was performed for this site.

4.2 Water Toxicity

Definitive chronic toxicity tests were conducted on *Ceriodaphnia dubia* using EPA methods (Weber et al. 1989). Test conditions are specified in Table 4. Toxicity tests were performed on a series of dilutions, (0, 6.3%, 13%, 25%, 50% and 100% sample water), using 10 test organisms per concentration. At the end of the 7-day test the reproductive success (number of young produced) of organisms exposed to each dilution was compared statistically to that of the control group (0%) in order to determine if reproduction was impaired. The results of the tests were reported as NOEC's (No Observed Effect Concentration), which was the highest concentration tested that did not cause a significant reduction in reproduction. If there was no reproductive impact, the NOEC was 100%. In addition, any mortality that occurs during the test was also recorded.

Water quality parameters routinely measured during the toxicity tests include temperature, pH, hardness, alkalinity and specific conductance. In addition, analyses for selected metals were also conducted twice at each sampling location.

4.3 Sediment Toxicity

Ten-day whole sediment toxicity tests were conducted on the amphipod *Hyalomma azteca* using EPA protocol (U.S. EPA, 1994). Test conditions are specified in Table 5. Water quality measurements routinely measured during the toxicity tests include hardness, alkalinity, conductivity, pH, ammonia, temperature, and dissolved oxygen.

Table 4. Test Conditions for Conducting a 7-day Definitive Water Toxicity Test with *Ceriodaphnia dubia*

Parameter	Conditions
Test type	Static renewal
Temperature	25 ± 1°C
Light quality	Ambient laboratory illumination
Light intensity	50 - 100 foot candles
Photoperiod	16L:8D
Test chamber size	30 ml
Test solution volume	15 ml
Renewal of test water	Daily
Age of test organisms	Less than 24 h at start of test; all released within a 12 h period
# neonates/test chamber	1
# Neonates/concentration	10
Feeding regime	0.1 ml YCT and algal suspension/test chamber/day
Aeration	None
Dilution water	Diluted mineral water
Number of dilutions	5 and a control

Table 5. Test Conditions for Conducting a 10-day Sediment Toxicity Test with *Hyaella azteca*

Parameter	Conditions
Test type	Whole sediment toxicity test with renewal of overlying water
Temperature	23 ± 1°C
Light quality	Wide-spectrum fluorescent lights
Light intensity	500 to 1000 lux
Photoperiod	16L:8D
Test chamber	500 ml beaker
Sediment volume	100 ml
Overlying water volume	175 ml
Water renewal	2 volume additions/day
Age of organisms	7 to 14 days at start of test
Number of organisms per chamber	10
Number of replicates per treatment	8
Feeding	YCT food, 1.5 ml/day/test chamber
Aeration	None, unless DO drops below 40% of saturation
Overlying water	Surface water
Overlying water quality parameters	Hardness, alkalinity, conductivity, pH, and ammonia at beginning and end of test; temperature and DO daily
Test duration	10 days
Endpoint	Survival
Test acceptability	Control survival ≥ 80%

5.0 RESULTS

5.1 Water Chemistry

Metals - The U.S. EPA (1991) has issued freshwater water quality criteria for many metals and organic compounds. The toxicity of most cationic metals is inversely related to water hardness. For a few metals, such as aluminum, toxicity is also pH dependent. Table 6 lists the EPA freshwater water quality criteria or other relevant criteria for metals that were sampled at the MWMF sampling locations. A hardness of 10 mg/l was used in calculating the criteria for metals for which the toxicity is hardness dependent.

Table 6. U.S. EPA Water Quality Criteria for Selected Metals

Metal	Criterion
Aluminum	75 ^a
Arsenic	850 ^b
Cadmium	0.19 ^c
Chromium	11
Copper	1.65 ^c
Iron	1000
Lead	0.17 ^c
Manganese	No criterion has been published.
Mercury	0.102
Selenium	5
Silver	0.08 ^c
Zinc	15 ^c

all concentrations are in µg/l

^aSCDHEC criterion; U.S. EPA has not issued a criterion

^bNo chronic value has been published; value is acute Lowest Observable Effect Level (LOEL)

^cCriterion is based on a water hardness of 10 mg/l

Analyses for 12 metals were performed on samples collected from six of the MWMF toxicity testing locations in August-September 1993, as part of another sampling program (Table 2; Dixon, personal communication). These results indicate that potentially toxic concentrations of aluminum, iron, zinc, and lead may occur at some of the MWMF and reference locations.

In February 1996, samples were collected at 11 of the 15 MWMF sampling locations and analyzed for aluminum, copper, iron, lead, manganese, and zinc (Table 7). The results indicate that potentially toxic concentrations of aluminum were present at all but one of the sampling locations and that iron and zinc were measured at potentially toxic concentrations at four of the locations that were sampled. Copper was found at a potentially toxic concentration at one location (FHB-020).

In April 1996, samples were collected at all fifteen locations and analyzed for total and dissolved aluminum, total and dissolved iron, and total copper, lead, and zinc (Table 8). These results indicate that potentially toxic concentrations of aluminum were measured at all of the sampling locations and that potentially toxic concentrations of iron, copper, lead, and zinc were found at one or more locations.

Table 7. Metal Concentrations at MWMF Sampling Locations, February 1996

Location	Al	Cu	Fe	Pb	Mn	Zn
BG-001	164	<5	1,560	<15	42	74
BG-002	152	<5	101	<15	26	<5
BG-003	86	<5	510	<15	42	<5
BG-004	407	<5	873	<15	68	11
FHB-006	1,008	<5	4,480	<15	120	31
FHB-014	<50	<5	216	<15	6.2	<5
FHB-020	2,360	18.1	10,900	<15	63	27
FHB-022	118	<5	642	<15	31	8
FHB-023	154	<5	1,500	<15	53	<5
HSP-064	190	<5	448	<15	139	17
FMB-002H	85	9	844	<15	34	8

All concentrations are in µg/l.

Numbers in bold indicate potential for toxicity

Table 8. Metal Concentrations at MWMF Sampling Locations, April 1996

Location	Total Al	Diss. Al	Cu	Total Fe	Diss. Fe	Pb	Zn
BG-001	206	157	<1	2,730	796	<3	3.2
BG-002	2,390	96	3.1	835	82	3.5	7.5
BG-003	140	97	<1	744	399	<3	1.6
BG-004	243	161	<1	1,230	685	<3	2.5
FHB-006	650	160	<1	1,840	783	<3	2.8
FHB-012	291	32	<1	655	89	<3	3
FHB-013	1,880	1,640	3.7	1,420	332	<3	10
FHB-014	128	21	<1	105	50	<3	2
FHB-018	251	30	1.4	15,200	19,900	<3	7
FHB-020	840	274	3	12,600	8	<3	6.9
FHB-021	77	31	<1	230	89	<3	19
FHB-022	120	61	<1	1,010	582	<3	6.9
FHB-023	203	112	<1	2,650	668	<3	3.9
HSP-064	94	52	<1	314	165	<3	4.5
FMB-002H	105	54	1	1,540	782	<3	6.9

All concentrations are in µg/l.

Numbers in bold indicate potential for toxicity

Other Water Quality Parameters - Water quality parameters that are routinely performed in conjunction with the toxicity tests include pH, total hardness, alkalinity, dissolved oxygen, and specific conductance (Table 9). The results indicate that all of the sampling locations had low hardness (2 to 20 mg/l as CaCO₃), and most locations had low alkalinity (0 to 14 mg/l) and conductivity (<50 µmhos/cm). However, several

Table 9. Dissolved Oxygen, pH, Hardness, Alkalinity, and Conductivity Measurements (Range) on Water Samples Used for Toxicity Testing

Location	Diss. Oxygen	pH	Jan - Feb 1996		
			Hardness	Alkalinity	Conductivity
BG-001	8.4 - 9.6	7.0 to 8.4	4 - 11	2	16
BG-002	8.7 - 9.0	6.4 - 8.5	2 - 4	2	19 - 20
BG-003	8.2 - 9.2	7.2 - 8.6	4 - 11	2 - 4	21 - 22
BG-004	8.0 - 9.2	6.8 - 8.5	6 - 10	2 - 4	23
FHB-006	8.2 - 9.0	6.1 - 8.6	4 - 6	4 - 6	34 - 37
FHB-012	8.2 - 9.2	6.4 - 8.3	8 - 10	4 - 6	40
FHB-013	dry	dry	dry	dry	dry
FHB-014	8.5 - 9.1	6.3 - 8.4	4 - 8	4 - 6	32 - 33
FHB-018	8.7	6.4	10 - 14	20 - 47	57 - 112
FHB-020	8.6 - 9.4	6.8 - 8.3	6 - 18	4 - 12	25 - 42
FHB-021	8.0 - 9.4	6.7 - 8.2	4 - 8	2 - 6	43 - 44
FHB-022	8.2 - 9.2	7.4 - 8.5	10 - 14	6 - 8	48 - 55
FHB-023	8.4 - 8.7	6.7 - 8.3	12 - 16	2 - 4	28 - 33
HSP-064	8.4 - 9.2	6.3 - 8.3	6 - 14	4 - 28	25 - 28
FMC-002H	8.4 - 9.2	6.3 - 8.3	8 - 18	6 - 8	44 - 51

Location	Diss. Oxygen	pH	Aug - Sept 1995		
			Hardness	Alkalinity	Conductivity
BG-001	8.0	5.5	6 - 10	<0.1 - 2	10 - 14
BG-002	8.1	5	6 - 16	<0.1	15 - 26
BG-003	8.2 - 10.0	6.9 - 7.6	6 - 8	4 - 8	19 - 32
BG-004	8.0 - 10.0	6.3 - 7.7	10 - 14	8 - 14	19 - 38
FHB-006	8.0 - 10.0	5.8 - 7.1	4 - 8	4 - 8	30 - 35
FHB-012	8.5 - 9.4	5.9 - 8.1	8 - 12	4 - 6	41 - 43
FHB-013	8.4 - 9.6	5.8 - 7.7	6 - 14	6 - 8	38 - 41
FHB-014	7.9 - 9.3	5.6 - 7.3	4	6 - 8	36 - 39
FHB-018	8.2 - 9.0	3.8 - 7.8	6 - 10	4 - 33	44 - 86
FHB-020	7.8 - 10.0	5.9 - 7.2	6 - 10	4 - 12	37 - 41
FHB-021	8.5 - 9.7	7.3 - 7.9	4 - 8	6	45 - 46
FHB-022	8.2 - 9.3	6.6 - 7.4	10 - 20	8 - 31	40 - 69
FHB-023	7.8 - 9.4	5.3 - 7.3	10 - 12	2 - 12	8 - 37
HSP-064	dry	dry	dry	dry	dry
FMC-002H	8.1 - 10.0	6.4 - 7.9	20 - 24	30 - 35	40 - 68

Location	Diss. Oxygen	pH	Feb - Apr 1996		
			Hardness	Alkalinity	Conductivity
BG-001	8.0 - 8.2	4.9 - 5.0	4 - 16	0.1 - 2	16 - 30
BG-002	8.2 - 8.5	6.2 - 7.2	10 - 26	<0.1 - 2	17 - 32
BG-003	8.4 - 9.0	7.5 - 8.2	8 - 14	2	23 - 24
BG-004	8.0 - 9.0	5.8 - 7.2	8 - 20	2 - 4	27 - 30
FHB-006	7.9 - 8.8	5.5 - 6.8	6 - 14	4 - 6	32 - 36
FHB-012	8.4 - 8.8	5.6 - 6.4	6 - 10	-	-
FHB-013	8.6 - 8.8	5.4 - 6.0	8 - 16	-	-
FHB-014	8.2 - 8.6	5.2 - 5.5	6 - 12	4 - 6	39
FHB-018	8.6	6.2	6 - 12	-	-
FHB-020	7.6 - 8.8	6.1 - 6.8	10	4 - 8	38 - 43
FHB-021	8.6 - 8.8	6.4 - 7.3	6 - 10	-	-
FHB-022	8.4 - 8.6	7.3 - 8.2	14 - 16	8 - 10	57 - 59
FHB-023	8.6	5.8 - 7.3	12 - 18	2	32 - 33
HSP-064	8.2 - 8.8	6.1 - 7.9	10 - 16	4 - 6	31 - 34
FMC-002H	8.1 - 9.1	7.4 - 7.9	12 - 24	8 - 10	57 - 59

locations (FHB-018, FHB-022 and FMB-002H) usually had higher alkalinities (up to 47 mg/l) and conductivities (up to 112 μ mhos/cm) than the other sampling stations. In some instances, a high value for alkalinity or conductivity would occur in only one out of three samples from a location, which suggests intermittent influxes of substances with high alkalinity and/or conductivity.

Dissolved oxygen concentrations were always at least 7.6 mg/l, which is greater than the 5 mg/l that is required to support most forms of aquatic life. pH was variable, ranging from 3.8 to 8.6. In samples with pH's of less than 6, high mortalities were often observed in the highest concentration (100%) of sample. These results suggest that low pH may be responsible for at least part of the observed toxicity.

5.2 Water Toxicity

5.2.1 General Overview

Table 10 summarizes the results of the water toxicity tests that were performed during three time periods in 1995 and 1996, while Appendices A through C contain more detailed results of the tests.

Table 10. No Observed Effect Concentrations (NOEC's) for MWMF Toxicity Testing Locations, 1995-1996

TEST DATES	JAN-FEB 1995	AUG-SEP 1995	FEB-APR 1996
LOCATION			
BG-001	50%	50%	50%
BG-002	25%	<6.25%	50%
BG-003	50%	6.25%	25%
BG-004	50%	12.50%	50%
FHB-006	50%	6.25%	50%
FHB-012	50%	50%	25%
FHB-013	Dry	50%	13%
FHB-014	100%	<6.25%	25%
FHB-018	25%	12.50%	6%
FHB-020	50%	<6.25%	50%
FHB-021	50%	12.50%	13%
FHB-022	50%	6.25%	100%
FHB-023	50%	<6.25%	50%
HSP-064	50%	Dry	100%
FMC-002H	100%	<6.25%	100%

The results indicate that most of the samples, including those from the reference locations (BG-001 through BG-004) were toxic to some extent, with NOEC's ranging from <6.25% to 100%. Of the 44 test results, only five showed no evidence of toxicity. The results also indicate substantial temporal variability. Eleven of the fifteen locations were more toxic in the summer than in either the winter of 1995 or 1996. This

suggests that toxicity may be greatest during the low flow conditions that usually exist during the summer months, and reduced following periods of greater rainfall, which dilutes the seepwater directly, and also causes further dilution as it infiltrates into the shallow groundwater.

Approximately 30% of the undiluted (100%) samples also resulted in complete mortality to the test organisms, and 73% of the undiluted samples caused at least partial mortality (Table 11).

Table 11. Percent Mortality in Undiluted Water from the MWMF Sampling Locations, 1995-1996

LOCATION	Jan-Feb 1995	Aug-Sept 1995	Feb-Apr 1996
BG-001	90	100	100
BG-002	100	100	100
BG-003	20	40	0
BG-004	30	50	10
FHB-006	40	100	30
FHB-012	50	0	10
FHB-013	dry	90	0
FHB-014	10	60	100
FHB-018	100	100	100
FHB-020	100	0	0
FHB-021	20	0	0
FHB-022	0	10	0
FHB-023	100	40	100
HSP-064	70	dry	0
FMC-002H	0	30	0

5.2.2 Background Locations

Uncontaminated reference locations included BG-001, BG-002, BG-003 and BG-004. BG-001 and BG-002 are located in uncontaminated groundwater outcrops and were selected as reference locations for the sampling sites adjacent to the Old F-Area Effluent ditch that are groundwater outcrops. BG-003 and BG-004 are located in uncontaminated flowing water and were selected as reference locations for the sampling sites in the Old F-Area Effluent Ditch.

As shown in Table 10, all of the toxicity tests conducted on water from the four reference locations were toxic to some extent during all three rounds of testing, with NOEC's ranging from <6.25% to 50%. BG-001 was consistently the least toxic, with NOEC's of 50% in all three sets of tests. However, BG-001 and BG-002 consistently had high mortality (90 to 100%) in undiluted sample water. BG-002 through BG-004 were much more toxic in late summer (NOEC's of <6.25 to 12.5%) than in winter (NOEC's of 25 to 50%).

These results indicate that uncontaminated seeps and flowing water on the SRS may be somewhat toxic to *Ceriodaphnia dubia*. These results confirm earlier findings of

toxicity at uncontaminated locations that were sampled as part of the F/H seep toxicity testing program. In that study, it was determined that the toxicity was due to naturally occurring iron (ETT Environmental, 1994, 1995).

5.2.3 MWMF Seeps

Toxicity tests conducted on seeps in the vicinity of the MWMF (FHB-006, FHB-013, FHB-014, FHB-018, FHB-020, FHB-023 and HSP-064) had NOEC's ranging from <6.25 to 100% (Table 10). Most of the seeps were most toxic in late summer. However, the seeps that were tested in April 1996 (FHB-012, FHB-013, FHB-018 and FHB-021), rather than in February 1996 were considerably more toxic. Since their toxicity was comparable to the other locations in the earlier test periods, it is likely that the lower NOEC's in April 1996 were related to the degree to which the groundwater was diluted by precipitation. Further investigations may be needed to define temporal variability in toxicity at the MWMF sampling locations.

These results indicate that the MWMF seeps are no more toxic than the reference locations that were tested, which suggests that the toxicity is due to naturally occurring constituents, and not contaminants from the MWMF.

5.2.4 Old F-Area Effluent Ditch

Toxicity tests on samples collected from the old F-Area effluent ditch (FHB-012, FHB-021 and FHB-022) had NOEC values ranging from 12.5% to 100% (Table 10). Only one of the samples (FHB-022 in winter 1996) showed no evidence of toxicity. These results indicate that the sampling locations in the effluent ditch are no more toxic than the reference locations that were tested, which suggests that the toxicity is due to naturally occurring constituents, and not contaminants from the MWMF.

5.2.5 Fourmile Branch

Samples collected from Fourmile Branch (FMC-002H) showed no evidence of toxicity in the winters of 1995 or 1996, but the test conducted in late summer of 1995 had an NOEC of <6.25%, with 30% mortality in undiluted stream water (Table 10).

5.3 Sediment Toxicity

Sediment toxicity tests were performed on wetland soil or sediment samples collected from 14 of the 15 sampling locations. One location (BG-004) could not be sampled due to the presence of dense root mats, which precluded collection of a sediment sample. Of the fourteen locations that were tested, four passed the sediment toxicity test (percent survival did not significantly differ from that of the controls), while at the remaining ten locations survival was significantly lower than in the controls (Table 12).

Two of the three reference locations were toxic, while eight of the 11 test sites were toxic. Percent survival ranged from 0% (FMC-002H) to 95% (FHB-012). Toxic responses at both the reference and FHB locations suggests that the toxicity is due to natural conditions, rather than to the presence of toxicants from the MWMF. However,

Table 12. Results of 10-day Whole Sediment *Hyaella azteca* Toxicity Tests

LOCATION	PASS/FAIL	% SURVIVAL
BG-001	Pass	74%
BG-002	Fail	4%
BG-003	Fail	68%
BG-004	a	a
FHB-006	Fail	3%
FHB-012	Pass	95%
FHB-013	Fail	55%
FHB-014	Pass	83%
FHB-018	Fail	50%
FHB-020	Pass	81%
FHB-021	Fail	73%
FHB-022	Fail	3%
FHB-023	Fail	20%
HSP-064	Fail	69%
FMC-002H	Fail	0%

^aNo sample was collected, due to dense root mats.

an examination of the supporting chemistry data for the overlying water (dissolved oxygen, conductivity, pH, alkalinity, hardness, and ammonia) showed no clear reason for most of the failures. Some of the locations had relatively low pH (~5) and/or low hardness (<20), but many of the sites that were toxic had pH and hardness values that should not have stressed the test organisms. Of particular concern is that the sample from Fourmile Branch was the most toxic of the 14 sampling locations, with 100% mortality by the end of the 10 day test period. Ammonia concentrations in the overlying water from the Fourmile Branch test were 1.11 mg/l at the beginning of the test and 3.04 mg/l at the end of the test (Appendix D). Dissolved oxygen concentrations were also less than 5 mg/l on three of the 10 test days. Ammonia concentrations in excess of 1 mg/l and/or dissolved oxygen levels of less than 5 mg/l can often be toxic to many aquatic species. These results suggest that the Fourmile Branch test failed due to reduced (anaerobic) conditions, rather than to the presence of toxicants such as metals or organic compounds. Macroinvertebrate sampling of Fourmile Branch at Road C in 1993 indicated that this area of the stream supported a depauperate macroinvertebrate community and that the stream had very low concentrations of dissolved oxygen (Specht 1994). Further studies may be needed to determine the cause of the low oxygen levels in this portion of Fourmile Branch. Ammonia concentrations were also initially high (1.89 mg/l) in the test conducted on sediment collected from FHB022. This site also exhibited very poor survival (3%). The results of the sediment toxicity tests suggest that although most of the sediments were toxic to some extent, the toxicity is probably due to anaerobic conditions in the sediments and/or naturally occurring toxicants, since both the reference and FHB locations were toxic.

6.0 CONCLUSIONS

The results of the toxicity tests indicate that water from all of the sampling locations, including the four reference locations, was toxic in at least one of the three rounds of testing. No Observed Effect Concentrations (NOEC's) ranged from <6.25% to 100%. At most locations, the water was more toxic during the summer months, and was probably due to reduced rainfall. Many of the sampling locations have naturally low pH's and potentially toxic concentrations of several metals, including aluminum, copper, iron, lead, and zinc have been measured at all of the sampling locations, including the reference locations. The observed toxicity is probably due to naturally elevated concentrations of one or more of these metals and/or low pH. Toxicity Identification Evaluations (TIE's) are being performed at several sampling locations to identify the toxicants.

All but four of the sediment toxicity tests showed evidence of toxicity. Reference sites, as well as MWMF sampling sites were toxic, which suggests that the toxicity is due to naturally occurring conditions and is not related to MWMF contaminants. The toxicity may be due to anoxic conditions in the sediments.

In conclusion, the results of the water and sediment toxicity tests conducted at sampling locations in the vicinity of the MWMF and reference sites indicate that all of the locations are toxic to some extent. However, the toxicity appears to be due to naturally occurring toxicants, and not to MWMF contaminants.

7.0 LITERATURE CITED

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APPENDIX A

WATER TOXICITY RESULTS, JANUARY-FEBRUARY 1995

(803) 877-6942 • FAX (803) 877-6938

P.O. Box 16414, Greenville, SC 29606 • 6C Craftsman Court, Greer, SC 29650

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

Test Organisms: *Ceriodaphnia dubia*

Method: EPA/600/4-89/001

**Facility: Westinghouse Savannah River Company
Sample ID: BG001**

Date: 2-2-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client:WSRC		Start Date: 2-2-95	Start Time: 4:00 PM
Log #: T3524	Sample ID: BG001	End Date: 2-11-95	End Time: 1:15 PM IWC:

TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new
2 0	0	0	0	0	0	0	0	0	0	8.2	8.6	7.4	7.9	2 0	0	0	0	0	0	0	0	0	0	8.7	8.4	7.5	6.6
3 0	0	0	0	0	0	0	0	0	0	8.2	8.5	7.4	8.0	3 0	0	0	0	0	0	0	0	0	0	8.7	8.7	7.5	7.4
4 0	4	0	0	0	4	0	3	2	4	8.4	8.4	8.0	7.9	4 0	5	3	0	0	0	0	0	5	2	9.2	9.4	8.0	8.4
5 7	7	0	0	0	3	0	0	0	5	8.5	8.6	8.4	8.0	5 4	7	0	0	0	0	0	0	7	5	8.2	8.2	8.5	8.1
6 0	0	0	0	0	0	0	0	0	0	9.2	8.6	8.5	8.2	6 0	1	8	0	0	0	4	X	0	0	8.5	8.4	7.9	8.3
7 12	10	0	0	14	0	11	0	12	12	8.2	8.7	8.1	8.1	7 12	2	6	0	7	0	6	X	7	0	8.0	8.1	8.1	8.1
8 0	0	4	5	0	4	0	14	0	0	8.1	8.7	8.2	8.1	8 10	4	3	0	6	0	10	X	6	14	8.8	8.8	8.3	8.1
9 13	0	11	11	10	13	0	9	11	0	8.8	8.3	8.3		9 0	0	0	13	9	9	0	X	0	0				
TOT32	21	15	16	24	24	11	26	25	21	22				TOT26	19	20	13	22	9	20	0	25	21	18			

TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new
2 0	0	0	0	0	0	0	0	0	0	8.4	8.4	7.6	6.6	2 0	0	0	0	0	0	0	0	0	0	8.8	8.8	7.6	6.8
3 0	0	0	0	0	0	0	0	0	0	8.5	8.5	7.6	7.5	3 0	0	0	0	0	0	0	0	0	0	8.4	8.5	7.6	7.5
4 0	0	0	0	0	0	0	1	3	0	8.8	9.1	8.2	8.4	4 0	5	0	0	0	0	4	5	4	0	9.2	9.2	8.2	8.4
5 0	5	0	0	1	0	0	0	5	3	8.1	8.0	8.6	8.4	5 0	5	0	1	0	0	0	0	0	0	8.6	8.6	8.4	8.3
6 0	0	5	0	0	0	3	7	0	0	8.3	8.5	8.4	8.0	6 0	0	4	0	0	0	0	8	0	8	8.5	8.3	8.4	7.7
7 1	7	11	0	4	7	10	11	9	11	8.1	8.0	8.2	8.2	7 11	8	7	0	2	0	6	11	7	8	8.1	8.1	8.2	8.1
8 12	10	10	8	0	0	12	3	0	13	8.8	8.9	8.4	8.1	8 14	0	9	8	12	12	4	0	14	7	8.8	8.8	8.4	7.9
9 16	0	0	8	10	12	0	0	0	0					9 0	0	0	10	0	10	0	0	0	14				
TOT29	22	26	16	15	19	25	22	17	27	22				TOT25	18	20	19	14	22	14	24	25	37	22			

TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new
2 0	0	0	0	0	0	0	0	0	0	8.3	8.3	7.7	6.8	2 0	0	0	0	0	X	X	X	0	0	8.4	8.4	7.0	
3 0	0	0	0	0	0	0	0	0	0	8.7	8.7	7.7	7.5	3 0	X	0	0	0	X	X	X	0	0	8.8	8.8	8.2	8.4
4 0	2	0	0	0	3	3	0	3	0	9.2	9.2	8.2	8.5	4 2	X	0	0	0	X	X	X	0	0	9.4	9.6	8.3	8.6
5 7	4	0	6	0	0	0	0	5	6	8.6	8.6	8.4	8.3	5 X	X	X	0	0	X	X	X	0	0	8.7	8.8	8.5	8.6
6 0	0	2	0	0	0	1	7	0	0	8.7	8.6	8.2	7.2	6 X	X	X	X	0	X	X	X	0	X	8.3	8.4	8.0	7.2
7 0	4	6	1	0	0	3	10	5	2	8.0	8.0	8.2	7.7	7 X	X	X	X	0	X	X	X	0	X	8.5	8.5	8.2	7.1
8 6	2	5	0	0	0	6	0	0	0	8.2	8.6	8.2	7.7	8 X	X	X	X	0	X	X	X	2	X	8.2	8.4	8.4	7.9
9 8	0	0	9	14	15	0	10	0	13					9 X	X	X	X	0	X	X	X	X	X	9.1		8.0	
TOT21	12	13	16	14	18	13	27	13	21	17				TOT 2	0	0	0	0	0	0	0	2	0	0			

TEM. °C	Time	TEM. °C	Time	TEM. °C	Time	TEM. °C	Time
Day 0 24.4	04:00 PM	Day 2 24.3	04:00 PM	Day 4 24.0	11:30 AM	Day 6 24.3	02:00 PM
Day 1 24.0	11:00 AM	Day 3 24.2	03:00 PM	Day 5 24.0	03:00 PM	Day 7 24.2	01:15 PM

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	2-1-95		96.04	71.05	226		
Final Eff. 1	Grab	2-1-95	08:20AM	3.92	2.03	16.4	<0.05	3.0°C
Final Eff. 2	Grab	2-3-95	08:10AM	11.1	2.03	15.6	<0.05	3.2°C
Final Eff. 3	Grab	2-6-95	10:10AM	7.84	2.03	15.9	<0.05	1.8°C

Results

Client: WSRC		Sample ID: BG001		
Log # : T3524	Start Date: 2-2-95		Time: 4:00 PM	

SURVIVAL EFFECTS

Effluent Conc.	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	0%	0%	0%	30%
7 Day Mortality	0%	10%	0%	0%	0%	90%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	FAIL
No-Observed-Effect Concentration (NOEC):		50%				
Lowest-Observed-Effect Concentration (LOEC):		100%				
7 Day LC50:		>50%				

QUALITY CONTROL

Standard Toxicant:		NaCl	
Central Tendency:	2.04	g/L	
Current Value:	1.9	g/L	
Deviation:	0.58	Std Dev units.	

Results

Client: WSRC		Sample ID: BG001	IWC:
Log # : T3524	Start Date: 2-2-95	Time: 4:00 PM	

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	21.5	17.5	21.8	21.8	16.8	0.4
Standard Deviation:	6.13	7.99	4.92	6.7	4.89	0.84
t =		1.43	-0.1	-0.1	1.68	NA

MSD= 6.23

Normality: Data Normal W = 1

Homogeneity: Data Homogeneous B = 3.06

Test Used: Dunnett's t Test

Critical Steel's Value: 75

Critical t Value: 2.23

Chronic Toxicity

6.25% No Chronic Toxicity

12.5% No Chronic Toxicity

25% No Chronic Toxicity

50% No Chronic Toxicity

100% Chronically Toxic

No-Observed-Effect Concentration (NOEC): 50%
 Lowest-Observed-Effect Concentration (LOEC): 100%
 7 Day EC50: >50%

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P.O. Box 16414, Greenville, SC 29606 • 6C Craftsman Court, Greer, SC 29650

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

Test Organisms: *Ceriodaphnia dubia*

Method: EPA/600/4-89/001

**Facility: Westinghouse Savannah River Company
Sample ID: BG002**

Date: 2-2-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client:WSRC		Start Date: 2-2-95	Start Time: 4:00 PM
Log #: T3525	Sample ID: BG002	End Date: 2-11-95	End Time: 1:15 PM IWC:

TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
2 0	0	0	0	0	0	0	0	0	0	8.2	8.6	7.4	7.9	2 0	0	0	0	0	0	0	0	0	0	8.8	8.6	7.6	6.5	
3 0	0	0	0	0	0	0	0	0	0	8.2	8.5	7.4	8.0	3 0	0	0	0	0	0	0	0	0	0	8.8	8.7	7.6	7.5	
4 0	4	0	0	0	4	0	3	2	4	8.4	8.4	8.0	7.9	4 0	0	0	0	0	0	0	0	0	0	8.9	8.8	7.9	8.3	
5 7	7	0	0	0	3	0	0	0	5	8.5	8.6	8.4	8.0	5 0	5	0	2	0	3	4	0	0	4	8.5	8.6	8.3	8.2	
6 0	0	0	0	0	0	0	0	0	0	9.2	8.6	8.5	8.2	6 0	0	6	0	0	0	1	7	0	0	8.1	8.1	8.2	8.0	
7 12	10	0	0	14	0	11	0	12	12	8.2	8.7	8.1	8.1	7 12	0	0	0	5	0	13	7	0	7	8.5	8.5	8.2	8.0	
8 0	0	4	5	0	4	0	14	0	0	8.1	8.7	8.2	8.1	8 4	2	X	X	4	0	U	8	0	0	8.8	8.9	7.7	8.1	
9 13	0	11	11	10	13	0	9	11	0	8.8	8.3	8.3	8.3	9 8	10	X	X	3	13	0	0	13	10	8.8	8.9	7.7	8.1	
TOT32	21	15	16	24	24	11	26	25	21	22				TOT24	17	6	2	12	16	18	22	13	21	15				

TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
2 0	0	0	0	0	0	0	0	0	0	8.5	8.5	7.6	7.6	2 0	0	0	0	0	0	0	0	0	0	8.9	8.9	7.6	7.6	
3 0	0	0	0	0	0	0	0	0	0	8.4	8.2	7.6	7.6	3 0	0	0	0	0	0	0	0	0	0	8.4	8.4	7.7	7.6	
4 0	3	2	X	0	0	3	0	4	2	8.8	8.7	8.0	8.4	4 4	1	0	0	1	0	1	0	4	0	8.7	8.6	8.1	8.4	
5 L	8	0	X	0	3	7	0	6	6	8.7	8.6	8.5	8.3	5 3	5	0	8	2	0	2	0	8	0	8.5	8.4	8.5	8.4	
6 L	0	6	X	0	0	0	7	0	0	8.5	8.0	8.3	8.0	6 X	0	5	0	0	4	0	4	0	4	8.6	8.7	8.3	8.1	
7 L	11	8	X	0	6	0	0	11	12	8.4	8.4	8.3	8.1	7 X	12	8	10	9	6	6	10	0	2	8.5	8.4	8.3	8.0	
8 L	0	0	X	X	3	4	0	0	0	8.8	8.8	8.1	8.1	8 X	0	0	6	X	0	0	X	3	0	9.0	9.0	8.2	7.9	
9 L	0	0	X	X	7	8	12	0	0	8.8	8.8	8.1	8.1	9 X	0	8	0	X	8	0	X	5	10	8.8	8.8	8.1	8.1	
TOT 0	22	16	0	0	19	22	19	21	20	15				TOT 7	18	21	24	12	18	9	14	20	16	16				

TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
2 0	0	0	0	0	0	0	0	0	0	8.4	9.0	7.7	6.8	2 0	X	0	0	0	0	0	0	0	0	8.8	8.8	7.8	6.4	
3 0	0	0	0	0	0	0	0	0	0	8.4	8.2	7.7	7.4	3 X	X	0	0	X	0	X	X	X	X	8.8	8.7	7.8	7.3	
4 0	0	0	2	0	2	2	0	0	2	0	8.6	8.6	8.1	8.4	4 X	X	0	0	X	X	X	X	X	8.9	9.0	8.2	8.5	
5 5	5	0	0	5	0	0	8	0	6	8.6	8.6	8.4	8.3	5 X	X	X	0	X	X	X	X	X	X	9.0	8.8	8.4	8.4	
6 0	0	0	0	0	0	0	0	0	0	8.7	8.6	8.0	7.6	6 X	X	X	X	X	X	X	X	X	X	8.8	8.8	7.7	7.7	
7 12	10	0	1	0	4	0	12	0	4	8.5	8.5	8.3	7.6	7 X	X	X	X	X	X	X	X	X	X	8.8	8.8	7.7	7.7	
8 0	0	0	0	0	0	0	0	0	0	8.5	8.7	8.2	7.7	8 X	X	X	X	X	X	X	X	X	X	8.8	8.8	7.7	7.7	
9 0	1	2	0	0	0	0	0	0	0	9.2	8.1	8.1	8.1	9 X	X	X	X	X	X	X	X	X	X	8.8	8.8	7.7	7.7	
TOT17	16	4	1	7	6	0	20	2	10	8				TOT 0	0	0	0	0	0	0	0	0	0	0				

TEM. °C	Time	TEM. °C	Time	TEM. °C	Time	TEM. °C	Time
Day 0 24.4	04:00 PM	Day 2 24.3	04:00 PM	Day 4 24.0	11:30 AM	Day 6 24.3	02:00 PM
Day 1 24.0	11:00 AM	Day 3 24.2	03:00 PM	Day 5 24.0	03:00 PM	Day 7 24.2	01:15 PM

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	2-1-95		96.04	71.05	226		
Final Eff. 1	Grab	2-1-95	08:30AM	3.92	2.03	19.7	<0.05	3.0°C
Final Eff. 2	Grab	2-3-95	08:20AM	1.96	2.03	19.3	<0.05	3.2°C
Final Eff. 3	Grab	2-6-95	10:20AM	11.7	2.03	18.6	<0.05	1.8°C

Results

Client: WSRC		Sample ID: BG002		
Log # : T3525	Start Date: 2-2-95		Time:	4:00 PM

SURVIVAL EFFECTS

Effluent Conc.	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	0%	0%	0%	10%
7 Day Mortality	0%	20%	22%	30%	0%	100%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	FAIL
No-Observed-Effect Concentration (NOEC):		50%				
Lowest-Observed-Effect Concentration (LOEC):		100%				
7 Day LC50:		>50%				

QUALITY CONTROL

Standard Toxicant:		NaCl		
Central Tendency:		2.04	g/L	
Current Value:		1.9	g/L	
Deviation:		0.58	Std Dev units.	

Results

Client: WSRC		Sample ID: BG002	IWC:
Log # : T3525	Start Date: 2-2-95	Time: 4:00 PM	

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	21.5	15.1	15.4	15.9	8.3	NA
Standard Deviation:	6.13	7.02	8.95	5.4	7.17	NA
t =		2.05	1.89	1.79	4.23	NA

MSD= 7.01

Normality: Data Normal W = 0.96

Homogeneity: Data Homogeneous B = 2.35

Test Used: Dunnett's t Test

Critical Steel's Value: 75

Critical t Value: 2.23

Chronic Toxicity

6.25% No Chronic Toxicity

12.5% No Chronic Toxicity

25% No Chronic Toxicity

50% Chronically Toxic

100% Chronically Toxic

No-Observed-Effect Concentration (NOEC): 25%
 Lowest-Observed-Effect Concentration (LOEC): 50%
 7 Day EC50: 32.48%

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

Test Organisms: *Ceriodaphnia dubia*

Method: EPA/600/4-89/001

**Facility: Westinghouse Savannah River Company
Sample ID: BG003**

Date: 2-2-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client:WSRC		Start Date: 2-2-95	Start Time: 3:00 PM
Log #: T3523	Sample ID: BG003	End Date: 2-11-95	End Time: 1:00 PM IWC:

TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
2 0	0	0	0	0	0	0	0	0	0	8.6	8.6	7.9	7.9	2 0	0	0	0	0	0	0	0	0	0	8.7	8.7	6.9	6.9	
3 0	0	0	0	0	0	0	0	0	0	8.2	8.5	7.4	8.0	3 0	0	0	0	0	0	0	0	0	0	8.6	8.6	7.5	7.3	
4 4	3	3	3	3	0	4	2	3	3	8.4	8.4	8.0	7.9	4 4	0	4	4	4	0	5	4	0	0	9.2	9.2	8.0	8.2	
5 0	4	0	6	6	5	5	6	0	0	8.5	8.6	8.4	8.0	5 6	6	6	6	7	X	7	0	9	1	8.8	8.8	8.5	8.3	
6 0	5	0	0	0	8	0	0	0	0	9.2	8.6	8.5	8.2	6 0	4	0	0	0	X	0	3	0	0	9.2	9.2	8.1	7.7	
7 9	0	12	8	0	0	8	10	6	2	8.2	8.7	8.1	8.1	7 12	10	8	10	12	X	10	9	0	0	8.8	8.6	7.2	7.6	
8 0	8	16	10	0	10	6	0	0	0	8.1	8.7	8.2	8.1	8 0	0	0	0	0	X	0	0	10	9	7.8	8.0	8.1	7.8	
9 10	0	0	0	14	0	0	0	13	4	8.8	8.3	8.3	8.3	9 0	0	0	0	0	X	0	0	0	0	8.8	8.8	8.8	8.8	
TOT23	20	31	27	23	23	23	18	22	9	22				TOT22	20	18	20	23	0	22	16	19	10	17				

TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
2 0	0	0	0	0	0	0	0	0	0	8.8	8.8	7.1	7.1	2 0	0	0	0	0	0	0	0	0	0	9.1	9.1	7.2	7.2	
3 0	0	0	0	0	0	0	0	0	0	8.5	8.6	7.5	7.5	3 0	0	0	0	0	0	0	0	0	0	8.6	8.6	7.6	7.6	
4 4	0	0	5	0	0	5	3	0	0	9.2	9.1	8.1	8.3	4 6	2	6	5	5	0	3	0	0	0	9.1	9.2	8.1	8.4	
5 6	4	0	5	8	6	0	0	0	3	8.6	8.6	8.6	8.4	5 3	6	4	0	7	5	9	0	0	0	8.8	8.8	8.6	8.4	
6 0	9	0	0	9	0	7	0	0	0	9.2	9.2	8.4	8.0	6 0	10	0	8	0	10	0	0	0	0	8.8	9.0	8.3	8.2	
7 14	0	0	11	0	5	9	10	3	3	8.6	8.5	7.7	8.2	7 12	0	10	11	6	0	10	7	0	0	8.6	8.5	7.9	8.2	
8 0	6	10	0	14	9	0	10	5	14	8.3	8.3	8.3	8.1	8 0	0	0	0	14	10	0	9	12	0	8.2	8.4	8.3	8.1	
9 0	17	1	0	0	0	0	0	14	0	8.2	8.5	8.5	8.5	9 0	0	0	0	0	0	0	0	15	8.8	8.8	8.8	8.8		
TOT24	36	11	21	31	20	21	23	22	20	23				TOT21	18	20	24	32	25	22	16	12	15	21				

TEST CONCENTRATION 50%														TEST CONCENTRATION 100%														
										D.O	D.O	pH	pH											D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
2 0	0	0	0	0	0	0	0	0	0	9.2	9.2	7.3	7.3	2 0	0	0	0	0	0	0	0	0	0	9.2	9.2	7.5	7.5	
3 0	0	0	0	0	0	0	0	0	0	8.4	8.4	7.7	7.6	3 0	0	0	0	0	0	0	0	0	0	8.7	8.6	7.8	7.6	
4 2	0	0	1	4	0	3	3	0	0	9.2	9.4	8.1	8.4	4 1	0	0	0	1	0	0	0	4	0	9.2	9.2	8.3	8.6	
5 6	4	5	0	0	4	0	4	0	0	8.8	8.8	8.5	8.4	5 0	X	0	3	2	3	0	0	0	0	8.9	9.0	8.5	8.4	
6 0	5	0	0	0	0	0	0	0	0	9.1	9.2	7.2	7.1	6 4	X	3	5	0	3	3	3	6	5	9.2	9.2	7.4	7.2	
7 11	0	0	7	9	7	2	10	0	0	8.3	8.6	8.0	8.2	7 0	X	3	2	2	0	1	2	8	X	8.6	8.8	8.0	7.9	
8 0	7	16	0	16	10	0	0	11	0	8.2	8.4	8.3	8.0	8 2	X	6	7	7	0	2	0	0	X	8.1	8.2	8.3	7.9	
9 0	0	0	11	0	0	0	0	0	8	8.8	8.8	8.8	8.8	9 2	X	3	0	5	2	2	0	0	X	9.2	8.0	8.0	8.0	
TOT19	16	21	19	29	21	5	17	11	8	17				TOT 9	0	15	17	17	8	8	5	18	5	10				

TEM. °C	Time	TEM. °C	Time	TEM. °C	Time	TEM. °C	Time
Day 0 24.4	03:00 PM	Day 2 24.3	03:50 PM	Day 4 24.0	05:00 PM	Day 6 24.3	11:10 AM
Day 1 24.0	01:00 PM	Day 3 24.2	12:30 PM	Day 5 24.0	03:00 PM	Day 7 24.2	11:13 AM

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	2-1-95		96.04	71.05	226		
Final Eff. 1	Grab	2-1-95	08:10AM	3.92	2.03	21.2	<0.05	3.0°C
Final Eff. 2	Grab	2-3-95	08:00AM	5.88	4.06	22.3	<0.05	3.2°C
Final Eff. 3	Grab	2-6-95	10:00AM	11.7	2.03	20.6	<0.05	1.8°C

Results

Client: WSRC	Sample ID: BG003	
Log # : T3523	Start Date: 2-2-95	Time: 3:00 PM

SURVIVAL EFFECTS

	Control	Effluent				
Effluent Conc.	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	0%	0%	0%	0%
7 Day Mortality	0%	10%	0%	0%	0%	20%

Method: Fishers Exact Test

	Control	Effluent				
Acute Toxicity		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
No-Observed-Effect Concentration (NOEC):					100%	
Lowest-Observed-Effect Concentration (LOEC):					>100%	
7 Day LC50:					>100%	

QUALITY CONTROL

Standard Toxicant:	NaCl
Central Tendency:	2.04 g/L
Current Value:	1.9 g/L
Deviation:	0.58 Std Dev units.

Results

Client: WSRC	Sample ID: BG003	IWC:
Log # : T3523	Start Date: 2-2-95	Time: 3:00 PM

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	21.9	17	22.9	20.5	16.6	10.2
Standard Deviation:	5.76	7.06	6.71	5.74	7.03	6.20
t =		1.7	-0.3	0.49	1.84	4.06
Steel's =		78.5	104	94.5	77	60
MSD= 6.65						

Normality: Data Not Normal W = 0.88

Homogeneity: Data Homogeneous B = 0.76

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.31

Chronic Toxicity

6.25% No Chronic Toxicity

12.5% No Chronic Toxicity

25% No Chronic Toxicity

50% No Chronic Toxicity

100% Chronically Toxic

No-Observed-Effect Concentration (NOEC): 50%
 Lowest-Observed-Effect Concentration (LOEC): 100%
 7 Day EC50: 81.23%

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

Test Organisms: *Ceriodaphnia dubia*

Method: EPA/600/4-89/001

Facility: Westinghouse Savannah River Company
Sample ID: BG004

Date: 2-2-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client:WSRC										Start Date: 2-2-95				Start Time: 2:45 PM															
Log #: T3522										Sample ID: BG004				End Date: 2-11-95				End Time: 1:00 PM				IWC:							
TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH		
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new		
2	0	0	0	0	0	0	0	0	0	8.6	8.6	7.9	7.9	2	0	0	0	0	0	0	0	0	0	8.9	8.9	7.6	7.6		
3	0	0	0	0	0	0	0	0	0	8.2	8.5	7.4	8.0	3	0	0	0	0	0	0	0	0	0	8.0	8.3	7.5	7.6		
4	6	5	6	4	1	3	3	3	5	8.4	8.4	8.0	7.9	4	4	0	0	0	3	2	5	3	0	5	8.8	8.8	8.1	7.8	
5	4	9	0	0	6	5	10	0	0	8.5	8.6	8.4	8.0	5	8	4	5	5	9	7	8	0	5	8	8.4	8.6	8.6	8.2	
6	0	0	0	0	0	0	0	0	0	9.2	8.6	8.5	8.2	6	0	0	0	8	0	0	0	7	8	0	8.5	8.3	8.5	7.8	
7	10	10	13	8	0	11	10	7	9	8.2	8.7	8.1	8.1	7	11	12	12	0	9	10	9	12	13	11	8.5	8.4	7.4	7.6	
8	0	0	0	0	0	10	6	0	0	8.1	8.7	8.2	8.1	8	0	0	0	0	0	0	0	0	0	0	8.8	8.8	7.8	7.8	
9	0	0	4	L	13	0	0	14	12	8.8	8.3	8.3	8.3	9	0	11	12	12	0	0	0	0	0	0	8.8	8.8	7.8	7.8	
TOT20	24	23	12	20	29	29	24	26	23	24				TOT23	27	29	25	21	19	22	22	26	24	24					
TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH		
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new		
2	0	0	0	0	0	0	0	0	0	8.9	8.9	7.0	7.0	2	0	0	0	0	0	0	0	0	0	9.2	9.2	7.1	7.1		
3	0	0	0	0	0	0	0	0	0	8.0	8.2	7.4	7.5	3	0	0	0	0	0	0	0	0	0	8.1	8.0	7.6	7.6		
4	5	5	3	0	4	4	1	4	0	9.0	9.0	8.1	8.1	4	6	5	3	0	4	1	L	5	0	4	9.2	9.2	8.2	8.2	
5	8	5	7	6	6	8	4	0	7	8.5	8.4	8.6	8.3	5	8	9	7	6	8	7	L	0	5	7	8.8	8.7	8.6	8.4	
6	0	0	0	6	6	0	0	7	9	8.6	8.4	7.6	8.4	6	0	0	0	9	0	0	L	7	10	0	8.6	8.8	8.1	7.6	
7	17	15	16	0	9	10	11	12	11	8.9	8.6	7.9	7.9	7	10	9	11	0	0	11	L	10	0	11	8.2	8.2	8.0	8.0	
8	0	0	0	9	0	0	13	0	0	8.5	8.5	8.2	8.0	8	0	0	0	11	10	0	L	0	11	0	8.8	8.8	8.2	8.0	
9	0	0	0	0	0	0	0	0	0	8.8	8.5	8.5	8.5	9	0	0	0	0	0	0	L	0	0	0	8.5	8.4	8.4	8.4	
TOT30	25	26	21	25	22	29	23	27	25	25				TOT24	23	21	26	22	19	0	22	26	22	23					
TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH		
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new		
2	0	0	0	0	0	0	0	0	0	9.4	9.4	7.2	7.2	2	0	0	0	0	0	0	0	0	0	9.2	9.2	6.8	6.8		
3	0	0	0	0	0	0	0	0	0	8.6	8.6	7.7	7.6	3	0	0	0	0	0	0	0	0	0	8.4	8.4	7.9	7.5		
4	5	5	0	0	3	2	3	L	1	9.2	9.2	8.2	8.3	4	0	0	0	X	0	0	0	0	0	0	9.0	9.0	8.2	8.4	
5	8	4	6	8	8	5	8	L	8	8.6	8.6	8.5	8.1	5	2	3	1	X	0	2	0	0	0	0	8.8	8.7	8.5	8.5	
6	0	0	0	7	0	0	0	L	12	8.5	8.7	7.4	7.1	6	3	5	4	X	0	4	3	0	0	2	8.5	8.3	7.6	7.0	
7	12	14	9	0	10	8	11	L	0	8.2	8.2	8.1	7.9	7	0	0	0	X	3	0	0	3	0	X	8.0	8.0	8.1	7.7	
8	0	0	7	11	0	0	0	L	0	8.6	8.7	8.2	7.9	8	2	4	1	X	1	3	3	5	2	X	8.0	8.8	8.1	7.7	
9	0	0	0	0	0	0	0	L	0	8.8	8.8	8.8	8.8	9	4	X	4	X	0	5	4	1	0	X	9.2	8.2	8.2	8.2	
TOT25	23	22	26	21	15	22	0	21	26	22				TOT11	12	10	0	4	14	10	9	2	2	7					
TEM. °C					Time					TEM. °C					Time					TEM. °C					Time				
Day 0	24.4	02:45 PM	Day 2	24.3	03:20 PM	Day 4	24.0	03:10 PM	Day 6	24.3	01:30 PM	Day 1	24.0	11:45 AM	Day 3	24.2	01:00 PM	Day 5	24.0	03:00 PM	Day 7	24.2	10:15 AM						

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	2-1-95		96.04	71.05	226		
Final Eff. 1	Grab	2-1-95	07:40AM	5.88	4.06	23.5	<0.05	3.0°C
Final Eff. 2	Grab	2-3-95	07:30AM	5.88	4.06	23.0	<0.05	3.2°C
Final Eff. 3	Grab	2-6-95	09:30AM	9.8	2.03	23.2	<0.05	1.8°C

Results

Client: WSRC	Sample ID: BG004	
Log # : T3522	Start Date: 2-2-95	Time: 2:45 PM

SURVIVAL EFFECTS

	Control	Effluent				
Effluent Conc.	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	0%	0%	0%	0%
7 Day Mortality	0%	0%	0%	0%	0%	30%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
No-Observed-Effect Concentration (NOEC):		100%				
Lowest-Observed-Effect Concentration (LOEC):		>100%				
7 Day LC50:		>100%				

QUALITY CONTROL

Standard Toxicant:	NaCl
Central Tendency:	2.04 g/L
Current Value:	1.9 g/L
Deviation:	0.58 Std Dev units.

Results

Client: WSRC	Sample ID: BG004	IWC:
Log # : T3522	Start Date: 2-2-95	Time: 2:45 PM

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	24.2	23.8	25.3	22.8	22.3	7.4
Standard Deviation:	3.31	3.01	2.87	2.28	3.39	4.93
t =		0.27	-0.7	0.9	1.17	10.72
Steel's =		107	121	93.5	94.5	64.5
MSD= 3.66						

Normality: Data Not Normal W = 0.86

Homogeneity: Data Homogeneous B = 5.67

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.31

Chronic Toxicity

6.25% No Chronic Toxicity

12.5% No Chronic Toxicity

25% No Chronic Toxicity

50% No Chronic Toxicity

100% Chronically Toxic

No-Observed-Effect Concentration (NOEC): 50%
 Lowest-Observed-Effect Concentration (LOEC): 100%
 7 Day EC50: 70.71%

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

Test Organisms: *Ceriodaphnia dubia*

Method: EPA/600/4-89/001

**Facility: Westinghouse Savannah River Company
Sample ID: FHB006**

Date: 2-2-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client:WSRC	Start Date: 2-2-95	Start Time: 2:45 PM
Log #: T3521	Sample ID: FHB006	End Date: 2-11-95
		End Time: 1:30 PM
		IWC:

TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
2	0	0	0	0	0	0	0	0	0	8.2	8.6	7.4	7.9	2	0	0	0	0	0	0	0	0	0	8.3	9.1	7.5	7.5	
3	0	0	0	0	0	0	0	0	0	8.2	8.5	7.4	8.0	3	0	0	0	0	0	0	0	0	0	8.3	8.3	7.5	7.4	
4	6	5	6	4	1	3	3	3	5	8.4	8.4	8.0	7.9	4	0	5	4	6	6	5	4	0	2	5	9.2	9.2	8.0	8.3
5	4	9	0	0	6	5	10	0	0	8.5	8.6	8.4	8.0	5	0	0	6	0	8	0	0	0	5	6	8.6	8.6	8.5	8.3
6	0	0	0	0	0	0	0	0	0	9.2	8.6	8.5	8.2	6	0	5	0	0	0	6	0	4	0	0	8.4	8.4	8.3	7.9
7	10	10	13	8	0	11	10	7	9	8.2	8.7	8.1	8.1	7	0	0	10	4	7	12	0	3	6	8	8.2	8.4	7.6	7.7
8	0	0	0	0	0	10	6	0	0	8.1	8.7	8.2	8.1	8	0	0	0	8	0	0	11	3	8	0	8.1	8.6	7.8	7.7
9	0	0	4	L	13	0	0	14	12	8.8	8.3	8.3	8.3	9	13	15	0	0	0	0	10	9	0	0	8.9	8.4	8.4	8.3
TOT20	24	23	12	20	29	29	24	26	23	24				TOT13	25	20	18	21	23	25	19	21	19	20				

TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
2 0	X	0	0	0	0	0	0	0	0	8.0	9.0	7.5	7.5	2 0	0	0	0	0	0	0	0	0	0	8.2	9.1	7.6	7.5	
3 0	X	0	0	0	0	0	0	0	0	8.0	8.0	7.5	7.5	3 0	0	0	0	0	0	0	0	0	0	8.2	8.1	7.6	7.5	
4 0	X	4	5	5	4	2	0	0	5	9.3	9.2	8.1	8.4	4 4	0	6	6	4	0	6	0	0	0	8.8	8.9	8.1	8.4	
5 0	X	0	0	5	4	0	X	6	5	8.8	8.7	8.6	8.4	5 0	4	8	9	4	5	4	0	8	7	8.6	8.4	8.6	8.4	
6 0	X	0	0	0	0	0	X	0	0	8.2	8.4	8.4	8.1	6 4	0	X	0	0	X	0	7	0	0	8.2	8.5	7.7	8.3	
7 2	X	4	3	8	11	4	X	5	11	8.2	8.2	7.9	7.8	7 5	6	X	0	3	X	3	11	9	0	8.3	8.3	8.0	7.7	
8 0	X	6	16	5	0	10	X	9	0	8.9	8.7	8.0	7.8	8 8	5	X	0	7	X	10	6	13	15	9.1	8.8	8.1	7.8	
9 15	X	16	0	0	0	0	X	0	0	8.9	8.4	8.4	8.4	9 0	0	X	6	0	X	0	0	0	12	8.9	8.5	8.5	8.3	
TOT17	0	30	24	23	19	16	0	20	21	17				TOT21	15	14	21	18	5	23	24	30	34	21				

TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
2	0	0	0	0	0	0	0	0	0	8.2	9.3	7.7	7.3	2	0	0	X	0	0	0	0	0	0	8.2	9.2	7.8	7.1	
3	0	0	0	0	0	0	0	0	0	8.2	8.0	7.7	7.5	3	0	0	X	0	0	0	0	0	0	8.2	8.0	7.8	7.4	
4	4	4	4	6	6	4	6	3	4	9.2	9.2	8.2	8.3	4	1	0	X	2	3	2	0	0	0	9.4	9.3	8.5	8.6	
5	6	6	5	2	7	4	7	0	0	8.7	8.6	8.5	8.3	5	0	1	X	0	0	0	0	1	0	8.4	8.5	8.5	8.4	
6	0	0	0	0	0	0	0	3	0	8.3	8.2	7.9	7.5	6	1	X	X	1	1	1	2	0	0	1	8.6	8.2	7.7	6.9
7	10	11	9	0	6	6	2	10	3	8.6	8.5	8.0	7.3	7	0	X	X	8	5	4	X	4	0	0	8.4	8.5	7.9	6.1
8	0	0	0	12	0	0	0	0	4	9.0	8.8	8.1	7.6	8	3	X	X	X	5	0	X	0	0	2	9.0	9.0	8.3	7.6
9	0	0	0	0	0	0	6	0	10	8.9	8.4	8.4	8.4	9	4	X	X	X	0	1	X	3	3	5	9.0	8.5	8.5	8.3
TOT20	21	18	20	19	14	21	16	21	31	20				TOT 9	1	0	11	14	8	2	8	3	8	6				

TEM.°C	Time	Day 2	TEM.°C	Time	Day 4	TEM.°C	Time	Day 6	TEM.°C	Time
Day 0 24.4	02:45 PM	Day 2 24.3	03:05 PM	Day 4 24.0	02:30 PM	Day 6 24.3	11:30 AM			
Day 1 24.0	11:45 AM	Day 3 24.2	02:00 PM	Day 5 24.0	03:00 PM	Day 7 24.2	11:00 AM			

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	2-1-95		96.04	71.05	226		
Final Eff. 1	Grab	2-1-95	07:40AM	5.88	6.09	36.5	<0.05	3.0°C
Final Eff. 2	Grab	2-3-95	07:30AM	3.92	4.06	34.5	<0.05	3.2°C
Final Eff. 3	Grab	2-6-95	09:30AM	3.92	4.06	36.8	<0.05	1.8°C

Results

Client: WSRC	Sample ID: FHB006	
Log # : T3521	Start Date: 2-2-95	Time: 2:45 PM

SURVIVAL EFFECTS

	Control	Effluent				
Effluent Conc.	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	10%	0%	0%	10%
7 Day Mortality	0%	0%	20%	20%	0%	40%

Method: Fishers Exact Test

	Control	Effluent				
Acute Toxicity		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	FAIL
No-Observed-Effect Concentration (NOEC):				50%		
Lowest-Observed-Effect Concentration (LOEC):					100%	
7 Day LC50:		>100%				

QUALITY CONTROL

Standard Toxicant:	NaCl
Central Tendency:	2.04 g/L
Current Value:	1.9 g/L
Deviation:	0.58 Std Dev units.

Results

Client: WSRC	Sample ID: FHB006	IWC:
Log # : T3521	Start Date: 2-2-95	Time: 2:45 PM

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	24.2	20.4	17	20.5	20.1	6.4
Standard Deviation:	3.31	3.57	9.79	8.24	4.48	4.65
t =		1.34	2.53	1.3	1.44	6.24
Steel's =		85	84	95	82	64.5
MSD= 6.6						

Normality: Data Not Normal W = 0.85

Homogeneity: Data Not Homogeneous B = 17.3

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.31

Chronic Toxicity

6.25% No Chronic Toxicity

12.5% No Chronic Toxicity

25% No Chronic Toxicity

50% No Chronic Toxicity

100% Chronically Toxic

No-Observed-Effect Concentration (NOEC): 50%
 Lowest-Observed-Effect Concentration (LOEC): 100%
 7 Day EC50: >50%

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

Test Organisms: *Ceriodaphnia dubia*

Method: EPA/600/4-89/001

**Facility: Westinghouse Savannah River Company
Sample ID: FHB012**

Date: 2-23-95

Client:WSRC										Start Date: 2-23-95				Start Time: 3:00 PM														
Log #: T3599										Sample ID: PHB012				End Date: 3-3-95				End Time: 4:00 PM				IWC:						
TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 25%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
1	0	0	0	0	0	0	0	0	0	8.8	8.8	7.9	7.9	1	0	0	0	0	0	0	0	0	0	8.8	8.8	7.5	7.5	
2	0	0	0	0	0	0	0	0	0	8.8	8.9	7.9	7.9	2	0	0	0	0	0	0	0	0	0	8.2	8.4	7.5	7.4	
3	0	0	0	0	0	0	0	0	0	8.8	8.8	7.3	7.9	3	0	0	0	0	5	3	0	0	0	9.0	9.2	7.8	7.8	
4	L	1	0	0	X	0	1	0	5	8.0	8.0	7.9	7.9	4	5	3	0	0	4	0	6	3	0	0	9.0	9.0	8.1	8.1
5	L	0	7	0	X	0	7	0	0	8.6	8.2	7.8	8.0	5	6	4	6	0	0	8	0	0	0	0	8.5	8.5	7.6	7.6
6	L	5	7	4	X	2	10	0	9	8.4	8.4	7.2	8.2	6	1	0	0	1	0	0	9	0	0	8	8.8	8.8	6.6	7.0
7	L	8	0	0	X	10	0	8	0	8.7	8.8	7.9	7.9	7	12	13	X	0	8	0	0	0	0	11	8.0	8.0	7.2	7.4
8	L	10	8	8	X	11	0	10	11	8.4	7.6	7.6	7.6	8	0	0	X	17	9	10	0	8	6	6	8.8	7.6	7.6	7.6
TOT	0	24	22	12	0	23	18	18	25	19				TOT	24	20	6	18	21	23	18	11	6	25	17			
TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
1	0	0	0	0	0	0	0	0	0	8.9	8.9	7.4	7.4	1	0	0	0	0	0	0	0	0	0	8.7	8.7	6.4	6.4	
2	0	0	0	0	0	0	0	0	0	8.3	8.4	7.5	7.4	2	0	0	0	0	0	0	0	0	0	8.4	8.2	7.6	7.4	
3	0	0	0	0	0	4	0	0	0	8.8	8.9	7.8	7.8	3	0	X	0	X	0	0	0	0	0	8.8	8.8	8.0	8.0	
4	3	4	0	0	3	0	0	4	4	8.9	9.0	8.1	8.1	4	0	X	0	X	4	0	X	3	1	2	9.0	8.8	8.3	8.3
5	7	4	6	7	6	6	9	7	0	8.6	8.4	7.6	7.6	5	0	X	3	X	0	0	X	0	5	0	8.7	9.2	7.7	7.8
6	0	0	0	5	0	6	12	0	8	8.8	8.8	6.7	6.7	6	X	X	X	X	5	4	X	2	0	3	8.7	8.8	7.0	5.9
7	13	13	0	0	12	0	0	13	3	8.0	7.9	7.0	7.1	7	X	X	X	X	6	0	X	0	0	5	8.8	8.8	6.6	6.6
8	0	0	5	8	0	0	12	0	5	8.9	7.6	7.6	7.6	8	X	X	X	X	8	3	X							

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	2-18-95		100	60.9	184.8		
Final Eff. 1	Grab	2-22-95	09:00AM	8.0	4.06	40.2	<0.05	0.9°C
Final Eff. 2	Grab	2-24-95	08:30AM	10.0	6.12	40.1	<0.05	3.3°C
Final Eff. 3	Grab	2-27-95	08:00AM	8.0	4.08	39.9	<0.05	1.6°C

Results

Client: WSRC		Sample ID: FHB012	
Log # : T3599	Start Date: 2-23-95	Time: 3:00 PM	

SURVIVAL EFFECTS

Effluent Conc.	Control	Effluent			
	SC.DMW	25%	50%	100%	
48 hr. Mortality	0%	0%	0%	20%	
7 Day Mortality	11%	10%	0%	50%	

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent			
		25%	50%	100%	
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	
7 Day Acute Results:	PASS	PASS	PASS	FAIL	
No-Observed-Effect Concentration (NOEC): 50%					
Lowest-Observed-Effect Concentration (LOEC): 100%					
7 Day LC50: 50%					

QUALITY CONTROL

Standard Toxicant:		NaCl			
Central Tendency:	2.04	g/L			
Current Value:	1.9	g/L			
Deviation:	0.58	Std Dev units.			

Results

Client: WSRC		Sample ID: FHB012		IWC:
Log # : T3599	Start Date: 2-23-95		Time: 3:00 PM	

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent		
	SC.DMW	25%	50%	100%
Average young / female:	18.6	17.2	21.6	7.3
Standard Deviation:	8.16	7.1	5.93	8.27
t =		0.3	-0.7	0
Steel's =		102	114	68
MSD= 10.9				

Normality: Data Not Normal W = 0.86

Homogeneity: Data Homogeneous B = 0.82

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.01

Chronic Toxicity

25% No Chronic Toxicity

50% No Chronic Toxicity

100% Chronically Toxic

No-Observed-Effect Concentration (NOEC): 50%

Lowest-Observed-Effect Concentration (LOEC): 100%

7 Day EC50: >50%

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

Test Organisms: *Ceriodaphnia dubia*

Method: EPA/600/4-89/001

Facility: Westinghouse Savannah River Company
Sample ID: FHB014

Date: 1-24-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client: WSRC										Start Date: 1-24-95					Start Time: 3:15 PM				
Log #: T3498 Sample ID: FHB014										End Date: 2-2-95					End Time: 4:30 PM				

TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH			
Day	A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day	A	B	C	D	E	F	G	H	I	J	old	new	old	new	
2	0	0	0	0	0	0	0	0	0	0	8.4	8.4	7.9	7.9	2	0	0	0	0	0	0	0	0	0	0	8.7	8.7	7.1	7.1	
3	L	4	L	5	4	1	4	5	0	0	8.3	8.7	7.3	8.0	3	0	5	4	4	4	0	4	4	0	0	8.6	8.7	7.1	7.4	
4	L	0	L	0	0	0	0	0	0	0	8.0	8.4	7.2	8.0	4	4	0	0	0	0	0	0	0	0	0	8.8	8.5	6.7	7.1	
5	L	0	L	5	3	6	4	0	0	6	8.6	8.7	7.6	7.9	5	10	9	8	7	1	6	6	2	L	0	8.2	8.6	7.0	7.1	
6	L	0	L	0	10	5	2	0	0	0	9.0	8.8	7.0	7.9	6	1	2	12	8	2	11	13	0	L	9	8.9	8.9	7.5	7.0	
7	L	4	L	9	2	0	6	0	3	4	8.6	8.8	7.8	7.9	7	0	0	0	0	3	7	0	0	L	2	8.6	8.6	7.6	7.8	
8	L	7	L	0	0	10	4	0	10	0	9.0	9.1	7.4	7.9	8	0	0	0	0	0	0	0	0	L	0	8.1	8.4	6.1	6.1	
9	L	0	L	0	0	0	0	0	16	8	8.5	8.5	7.6	7.6	9	10	4	0	0	10	0	0	X	L	12	8.5	8.5	6.6	6.6	
TOT	0	15	0	19	19	22	20	5	29	18	18				TOT	25	20	24	19	20	24	23	6	0	23	20				

TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH		
Day	A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day	A	B	C	D	E	F	G	H	I	J	old	new	old	new
2	0	0	0	0	0	0	0	0	0	0	8.6	8.6	7.9	7.9	2	0	0	0	0	0	0	0	0	0	L	8.4	8.4	8.0	8.0
3	0	6	4	4	4	5	6	5	0	0	8.8	8.8	7.5	7.6	3	0	5	3	4	4	2	5	0	0	X	8.7	8.8	7.7	7.6
4	0	0	0	0	0	0	0	0	X	0	8.9	8.8	7.0	7.2	4	6	0	0	0	7	0	8	0	X	X	8.9	8.6	7.2	7.2
5	3	7	8	3	7	4	0	0	X	3	8.4	8.8	7.1	7.2	5	10	10	8	0	0	8	0	6	X	X	8.4	8.7	7.3	7.2
6	8	8	13	11	11	0	11	0	X	10	8.9	9.0	7.5	7.9	6	0	9	0	10	12	13	14	13	X	X	9.0	8.9	7.6	7.9
7	1	0	0	0	0	0	7	0	X	0	9.2	9.2	7.8	7.8	7	7	0	0	0	0	0	0	0	X	X	9.2	9.2	7.8	7.9
8	0	0	0	0	0	0	0	0	X	0	8.6	8.6	6.3	6.3	8	0	0	8	0	0	0	0	6	X	X	8.6	8.6	6.4	6.4
9	10	0	0	0	0	11	0	15	X	11	8.6	8.6	7.4	7.4	9	0	0	0	8	0	0	0	0	X	X	8.8	8.8	7.6	7.6
TOT22	21	25	18	22	20	24	20	0	24	20					TOT23	24	19	22	23	23	27	25	0	0		19			

TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH			
Day	A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day	A	B	C	D	E	F	G	H	I	J	old	new	old	new	
2	0	0	0	0	0	0	0	0	0	0	8.4	8.4	8.1	8.1	2	0	0	0	0	0	0	0	0	0	0	8.5	8.5	8.4	8.4	
3	0	4	0	5	4	5	0	3	0	0	8.8	8.8	7.7	7.5	3	0	4	3	4	3	3	4	3	3	0	8.7	8.7	7.7	7.7	
4	6	1	0	0	6	0	5	0	0	3	8.9	8.7	7.3	7.2	4	4	0	0	0	0	0	0	0	0	0	8.3	9.1	7.7	6.9	
5	2	7	9	0	0	5	0	8	X	7	8.6	8.6	7.3	7.1	5	4	5	5	5	4	5	7	6	4	2	8.4	8.6	7.4	6.3	
6	8	12	17	8	14	12	14	10	X	8	8.9	9.0	7.7	8.0	6	4	6	0	6	0	0	0	5	4	5	9.0	9.0	7.8	8.2	
7	0	0	0	0	0	0	0	0	X	0	8.9	8.9	7.8	7.8	7	X	0	0	0	0	0	0	0	0	0	9.1	9.0	8.1	8.1	
8	13	0	4	2	0	0	14	0	X	0	8.5	8.4	6.5	6.5	8	X	0	3	3	0	6	0	0	0	4	8.6	8.8	6.8	6.8	
9	0	0	0	2	0	0	0	0	X	0	8.9	8.9	7.7	7.7	9	X	0	6	2	5	7	6	0	3	6	8.8	8.8	8.0	8.0	
TOT	29	24	30	17	24	22	33	21	0	18	22				TOT	12	15	17	20	12	21	17	14	14	17	16				

TEM. °C		Time		TEM. °C		Time		TEM. °C		Time		TEM. °C		Time	
Day 0	25.0	03:15 PM		Day 2	25.5	03:45 PM		Day 4	25.3	04:20 PM		Day 6	25.1	02:15 PM	
Day 1	24.4	03:30 PM		Day 3	25.0	04:30 PM		Day 5	25.5	01:55 PM		Day 7	24.3	05:00 PM	

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	1-24-95		96.0	75.1	223		
Final Eff. 1	Grab	1-23-95	09:50AM	4.0	4.06	31.8	<0.05	2.0°C
Final Eff. 2	Grab	1-25-95	09:45AM	8.0	4.06	33.1	<0.05	2.3°C
Final Eff. 3	Grab	1-27-95	09:30AM	6.0	6.09	32.1	<0.05	2.3°C

Results

Client: WSRC		Sample ID: FHB014		
Log # : T3498	Start Date: 1-24-95		Time: 3:15 PM	

SURVIVAL EFFECTS

Effluent Conc.	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	10%	20%	0%	0%
7 Day Mortality	0%	11%	10%	20%	10%	10%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
No-Observed-Effect Concentration (NOEC):		100%				
Lowest-Observed-Effect Concentration (LOEC):		>100%				
9 Day LC50:		>100%				

QUALITY CONTROL

Standard Toxicant:		NaCl		
Central Tendency:	2.04	g/L		
Current Value:	1.9	g/L		
Deviation:	0.58	Std Dev units.		

Results

Client: WSRC		Sample ID: FHB014		IWC:	
Log # : T3498	Start Date: 1-24-95		Time: 3:15 PM		

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	18.4	20.4	19.6	18.6	21.8	15.9
Standard Deviation:	6.76	5.81	7.21	10	9.24	3.07
t =		-0.6	-0.3	-0.06	-1	0.70
Steel's =		125	128	126	129	98
MSD= 8.18						

Normality: Data Not Normal W = 0.75

Homogeneity: Data Homogeneous B = 11.8

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.31

Chronic Toxicity

6.25% No Chronic Toxicity

12.5% No Chronic Toxicity

25% No Chronic Toxicity

50% No Chronic Toxicity

100% No Chronic Toxicity

No-Observed-Effect Concentration (NOEC): 100%

Lowest-Observed-Effect Concentration (LOEC): >100%

7 Day EC50: >100%

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

Test Organisms: Ceriodaphnia dubia

Method: EPA/600/4-89/001

Facility: Westinghouse Savannah River Company
Sample ID: FHB018

Date: 2-23-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client: WSRC											Start Date: 2-23-95				Start Time: 3:00 PM			
Log #: T3600 Sample ID: FHB018											End Date: 3-3-95				End Time: 4:00 PM		IWC:	

TEST CONCENTRATION: 0%											D.O	D.O	pH	pH
Day A	B	C	D	E	F	G	H	I	J		old	new	old	new
1	0	0	0	0	0	0	0	0	0		8.8	8.8	7.9	7.9
2	0	0	0	0	0	0	0	0	0		8.8	8.8	7.3	7.9
3	0	0	0	0	0	0	0	0	0		8.8	8.8	7.3	7.9
4	L	1	0	0	X	0	1	0	5	6	8.0	8.0	7.9	7.9
5	L	0	7	0	X	0	7	0	0	3	8.6	8.2	7.8	8.0
6	L	5	7	4	X	2	10	0	9	8	8.4	8.4	7.2	8.2
7	L	8	0	0	X	10	0	8	0	0	8.7	8.8	7.9	7.9
8	L	10	8	8	X	11	0	10	11	8	8.4		7.6	
TOT	0	24	22	12	0	23	18	18	25	25	19			

TEST CONCENTRATION: 6.25%											D.O	D.O	pH	pH
Day A	B	C	D	E	F	G	H	I	J		old	new	old	new
1	0	0	0	0	0	0	0	0	0		8.6	8.6		7.1
2	0	0	0	0	0	0	0	0	0		8.2	8.2	6.8	6.9
3	0	0	0	0	0	0	0	0	0		8.8	8.9	7.7	7.8
4	3	0	4	3	1	8	4	0	0	0	8.9	9.0	7.7	7.8
5	0	0	0	6	0	0	8	8	7	0	8.9	8.3	6.9	6.9
6	0	0	0	5	0	14	9	12	10	X	8.8	8.8	7.4	7.5
7	10	0	6	0	7	0	0	0	0	X	8.8	8.6	6.9	7.2
8	7	L	8	8	2	0	0	9	10	X	8.9		7.6	
TOT	20	0	18	22	10	26	21	29	27	0	19			

TEST CONCENTRATION 12.5%											D.O	D.O	pH	pH
Day A	B	C	D	E	F	G	H	I	J		old	new	old	new
1	0	0	0	0	0	0	0	0	0		8.6			7.1
2	0	0	0	0	0	0	0	0	0		8.1	8.0	7.0	7.0
3	0	0	0	0	4	0	0	0	0		8.8	8.8	7.9	7.9
4	0	2	0	0	2	0	0	5	0	0	8.8	8.7	7.9	7.9
5	6	0	0	0	6	8	6	0	0	1	8.2	8.2	7.0	7.1
6	2	0	6	3	0	X	X	0	0	0	8.6	8.6	7.4	7.3
7	0	0	0	0	7	X	X	0	0	0	9.0	8.8	7.3	7.4
8	8	12	10	13	0	X	X	10	X	15	8.6		7.4	
TOT	16	14	16	16	15	12	6	15	0	16	13			

TEST CONCENTRATION 25%											D.O	D.O	pH	pH
Day A	B	C	D	E	F	G	H	I	J		old	new	old	new
1	0	0	0	0	0	0	0	0	0		8.6			7.0
2	0	0	0	0	0	0	0	0	0		8.1	8.0	7.2	7.0
3	0	0	0	1	0	0	0	0	3	3	8.7	8.8	7.9	8.0
4	0	0	0	0	0	0	1	2	2	0	8.6	8.9	8.0	8.0
5	4	2	0	3	4	4	3	0	4	3	8.2	8.1	7.2	7.2
6	2	8	3	0	6	7	0	6	6	6	8.8	9.0	7.5	7.4
7	0	0	5	0	0	0	4	0	0	0	8.6	8.6	7.1	7.0
8	10	10	9	7	7	7	6	6	3	7	8.6		7.2	
TOT	16	20	17	11	17	18	14	14	18	19	16			

TEST CONCENTRATION 50%											D.O	D.O	pH	pH
Day A	B	C	D	E	F	G	H	I	J		old	new	old	new
1	0	0	0	X	0	0	X	0	0	0	8.7			6.7
2	X	0	0	X	0	0	X	0	0	0	8.1	8.1	7.1	6.8
3	X	X	0	X	0	0	X	0	0	0	8.8	8.9	8.0	7.9
4	X	X	0	X	0	0	X	0	0	0	8.8	8.9	8.1	8.1
5	X	X	0	X	0	0	X	0	0	0	8.4	8.3	7.3	7.2
6	X	X	0	X	1	1	X	1	2	2	9.1	9.0	7.4	7.2
7	X	X	0	X	0	0	X	0	0	0	8.8	8.7	6.7	7.0
8	X	X	8	X	4	0	X	3	2	0	8.6		7.1	
TOT	0	0	8	0	5	1	0	4	4	2	2			

TEST CONCENTRATION 100%											D.O	D.O	pH	pH
Day A	B	C	D	E	F	G	H	I	J		old	new	old	new
1	X	X	X	0	0	X	X	0	X	X		8.7		6.4
2	X	X	X	X	X	X	X	X	X	X	8.2		7.0	
3	X	X	X	X	X	X	X	X	X	X				
4	X	X	X	X	X	X	X	X	X	X				
5	X	X	X	X	X	X	X	X	X	X				
6	X	X	X	X	X	X	X	X	X	X				
7	X	X	X	X	X	X	X	X	X	X				
8	X	X	X	X	X	X	X	X	X	X				
TOT	0	0	0	0	0	0	0	0	0	0	0			

TEM. °C		Time		TEM. °C		Time		TEM. °C		Time		TEM. °C		Time	
Day 0	25.0	03:00	PM	Day 2	25.6	03:45	PM	Day 4	25.2	02:00	PM	Day 6	26.0	03:15	PM
Day 1	24.6	01:00	PM	Day 3	25.9	01:00	PM	Day 5	25.9	02:00	PM	Day 7	25.5	02:00	PM

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	2-18-95		100	60.9	184.8		
Final Eff. 1	Grab	2-22-95	09:40AM	10.0	46.7	112.3	<0.05	0.9°C
Final Eff. 2	Grab	2-24-95	08:40AM	14.0	32.6	81.7	<0.05	3.3°C
Final Eff. 3	Grab	2-27-95	08:40AM	10.0	20.4	56.9	<0.05	1.6°C

Results

Client: WSRC		Sample ID: FHB018	
Log # : T3600	Start Date: 2-23-95	Time: 3:00 PM	

SURVIVAL EFFECTS

	Control	Effluent				
Effluent Conc.	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	0%	0%	30%	100%
7 Day Mortality	11%	11%	30%	0%	40%	100%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	FAIL
7 Day Acute Results:	PASS	PASS	PASS	PASS	FAIL	FAIL
No-Observed-Effect Concentration (NOEC):		25%				
Lowest-Observed-Effect Concentration (LOEC):		50%				
7 Day LC50:		53.59%				

QUALITY CONTROL

Standard Toxicant: NaCl	
Central Tendency:	2.04 g/L
Current Value:	1.9 g/L
Deviation:	0.58 Std Dev units.

Results

Client: WSRC	Sample ID: FHB018	IWC:
Log # : T3600	Start Date: 2-23-95	Time: 3:00 PM

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	18.6	19.2	12.6	16.4	2.4	NA
Standard Deviation:	8.16	9.15	5.4	2.72	2.76	NA
t =		-0.2	2.13	0.77	5.77	NA
Steel's =		109	81.5	90	71	65
MSD= 6.29						

Normality: Data Not Normal W = 0.87

Homogeneity: Data Not Homogeneous B = 19

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.23

Chronic Toxicity

6.25% No Chronic Toxicity

12.5% No Chronic Toxicity

25% No Chronic Toxicity

50% Chronically Toxic

100% Chronically Toxic

No-Observed-Effect Concentration (NOEC): 25%

Lowest-Observed-Effect Concentration (LOEC): 50%

7 Day EC50: 24.16%

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

Test Organisms: *Ceriodaphnia dubia*

Method: EPA/600/4-89/001

Facility: Westinghouse Savannah River Company

Sample ID: FHB020

Date: 1-24-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client: WSRC

Start Date: 1-24-95

Start Time: 3:00 PM

Log #: T3497

Sample ID: FHB020

End Date: 2-2-95

End Time: 4:30 PM

TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH			
Day	A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day	A	B	C	D	E	F	G	H	I	J	old	new	old	new	
2	0	0	0	0	0	0	0	0	0	0	8.4	8.4	7.9	7.9	2	0	0	0	0	0	0	0	0	0	0	8.8	8.8	7.0	7.8	
3	L	4	L	5	4	1	4	5	0	0	8.3	8.7	7.3	8.0	3	0	6	5	5	5	0	4	4	X	4	8.8	8.8	7.0	7.2	
4	L	0	L	0	0	0	0	0	0	0	8.0	8.4	7.2	8.0	4	5	0	0	0	0	0	0	0	X	0	8.7	8.6	7.0	6.8	
5	L	0	L	5	3	6	4	0	0	6	8.6	8.7	7.6	7.9	5	8	9	11	9	5	8	5	8	X	2	8.0	8.4	6.8	6.9	
6	L	0	L	0	10	5	2	0	0	0	9.0	8.8	7.0	7.9	6	0	9	8	13	6	5	10	6	X	10	8.9	8.9	7.0	7.5	
7	L	4	L	9	2	0	6	0	3	4	8.6	8.8	7.8	7.9	7	0	0	0	0	5	0	4	1	X	2	9.1	9.1	7.5	7.6	
8	L	7	L	0	0	10	4	0	10	0	9.0	9.1	7.4	7.9	8	0	0	0	0	0	0	0	0	X	0	8.2	8.4	6.3	6.4	
9	L	0	L	0	0	0	0	0	16	8	8.5	7.6	7.6	7.6	9	8	0	0	0	0	4	0	0	X	0	8.9	7.6	7.6	7.6	
TOT	0	15	0	19	19	22	20	5	29	18	18				TOT	21	24	24	27	21	17	23	19	0	18	19				

TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH			
Day	A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day	A	B	C	D	E	F	G	H	I	J	old	new	old	new	
2	0	0	0	0	0	0	0	0	0	0	8.7	8.7	8.0	8.0	2	0	0	0	0	0	0	0	0	0	L	8.6	8.6	8.0	8.0	
3	0	6	4	0	4	4	4	4	0	0	8.8	8.9	7.2	7.5	3	4	4	5	3	5	3	4	4	X	L	8.8	8.8	7.5	7.6	
4	4	0	0	0	1	0	0	0	2	0	8.8	8.9	6.8	6.5	4	1	0	0	0	4	0	0	0	X	L	8.8	9.0	7.2	6.5	
5	4	8	8	L	7	8	7	7	0	8	8.3	8.5	7.6	7.5	5	9	8	7	0	0	7	9	0	X	L	8.1	8.4	7.5	7.3	
6	0	8	9	L	2	3	9	12	0	3	8.9	8.8	7.2	7.6	6	14	12	11	2	8	12	9	0	X	L	8.7	8.8	7.2	7.7	
7	3	0	0	L	0	0	4	2	3	0	9.6	9.1	7.6	7.7	7	0	0	0	0	2	5	0	1	X	L	9.0	9.2	7.6	7.8	
8	8	0	0	L	0	0	0	0	0	0	8.4	8.4	6.4	6.5	8	0	0	0	0	0	0	0	0	X	L	8.5	8.5	6.5	6.6	
9	0	0	0	L	15	14	0	0	21	17	8.9	7.7	7.7	7.7	9	0	0	0	14	0	0	0	8	X	L	8.9	7.8	7.8	7.8	
TOT	19	22	21	0	29	29	24	25	26	28	25				TOT	28	24	23	19	19	27	22	13	0	0	19				

TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH			
Day	A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day	A	B	C	D	E	F	G	H	I	J	old	new	old	new	
2	0	0	0	0	0	0	0	0	0	0	8.6	8.6	8.1	8.1	2	0	0	0	0	0	0	0	X	0	X	8.6	8.6	8.3	8.3	
3	0	0	0	1	3	0	2	3	0	0	8.7	8.9	7.6	7.6	3	0	X	0	0	0	0	0	X	X	X	9.0	8.9	7.7	8.0	
4	4	0	0	0	0	0	0	0	0	0	9.2	9.1	7.3	6.5	4	0	X	X	0	0	X	0	X	X	X	9.0	9.4	7.1	6.8	
5	6	5	7	4	10	7	0	0	0	4	8.2	8.3	7.4	7.1	5	0	X	X	X	X	X	X	X	X	X	8.3	8.4	7.1	6.8	
6	12	11	14	8	13	13	0	6	4	0	8.7	8.8	7.3	7.8	6	X	X	X	X	X	X	X	X	X	X	8.6	8.7	7.5	8.0	
7	0	0	0	0	0	0	0	0	0	9	9.1	9.2	7.7	7.8	7	X	X	X	X	X	X	X	X	X	X	9.2	9.2	7.9	7.9	
8	0	0	0	0	0	0	0	0	0	0	8.5	8.6	6.7	6.7	8	X	X	X	X	X	X	X	X	X	X	8.6	6.9	6.9	6.9	
9	0	6	12	10	0	3	16	13	23	6	8.8	7.8	7.8	7.8	9	X	X	X	X	X	X	X	X	X	X	8.6	6.9	6.9	6.9	
TOT	22	33	23	26	23	18	22	27	19	24					TOT	0	0	0	0	0	0	0	0	0	0	0				

TEM. °C	Time	TEM. °C	Time	TEM. °C	Time	TEM. °C	Time
Day 0	25.0 03:00 PM	Day 2	25.5 04:00 PM	Day 4	25.3 02:50 PM	Day 6	25.1 01:40 PM
Day 1	24.4 03:45 PM	Day 3	25.0 04:00 PM	Day 5	25.5 01:30 PM	Day 7	24.3 03:00 PM

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	1-24-95		96.0	75.1	223		
Final Eff. 1	Grab	1-23-95	09:50AM	6.0	4.06	25.4	<0.05	2.0°C
Final Eff. 2	Grab	1-25-95	09:40AM	18.0	12.18	42.0	<0.05	2.3°C
Final Eff. 3	Grab	1-27-95	09:20AM	10.0	8.12	30.9	<0.05	2.3°C

Results

Client: WSRC	Sample ID: FHB020	
Log # : T3497	Start Date: 1-24-95	Time: 3:00 PM

SURVIVAL EFFECTS

	Control	Effluent				
Effluent Conc.	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	10%	0%	11%	0%	60%
7 Day Mortality	0%	10%	0%	11%	0%	100%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	FAIL
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	FAIL
No-Observed-Effect Concentration (NOEC): 50%						
Lowest-Observed-Effect Concentration (LOEC): 100%						
9 Day LC50: 56.71%						

QUALITY CONTROL

Standard Toxicant:	NaCl		
Central Tendency:	2.04	g/L	
Current Value:	1.9	g/L	
Deviation:	0.58	Std Dev units.	

Results

Client: WSRC		Sample ID: FHB020	IWC:
Log # : T3497	Start Date: 1-24-95	Time: 3:00 PM	

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	18.4	19.4	24.8	19.4	23.5	0
Standard Deviation:	6.76	7.47	3.6	8.59	4.3	0.00
t =		-0.3	-2.1	-0.3	-1.7	0.00
Steel's =		55	55	105	86	55
MSD= 6.86						

Normality: Data Not Normal W = 0.88

Homogeneity: Data Homogeneous B = 7.8

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.23

Chronic Toxicity

6.25% No Chronic Toxicity

12.5% No Chronic Toxicity

25% No Chronic Toxicity

50% No Chronic Toxicity

100% Chronically Toxic

No-Observed-Effect Concentration (NOEC): 50%
 Lowest-Observed-Effect Concentration (LOEC): 100%
 7 Day EC50: 56.71%

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

Test Organisms: *Ceriodaphnia dubia*

Method: EPA/600/4-89/001

Facility: Westinghouse Savannah River Company
Sample ID: FHB021

Date: 2-23-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client:WSRC										Start Date: 2-23-95				Start Time: 5:30 PM																	
Log #: T3601										Sample ID: FHB021				End Date: 3-3-95				End Time: 3:30 PM				IWC:									
TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH				
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new				
1	0	0	0	0	0	0	0	0	0	8.8	8.8	7.9	7.9	1	0	0	0	0	0	0	0	X	0	8.2	8.2	7.1	7.1				
2	0	0	0	0	0	0	0	0	0	8.8	8.9	7.9	7.9	2	0	0	0	0	0	0	0	X	0	8.2	8.1	7.1	7.3				
3	0	0	0	0	0	0	0	0	0	8.8	8.8	7.3	7.9	3	0	0	0	0	0	0	0	X	0	9.6	8.9	7.8	7.8				
4	L	1	0	0	X	0	1	0	5	6	8.0	8.0	7.9	7.9	4	3	0	0	0	0	0	0	X	4	8.8	8.5	7.6	7.7			
5	L	0	7	0	X	0	7	0	0	3	8.6	8.2	7.8	8.0	5	0	0	4	7	5	4	3	4	X	8	8.2	8.4	6.5	6.8		
6	L	5	7	4	X	2	10	0	9	8	8.4	8.4	7.2	8.2	6	7	4	0	0	0	6	7	6	X	0	8.4	8.6	6.9	6.9		
7	L	8	0	0	X	10	0	8	0	0	8.7	8.8	7.9	7.9	7	6	0	8	4	6	8	3	0	X	4	8.8	8.6	7.0	7.1		
8	L	10	8	8	X	11	0	10	11	8	8.4	7.6	7.6	8	0	11	12	9	11	0	8	6	X	10	8.8	7.2	7.2	7.2			
TOT	0	24	22	12	0	23	18	18	25	25	19			TOT	16	15	24	20	22	18	21	16	0	26	18						
TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH				
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new				
1	0	0	0	0	0	0	0	0	0	8.1	8.1	7.3	7.3	1	0	0	0	0	0	0	0	0	0	8.0	8.0	7.2	7.2				
2	0	0	0	0	0	0	0	0	0	8.2	8.2	7.3	7.3	2	0	0	0	0	0	0	0	0	0	8.3	8.4	7.4	7.4				
3	0	0	0	0	0	0	0	0	4	0	8.9	8.8	7.9	7.9	3	0	0	0	0	0	0	0	3	3	9.0	8.9	8.0	8.0			
4	3	0	0	0	0	0	0	0	6	4	8.8	8.8	7.9	7.9	4	4	0	0	4	4	4	0	5	8	6	8.9	8.9	8.0	8.0		
5	8	4	6	6	5	6	4	3	0	3	8.0	8.0	7.0	6.9	5	7	4	0	6	4	0	9	0	8	5	8.1	8.0	6.9	7.0		
6	0	6	0	0	8	0	7	6	0	0	9.0	8.6	7.5	7.5	6	0	6	4	0	0	7	1	3	0	5	8.8	8.6	7.6	7.5		
7	7	0	8	7	5	5	6	0	6	0	8.9	8.8	7.3	7.3	7	7	0	0	4	7	1	0	8	0	0	9.0	9.0	7.4	7.4		
8	0	10	8	12	0	8	0	6	0	10	8.8	7.7	7.7	8	0	10	10	8	8	2	10	0	0	0	9.0	7.7	7.7	7.7			
TOT	18	20	22	25	18	19	17	15	16	17	19			TOT	18	20	14	22	23	14	20	16	19	19	19						
TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH				
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new				
1	0	0	0	0	0	0	0	0	0	8.1	8.1	7.3	7.3	1	0	0	0	0	0	0	0	0	0	8.0	8.0	7.4	7.4				
2	0	0	0	0	0	0	0	0	0	8.2	8.2	7.0	7.0	2	0	0	0	0	0	0	0	0	0	8.4	8.4	7.3	7.1				
3	0	0	0	0	0	0	0	0	4	0	9.0	9.0	8.0	8.0	3	0	0	0	3	0	0	0	4	0	9.0	9.0	8.2	8.2			
4	5	0	0	4	2	4	4	4	7	5	8.9	8.9	8.0	8.1	4	0	0	4	4	X	3	2	1	8	3	8.9	8.2	8.3	7.2		
5	7	5	3	7	6	4	6	0	8	L	8.2	8.1	6.4	6.9	5	3	0	3	0	X	0	6	0	8	0	8.3	8.6	7.2	6.8		
6	0	6	0	0	0	4	0	6	0	L	9.0	8.4	7.5	7.4	6	5	5	0	3	X	1	0	2	0	0	8.6	9.0	6.8	6.7		
7	4	0	0	8	8	8	0	7	0	L	9.0	9.2	7.5	7.4	7	0	0	2	0	X	3	0	2	4	5	8.8	9.4	7.4	7.4		
8	10	11	11	0	0	0	8	0	0	L	9.0	7.7	7.7	8	0	6	0	X	X	0	6	0	0	6	8.7	7.5	7.5	7.5			
TOT	26	22	14	19	16	20	18	17	19	5	19			TOT	8	11	9	7	3	7	14	5	24	14	10						
TEM. °C				Time				TEM. °C				Time				TEM. °C				Time				TEM. °C				Time			
Day 0				25.0 05:30 PM				Day 2				25.6 03:00 PM				Day 4				25.2 04:00 PM				Day 6				26.0 03:30 PM			
Day 1				24.6 03:15 PM				Day 3				25.9 11:40 AM				Day 5				25.9 03:00 PM				Day 7				25.5 03:15 PM			

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	2-18-95		100	60.9	184.8		
Final Eff. 1	Grab	2-22-95	09:40AM	8.0	2.03	43.6	<0.05	0.9°C
Final Eff. 2	Grab	2-24-95	08:40AM	4.0	6.12	43.4	<0.05	3.3°C
Final Eff. 3	Grab	2-27-95	08:40AM	8.0	4.08	44.1	<0.05	1.6°C

Results

Client: WSRC	Sample ID: FHB021	
Log # : T3601	Start Date: 2-23-95	Time: 5:30 PM

SURVIVAL EFFECTS

	Control	Effluent				
Effluent Conc.	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	10%	0%	0%	0%	0%
7 Day Mortality	11%	10%	0%	0%	0%	20%

Method: Fishers Exact Test

	Control	Effluent				
Acute Toxicity		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
No-Observed-Effect Concentration (NOEC):					100%	
Lowest-Observed-Effect Concentration (LOEC):					>100%	
7 Day LC50:					>100%	

QUALITY CONTROL

Standard Toxicant:	NaCl	
Central Tendency:	2.04	g/L
Current Value:	1.9	g/L
Deviation:	0.58	Std Dev units.

Results

Client: WSRC	Sample ID: FHB021	IWC:
Log # : T3601	Start Date: 2-23-95	Time: 5:30 PM

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	18.6	17.8	18.7	18.5	19	10.2
Standard Deviation:	8.16	7.22	2.98	3.06	3.5	6.01
t =		0.3	-0.06	0.02	-0.2	3.29
Steel's =		102	99.5	100	99.5	70
MSD= 5.9						

Normality: Data Not Normal W = 0.83

Homogeneity: Data Not Homogeneous B = 15.8

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.31

Chronic Toxicity

6.25% No Chronic Toxicity

12.5% No Chronic Toxicity

25% No Chronic Toxicity

50% No Chronic Toxicity

100% Chronically Toxic

No-Observed-Effect Concentration (NOEC): 50%
 Lowest-Observed-Effect Concentration (LOEC): 100%
 7 Day EC50: 89.09%

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

Test Organisms: *Ceriodaphnia dubia*

Method: EPA/600/4-89/001

**Facility: Westinghouse Savannah River Company
Sample ID: FHB022**

Date: 2-2-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client:WSRC										Start Date: 2-2-95										Start Time: 2:30 PM																													
Log #: T3520										Sample ID: FHB022										End Date: 2-11-95										End Time: 1:30 PM										IWC:									
TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH																						
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new																						
2 0	0	0	0	0	0	0	0	0	0	8.6	8.6	7.9	7.9	2 0	0	0	0	0	0	0	0	0	0	9.2	9.2	7.6	7.6																						
3 0	0	0	0	0	0	0	0	0	0	8.2	8.5	7.4	8.0	3 0	0	0	0	0	0	0	0	0	0	8.3	8.2	7.6	7.7																						
4 6	5	6	4	1	3	3	3	5	5	8.4	8.4	8.0	7.9	4 0	0	0	5	0	5	0	0	0	0	9.0	9.0	7.9	8.3																						
5 4	9	0	0	6	5	10	0	0	0	8.5	8.6	8.4	8.0	5 0	0	0	0	0	0	0	0	0	0	8.6	8.6	8.2	8.0																						
6 0	0	0	0	0	0	0	0	0	7	9.2	8.6	8.5	8.2	6 0	6	0	0	0	0	0	3	0	0	8.7	8.6	8.4	8.0																						
7 10	10	13	8	0	11	10	7	9	11	8.2	8.7	8.1	8.1	7 3	0	0	1	0	1	0	0	0	0	8.6	8.4	8.2	8.0																						
8 0	0	0	0	0	10	6	0	0	0	8.1	8.7	8.2	8.1	8 0	0	0	1	0	0	0	0	0	0	8.9	8.7	8.2	7.8																						
9 0	0	4	L	13	0	0	14	12	0	8.8	8.3	8.3	8.3	9 12	15	16	10	14	13	8	15	10	11	9.0	8.7	7.7	7.7																						
TOT20	24	23	12	20	29	29	24	26	23	24				TOT15	21	16	17	14	19	8	18	10	11	15																									
TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH																						
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new																						
2 0	0	0	0	0	0	0	0	0	0	9.0	9.0	7.6	7.6	2 0	0	0	0	0	0	0	0	0	0	9.0	9.0	7.7	7.7																						
3 0	0	0	0	0	0	0	0	0	0	8.1	8.0	7.6	7.7	3 0	0	0	0	0	0	0	0	0	0	8.2	8.2	7.6	7.7																						
4 0	4	4	6	0	5	0	3	0	5	8.9	9.2	8.0	8.3	4 0	5	3	0	4	5	4	0	4	1	9.1	9.2	8.1	8.3																						
5 0	0	0	7	4	0	0	0	0	6	8.7	8.6	8.3	8.2	5 0	0	0	2	7	0	6	0	0	1	8.6	8.6	8.3	8.3																						
6 1	0	6	0	X	5	0	4	3	0	8.5	8.5	8.1	7.4	6 0	0	0	0	0	4	0	5	5	0	8.4	8.5	8.3	7.5																						
7 0	0	6	8	X	6	3	0	4	10	8.7	8.7	8.2	8.1	7 6	2	8	1	3	9	5	5	7	7	8.7	8.7	8.2	8.0																						
8 0	7	9	2	X	2	6	0	8	10	8.7	8.7	8.4	8.0	8 12	8	7	7	8	5	11	0	14	9	8.6	8.7	8.4	8.0																						
9 12	10	0	0	X	0	8	10	6	0	8.9	8.1	8.1	8.1	9 0	0	0	X	0	0	0	9	0	0	8.8	8.2	8.2	8.2																						
TOT13	21	25	23	4	18	17	17	21	31	19				TOT18	15	18	10	22	23	26	19	30	18	20																									
TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH																						
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new																						
2 0	0	0	0	0	0	0	0	0	0	9.1	9.1	7.7	7.7	2 0	0	0	0	0	0	0	0	0	0	9.2	9.2	7.7	7.7																						
3 0	0	0	0	0	0	0	0	0	0	8.2	8.0	7.7	7.7	3 0	0	0	0	0	0	0	0	0	0	8.2	8.2	7.8	7.8																						
4 0	0	5	4	5	5	3	0	4	5	9.2	9.1	8.1	8.3	4 0	3	4	5	0	4	5	0	2	0	8.8	9.2	8.2	8.5																						
5 0	0	2	0	6	0	5	0	2	7	8.6	8.6	8.2	8.3	5 0	0	0	0	0	0	0	1	3	0	9.0	9.0	8.2	8.3																						
6 0	X	0	0	0	5	0	2	0	0	8.5	8.6	8.3	7.7	6 0	0	0	0	0	0	0	0	0	0	8.6	8.6	8.0	7.5																						
7 11	X	4	6	3	7	5	4	8	6	8.8	8.8	8.2	7.9	7 0	2	10	0	5	2	7	1	1	5	8.2	8.6	8.2	7.7																						
8 7	X	3	1	6	6	15	11	9	5	8.6	8.7	8.3	7.9	8 10	0	4	0	9	8	13	8	8	2	8.4	8.5	8.1	7.4																						
9 0	X	6	14	0	0	0	0	0	0	8.8	8.2	8.2	8.2	9 0	0	0	0	2	0	0	4	2	9	8.8	8.3	8.3	8.3																						
TOT18	0	20	25	20	23	28	17	23	23	20				TOT10	5	18	5	16	14	25	14	16	16	14																									
TEM. °C Time										TEM. °C Time										TEM. °C Time										TEM. °C Time																			
Day 0	24.4	02:30 PM	Day 2	24.3	02:30 PM	Day 4	24.0	02:00 PM	Day 6	24.3	10:45 AM	Day 1	24.0	11:20 AM	Day 3	24.2	01:30 PM	Day 5	24.0	02:30 PM	Day 7	24.2	10:30 AM																										

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	2-1-95		96.04	71.05	226		
Final Eff. 1	Grab	2-1-95	07:30AM	9.8	6.09	55.3	<0.05	3.0°C
Final Eff. 2	Grab	2-3-95	07:20AM	11.8	8.12	52.9	0.08	3.2°C
Final Eff. 3	Grab	2-6-95	09:00AM	13.7	8.12	47.7	<0.05	1.8°C

Results

Client: WSRC	Sample ID: FHB022	
Log # : T3520	Start Date: 2-2-95	Time: 2:30 PM

SURVIVAL EFFECTS

Effluent Conc.	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	0%	0%	0%	0%
7 Day Mortality	0%	0%	10%	10%	10%	0%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
No-Observed-Effect Concentration (NOEC):				100%		
Lowest-Observed-Effect Concentration (LOEC):				>100%		
7 Day LC50:				>100%		

QUALITY CONTROL

Standard Toxicant: NaCl

Central Tendency: 2.04 g/L
 Current Value: 1.9 g/L
 Deviation: 0.58 Std Dev units.

Results

Client: WSRC		Sample ID: FHB022		IWC:
Log # : T3520	Start Date: 2-2-95		Time: 2:30 PM	

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	24.2	14.9	19	19.9	19.7	13.9
Standard Deviation:	3.31	4.18	7.26	5.65	7.66	6.03
t =		3.42	1.92	1.59	1.66	3.79
Steel's =		67	87	85.5	88.5	71
MSD= 6.29						

Normality: Data Not Normal W = 0.86

Homogeneity: Data Homogeneous B = 7.57

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.31

Chronic Toxicity

6.25% Chronically Toxic **

12.5% No Chronic Toxicity

25% No Chronic Toxicity

50% No Chronic Toxicity

100% Chronically Toxic

No-Observed-Effect Concentration (NOEC): 50%
 Lowest-Observed-Effect Concentration (LOEC): 100%
 7 Day EC50: >50%

** 6.25% concentration mean production is regarded as an outlier

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

Test Organisms: *Ceriodaphnia dubia*

Method: EPA/600/4-89/001

Facility: Westinghouse Savannah River Company

Sample ID: FHB023

Date: 1-24-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client:WSRC										Start Date: 1-24-95										Start Time: 2:30 PM																			
Log #: T3495										Sample ID: FHB023										End Date: 2-2-95										End Time: 9:30 AM									
TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH												
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new												
2	0	0	0	0	0	0	0	0	0	8.4	8.4	7.9	7.9	1	0	0	0	0	0	0	0	0	0	8.9	8.9	7.8	7.8												
3	0	2	2	3	X	0	0	0	0	8.3	8.7	7.3	8.0	2	0	0	0	0	0	0	0	0	0	8.4	8.8	7.0	7.5												
4	4	0	0	1	X	0	0	0	0	8.0	8.4	7.2	8.0	3	0	4	6	4	0	0	0	0	0	8.3	8.4	7.0	7.2												
5	0	0	0	0	X	0	1	1	0	8.6	8.7	7.6	7.9	4	6	0	0	0	5	3	3	4	1	6	8.2	8.4	7.6	7.5											
6	3	0	0	6	X	0	0	0	0	9.0	8.8	7.0	7.9	5	9	8	7	6	3	6	9	8	7	9	8.8	9.0	7.4	7.8											
7	4	0	0	0	X	6	8	10	0	8.6	8.8	7.8	7.9	6	0	0	4	0	0	0	0	0	0	8.8	8.7	7.2	7.3												
8	12	0	6	10	X	7	11	13	6	9.0	9.1	7.4	7.9	7	0	4	0	3	0	1	3	7	6	0	8.4	8.4	6.8	6.9											
9	0	0	10	0	X	13	0	0	8	8.5	8.5	7.6	7.6	8	8	3	8	6	8	11	7	0	4	6	9.0	8.5	7.8	7.8											
TOT23	2	18	20	0	26	20	24	14	6	15				TOT23	19	25	19	16	21	22	19	18	21	20															
TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH												
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new												
1	0	0	0	0	0	0	0	0	0	8.9	8.9	7.9	7.9	2	0	0	0	0	0	0	0	0	0	8.8	8.8	8.0	8.0												
2	0	0	0	0	0	0	0	0	0	8.8	8.8	7.8	7.8	3	0	4	5	6	0	0	0	0	0	8.5	8.7	7.5	7.5												
3	0	4	5	6	0	0	0	0	0	8.8	8.4	7.2	7.3	4	4	0	0	0	5	8	4	5	5	5	8.6	8.7	7.3	7.3											
4	6	0	0	0	4	4	3	6	4	8.4	8.6	7.5	7.6	5	0	0	7	4	3	11	9	13	10	10	8.6	8.6	7.6	7.5											
5	10	7	11	9	4	12	10	12	9	8.6	8.9	7.4	8.0	6	0	10	1	2	0	0	3	15	9	0	9.0	9.0	7.8	8.3											
6	0	11	0	1	0	0	11	0	14	8.9	9.0	7.3	7.8	7	0	1	0	0	0	3	0	0	3	0	9.2	9.2	7.4	7.8											
7	3	2	0	1	0	1	0	0	0	9.0	8.6	6.8	6.9	8	8	9	0	0	8	5	9	0	0	8	8.7	8.6	6.9	7.0											
8	7	0	9	7	6	7	0	6	0	8.6	8.6	7.9	7.9	9	8	0	0	7	0	0	0	0	0	9.4	8.5	7.9	7.9												
TOT26	24	25	24	14	24	24	24	27	17	23				TOT20	24	13	19	16	27	25	33	27	23	23															
TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH												
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new												
2	0	0	0	0	0	0	0	0	0	8.7	8.7	7.9	8.0	0	0	0	0	0	0	0	0	0	0	8.7	8.7	8.3	8.3												
3	0	4	5	5	0	0	0	0	0	8.4	8.7	7.9	7.5	1	0	0	0	0	0	0	0	0	0	8.4	8.4	7.7	7.6												
4	0	8	3	4	0	6	5	5	X	8.3	8.9	7.4	7.3	2	0	0	0	0	0	0	0	0	0	8.9	8.4	7.6	7.1												
5	1	0	0	0	0	6	11	11	X	8.7	8.6	7.5	7.4	3	0	0	0	0	0	0	0	0	0	8.4	8.4	7.6	6.7												
6	0	19	1	0	1	0	0	8	X	8.8	8.9	7.6	8.0	4	X	X	X	X	X	X	X	X	X	X	8.9		8.1												
7	0	0	0	0	0	4	0	0	X	9.0	9.0	7.5	7.8	5	X	X	X	X	X	X	X	X	X	X															
8	0	0	8	0	0	8	8	0	X	8.5	8.4	7.0	7.0	6	X	X	X	X	X	X	X	X	X	X															
9	18	0	0	17	15	0	0	0	X	9.3	9.3	7.9	7.9	7	X	X	X	X	X	X	X	X	X	X															
TOT19	31	17	26	16	24	24	24	0	21	20				TOT	0	0	0	0	0	0	0	0	0	0	0														
TEM. °C				Time				TEM. °C				Time				TEM. °C				Time				TEM. °C				Time											
Day 0	25.0			02:30	PM			Day 2	25.5			02:20	PM			Day 4	25.3			03:50	PM			Day 6	25.1			11:20	AM										
Day 1	24.4			03:55	PM			Day 3	25.0			01:45	PM			Day 5	25.5			12:20	PM			Day 7	24.3			04:15	PM										

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	1-24-95		96.0	75.1	223		
Final Eff. 1	Grab	1-23-95	09:30AM	14.0	4.06	33.2	<0.05	2.0°C
Final Eff. 2	Grab	1-25-95	09:30AM	16.0	2.03	31.1	0.08	2.3°C
Final Eff. 3	Grab	1-27-95	09:00AM	12.0	4.06	28.2	<0.05	2.3°C

Results

Client: WSRC		Sample ID: FHB023		
Log # : T3495	Start Date: 1-24-95		Time:	2:30 PM

SURVIVAL EFFECTS

	Control	Effluent				
Effluent Conc.	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	10%	0%	0%	0%	10%	0%
7 Day Mortality	10%	0%	0%	0%	10%	100%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	FAIL
No-Observed-Effect Concentration (NOEC):		50%				
Lowest-Observed-Effect Concentration (LOEC):		100%				
7 Day LC50:		65.98%				

QUALITY CONTROL

Standard Toxicant: NaCl

Central Tendency:	2.04	g/L
Current Value:	1.9	g/L
Deviation:	0.58	Std Dev units.

Results

Client: WSRC		Sample ID: FHB023		IWC:
Log # : T3495	Start Date: 1-24-95		Time: 2:30 PM	

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	15.3	20.3	22.9	22.7	20.2	0
Standard Deviation:	9.43	2.63	4.09	5.87	8.38	0.00
t =		-1.7	-2.6	-2.5	-1.7	0.00
Steel's =		116	134	128	121	60
MSD= 6.57						

Normality: Data Normal W = 0.93

Homogeneity: Data Not Homogeneous B = 15.7

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.23

Chronic Toxicity

6.25% No Chronic Toxicity

12.5% No Chronic Toxicity

25% No Chronic Toxicity

50% No Chronic Toxicity

100% Chronically Toxic

No-Observed-Effect Concentration (NOEC): 50%
 Lowest-Observed-Effect Concentration (LOEC): 100%
 7 Day EC50: 65.98%

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

Test Organisms: Ceriodaphnia dubia

Method: EPA/600/4-89/001

Facility: Westinghouse Savannah River Company

Sample ID: HSP064

Date: 1-24-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client:WSRC										Start Date: 1-24-95										Start Time: 3:30 PM																			
Log #: T3499										Sample ID: HSP064										End Date: 2-2-95										End Time: 5:00 PM									
TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH												
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new												
2	0	0	0	0	0	0	0	0	0	8.4	8.4	7.9	7.9	2	0	0	0	0	0	0	0	0	0	8.1	8.1	7.9	7.9												
3	0	0	3	4	4	0	3	0	4	2	8.3	8.7	7.3	8.0	3	2	5	4	5	0	0	0	0	0	8.8	8.9	7.3	7.8											
4	3	3	0	0	0	4	0	2	0	0	8.0	8.4	7.2	8.0	4	0	0	0	0	0	0	0	0	0	8.4	8.4	6.7	7.2											
5	0	2	4	0	3	2	3	4	3	3	8.6	8.7	7.6	7.9	5	8	10	9	8	0	0	0	1	0	8.2	8.4	6.7	6.9											
6	0	0	0	0	0	0	0	0	0	0	9.0	8.8	7.0	7.9	6	0	2	2	1	2	0	0	0	1	8.6	8.7	6.7	7.0											
7	0	0	0	0	0	0	0	0	X	8.6	8.8	7.8	7.9	7	0	0	0	0	0	0	0	0	0	9.2	9.2	7.6	7.6												
8	13	0	0	0	0	16	0	0	X	9.0	9.1	7.4	7.9	8	8	6	6	8	7	6	9	7	6	8	8.2	8.4	6.0	6.1											
9	8	10	9	12	13	0	8	4	11	X	8.5	7.6	7.6	9	0	0	0	0	15	24	21	13	8	9	9.2	7.9	7.9	7.9											
TOT24	15	16	16	20	22	14	10	18	5	16				TOT18	23	21	22	24	30	30	20	15	18	22															
TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH												
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new												
2	0	0	0	0	0	0	0	0	0	8.5	8.5	8.0	8.0	2	0	0	0	0	0	0	0	0	0	8.4	8.4	8.0	8.0												
3	0	6	5	4	4	0	0	0	0	8.8	8.8	7.9	7.9	3	2	1	6	0	4	3	0	0	X	8.8	8.9	7.7	7.8												
4	0	0	0	0	0	0	0	L	L	L	8.6	8.6	7.1	7.3	4	0	X	0	0	0	0	0	X	8.5	8.6	7.2	7.4												
5	3	7	8	6	8	1	0	L	L	L	8.5	8.4	7.1	7.2	5	0	X	0	6	4	0	0	0	X	8.7	8.6	7.3	7.3											
6	1	2	5	4	3	0	0	L	L	L	8.8	8.7	6.9	7.2	6	0	X	0	0	3	11	1	10	5	X	8.8	8.8	7.0	7.4										
7	0	0	0	0	0	0	0	L	L	L	9.2	9.2	7.7	7.7	7	0	X	0	0	0	0	0	0	X	9.2	9.2	7.8	7.8											
8	7	8	0	6	8	7	9	L	L	L	8.8	8.8	6.2	6.3	8	0	X	8	7	7	9	X	0	8	X	9.0	9.0	5.9	5.9										
9	9	0	0	0	0	14	13	L	L	L	9.2	8.0	8.0	9	12	X	9	3	0	0	X	10	13	X	9.2	8.0	8.0	8.0											
TOT20	23	18	20	23	22	22	0	0	0	21				TOT14	1	23	16	18	23	1	20	26	0	14															
TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH												
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new												
2	0	0	0	0	0	0	0	0	0	8.4	8.4	8.1	8.1	2	0	0	0	0	0	0	0	0	0	8.4	8.4	8.3	8.3												
3	2	2	2	0	2	2	0	X	X	0	8.8	8.6	7.8	7.8	3	0	2	2	3	2	X	0	0	0	0	8.9	8.8	7.9	7.4										
4	0	0	0	0	0	0	0	X	X	0	8.5	8.8	7.3	7.4	4	0	0	0	0	0	X	0	0	0	0	8.5	8.9	7.6	7.6										
5	4	2	4	7	8	0	0	X	X	2	8.5	8.5	7.3	7.3	5	6	5	1	2	2	X	0	0	0	1	8.4	8.4	7.4	7.1										
6	2	0	0	3	6	10	0	X	X	7	8.7	8.8	7.1	7.5	6	0	2	7	4	0	X	0	0	X	X	8.9	9.0	7.2	7.6										
7	0	0	0	0	0	0	0	X	X	0	9.2	9.1	7.8	7.8	7	0	X	0	X	0	X	0	0	X	X	9.1	9.2	8.0	7.9										
8	6	10	0	0	0	0	15	X	X	0	9.0	8.6	5.6	5.7	8	0	X	5	X	X	X	0	X	X	X	8.4	8.6	6.6	6.3										
9	0	0	13	10	0	10	2	X	X	9	9.2	8.0	8.0	9	0	X	0	X	X	X	0	X	X	X	9.0	8.1	8.1	8.1											
TOT14	14	19	20	16	22	17	0	0	18	14				TOT 6	9	15	9	4	0	0	0	0	1	4															
TEM.°C Time										TEM.°C Time										TEM.°C Time										TEM.°C Time									
Day 0	25.0	03:30 PM			Day 2	25.5	01:45 PM			Day 4	25.3	02:30 PM			Day 6	25.1	04:00 PM			Day 0	25.0	03:30 PM			Day 2	25.5	01:45 PM			Day 4	25.3	02:30 PM			Day 6	25.1	04:00 PM		
Day 1	24.4	04:45 PM			Day 3	25.0	03:05 PM			Day 5	25.5	02:15 PM			Day 7	24.3	05:00 PM			Day 1	24.4	04:45 PM			Day 3	25.0	03:05 PM			Day 5	25.5	02:15 PM			Day 7	24.3	05:00 PM		

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	1-24-95		96.0	75.1	223		
Final Eff. 1	Grab	1-23-95	10:20AM	6.0	4.06	24.7	<0.05	2.0°C
Final Eff. 2	Grab	1-25-95	10:00AM	14.0	28.4	28.1	<0.05	2.3°C
Final Eff. 3	Grab	1-27-95	09:40AM	6.0	4.06	26.7	<0.05	2.3°C

Results

Client: WSRC		Sample ID: HSP064	
Log # : T3499	Start Date: 1-24-95	Time: 3:30 PM	

SURVIVAL EFFECTS

Effluent Conc.	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	0%	20%	20%	10%
7 Day Mortality	10%	0%	0%	30%	20%	70%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	FAIL
No-Observed-Effect Concentration (NOEC):		50%				
Lowest-Observed-Effect Concentration (LOEC):		100%				
9 Day LC50:		61.56%				

QUALITY CONTROL

Standard Toxicant:		NaCl	
Central Tendency:	2.04	g/L	
Current Value:	1.9	g/L	
Deviation:	0.58	Std Dev units.	

Results

Client: WSRC		Sample ID: HSP064		IWC:
Log # : T3499	Start Date: 1-24-95	Time: 3:30 PM		

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	16	22.1	21.1	14.2	14	4.4
Standard Deviation:	5.6	4.93	1.86	9.98	7.79	5.23
t =		-1.8	-1.4	0.53	0.59	0.00
Steel's =		134	112	105	101	61.5
MSD= 7.74						

Normality: Data Not Normal W = 0.81

Homogeneity: Data Not Homogeneous B = 15.2

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.23

Chronic Toxicity

6.25% No Chronic Toxicity

12.5% No Chronic Toxicity

25% No Chronic Toxicity

50% No Chronic Toxicity

100% Chronically Toxic

No-Observed-Effect Concentration (NOEC): 50%

Lowest-Observed-Effect Concentration (LOEC): 100%

7 Day EC50: 61.56%

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P.O. Box 16414, Greenville, SC 29606 • 6C Craftsman Court, Greer, SC 29650

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

Test Organisms: *Ceriodaphnia dubia*

Method: EPA/600/4-89/001

Facility: Westinghouse Savannah River Company
Sample ID: FMC002H

Date: 1-24-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client:WSRC										Start Date: 1-24-95										Start Time: 2:45 PM																			
Log #: T3496										Sample ID: FMC002H										End Date: 2-2-95										End Time: 9:45 AM									
TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH												
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new												
2	0	0	0	0	0	0	0	0	0	8.4	8.4	7.9	7.9	2	0	0	0	0	0	0	0	0	0	8.4	8.4	7.9	7.9												
3	0	2	2	3	X	0	0	0	0	8.3	8.7	7.3	8.0	3	0	4	4	0	0	5	5	3	0	0	8.8	8.9	7.3	7.8											
4	4	0	0	1	X	0	0	0	0	8.0	8.4	7.2	8.0	4	6	0	0	0	4	0	0	0	4	1	8.4	8.4	6.7	7.2											
5	0	0	0	0	X	0	1	1	0	8.6	8.7	7.6	7.9	5	5	7	8	2	0	6	6	5	1	2	8.2	8.4	6.7	6.9											
6	3	0	0	6	X	0	0	0	0	9.0	8.8	7.0	7.9	6	0	0	0	0	0	3	3	3	0	0	8.6	8.7	6.7	7.0											
7	4	0	0	0	X	6	8	10	0	8.6	8.8	7.8	7.9	7	2	0	1	0	0	0	0	0	3	1	9.2	9.2	7.6	7.6											
8	12	0	6	10	X	7	11	13	6	9.0	9.1	7.4	7.9	8	5	0	1	0	3	0	0	0	0	0	8.2	8.4	6.0	6.1											
9	0	0	10	0	X	13	0	0	8	8.5	8.5	7.6	7.6	9	0	9	13	13	8	5	9	10	1	12	9.2	8.4	7.9	7.9											
TOT23	2	18	20	0	26	20	24	14	6	15				TOT18	20	27	15	15	19	23	21	9	16	18															
TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH												
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new												
2	0	0	0	0	0	0	0	0	0	8.5	8.5	8.0	8.0	2	0	0	0	0	0	0	0	0	0	8.4	8.4	8.0	8.0												
3	0	4	5	5	0	0	0	0	0	8.8	8.8	7.9	7.9	3	0	6	0	4	0	0	0	0	0	8.8	8.9	7.7	7.8												
4	3	0	0	0	4	6	7	5	4	8.6	8.6	7.1	7.3	4	4	1	3	0	0	4	4	6	4	5	8.5	8.6	7.2	7.4											
5	9	8	0	3	7	0	7	7	1	8.5	8.4	7.1	7.2	5	10	X	7	9	4	5	8	10	4	6	8.7	8.6	7.3	7.3											
6	1	0	3	0	0	0	0	0	0	8.8	8.7	6.9	7.2	6	0	X	2	8	0	0	0	0	0	0	8.8	8.8	7.0	7.4											
7	8	1	0	1	0	6	8	7	0	9.2	9.2	7.7	7.7	7	3	X	0	0	0	0	1	0	0	1	9.2	9.2	7.8	7.8											
8	0	0	0	1	3	5	6	7	6	8.8	8.8	6.2	6.3	8	5	X	3	0	6	5	7	2	3	6	9.0	9.0	5.9	5.9											
9	0	8	10	15	5	0	0	0	10	9.2	8.0	8.0	8.0	9	0	X	12	0	9	6	0	11	7	0	9.2	8.0	8.0	8.0											
TOT21	21	18	25	19	17	28	26	21	24	22				TOT22	7	27	21	19	20	20	29	18	18	20															
TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH												
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new												
2	0	0	0	0	0	0	0	0	0	8.4	8.4	8.1	8.1	2	0	0	0	0	0	0	0	0	0	8.4	8.4	8.3	8.3												
3	0	4	5	5	0	0	0	0	0	8.8	8.6	7.8	7.8	3	0	4	2	0	0	0	0	0	0	8.9	8.8	7.9	7.4												
4	6	0	0	0	0	4	4	4	3	8.5	8.8	7.3	7.4	4	3	0	0	0	4	3	2	5	3	0	8.5	8.9	7.6	7.6											
5	8	8	5	7	7	6	6	9	9	8.5	8.5	7.3	7.3	5	8	8	7	7	6	7	8	6	6	0	8.4	8.4	7.4	7.1											
6	0	6	4	5	2	0	0	0	9	8.7	8.8	7.1	7.5	6	0	5	3	6	1	0	0	0	6	0	8.9	9.0	7.2	7.6											
7	0	0	0	0	0	0	0	0	0	9.2	9.1	7.8	7.8	7	0	0	0	0	0	8	0	4	0	0	9.1	9.2	8.0	7.9											
8	4	0	0	0	1	4	13	8	0	9.0	8.6	5.6	5.7	8	0	0	0	0	0	0	0	0	13	6	8.4	8.6	6.6	6.3											
9	4	0	11	0	7	1	0	0	0	9.2	8.0	8.0	8.0	9	10	11	13	7	16	0	12	7	0	8	9.0	8.1	8.1	8.1											
TOT22	18	25	17	17	15	23	21	21	14	19				TOT21	28	25	20	27	18	22	22	28	14	23															
TEM. °C		Time		TEM. °C		Time		TEM. °C		Time		TEM. °C		Time		TEM. °C		Time																					
Day 0	25.0	02:45 PM		Day 2	25.5	03:15 PM		Day 4	25.3	03:25 PM		Day 6	25.1	11:45 AM																									
Day 1	24.4	04:20 PM		Day 3	25.0	02:15 PM		Day 5	25.5	01:00 PM		Day 7	24.3	04:30 PM																									

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	1-24-95		96.0	75.1	223		
Final Eff. 1	Grab	1-23-95	09:40AM	8.0	8.12	44.3	<0.05	2.0°C
Final Eff. 2	Grab	1-25-95	09:40AM	18.0	8.12	50.4	<0.05	2.3°C
Final Eff. 3	Grab	1-27-95	09:10AM	10.0	6.09	50.7	<0.05	2.3°C

Results

Client: WSRC		Sample ID: FMC002H		
Log # : T3496	Start Date: 1-24-95		Time:	2:45 PM

SURVIVAL EFFECTS

Effluent Conc.	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	10%	0%	0%	0%	0%	0%
7 Day Mortality	10%	0%	0%	10%	0%	0%

Method: Fishers Exact Test

Acute Toxicity

	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS

No-Observed-Effect Concentration (NOEC): 100%
 Lowest-Observed-Effect Concentration (LOEC): >100%
 7 Day LC50: >100%

QUALITY CONTROL

Standard Toxicant: NaCl

Central Tendency: 2.04 g/L
 Current Value: 1.9 g/L
 Deviation: 0.58 Std Dev units.

Results

Client: WSRC		Sample ID: FMC002H		IWC:
Log # : T3496	Start Date: 1-24-95		Time: 2:45 PM	

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	15.3	18.3	22	20.1	19.3	22.5
Standard Deviation:	9.43	4.97	3.62	5.9	3.62	4.58
t =		-1.2	-2.6	-1.9	-1.6	-2.82
Steel's =		110	127	118	113	129
MSD= 5.9						

Normality: Data Not Normal W = 0.85

Homogeneity: Data Homogeneous B = 12.7

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.31

Chronic Toxicity

6.25% No Chronic Toxicity

12.5% No Chronic Toxicity

25% No Chronic Toxicity

50% No Chronic Toxicity

100% No Chronic Toxicity

No-Observed-Effect Concentration (NOEC): 100%
 Lowest-Observed-Effect Concentration (LOEC): >100%
 7 Day EC50: >100%

APPENDIX B

WATER TOXICITY RESULTS, AUGUST-SEPTEMBER 1995

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P.O. Box 16414, Greenville, SC 29606 • 4 Craftsman Court, Greer, SC 29650

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

Test Organisms: *Ceriodaphnia dubia*

Method: EPA/600/4-89/001

**Facility: Westinghouse Savannah River Company
Sample ID: BG 001 Effluent**

Date: 8-17-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client: WSRC											Start Date: 8-17-95				Start Time: 3:40 PM			
Log #: T4390 Sample ID: BG001											End Date: 8-24-95				End Time: 4:15 PM IWC:			

TEST CONCENTRATION: 0%											D.O.	D.O.	pH	pH	TEST CONCENTRATION: 6.25%											D.O.	D.O.	pH	pH	
Day	A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day	A	B	C	D	E	F	G	H	I	J	old	new	old	new	
0	0	0	0	0	0	0	0	0	0	0	8.8	8.9	7.9	7.9	0	0	0	0	0	0	0	0	0	0	0	8.1	8.1	7.5	7.5	
1	0	0	0	0	0	0	0	0	0	0	8.4	8.6	7.9	7.9	1	0	0	0	0	0	0	0	0	0	0	8.3	8.4	7.3	7.3	
2	0	0	0	0	0	0	0	0	0	0	8.5	8.5	8.2	8.0	2	0	0	0	0	0	0	0	0	0	0	8.7	8.8	8.1	8.2	
3	0	0	0	0	0	0	0	4	0	0	8.2	8.7	7.7	8.0	3	0	0	0	0	0	0	0	0	0	0	8.4	8.4	7.8	7.7	
4	4	3	2	3	3	2	4	0	4	3	9.2	8.7	7.7	8.0	4	4	6	6	0	0	0	4	5	3	4	9.7	9.8	7.5	7.5	
5	0	0	0	7	0	6	7	8	0	7	8.1	8.8	7.6	8.2	5	0	0	0	5	5	4	9	0	7	6	9.4	9.6	7.7	7.6	
6	9	7	9	9	6	9	0	0	6	0	10	9.3	8.0	8.3	6	7	7	6	7	6	0	0	8	0	0	10	10	7.8	7.5	
7	7	7	8	0	10	0	10	10	10	11	9.2	8.0	8.0	8.0	7	9	11	9	9	8	11	8	10	10	10	9.2	7.5	7.5	7.5	
TOT20	17	19	19	19	17	21	22	20	21	20					TOT20	24	21	21	19	15	21	23	20	20	20					

TEST CONCENTRATION 12.5%											D.O.	D.O.	pH	pH	TEST CONCENTRATION 25%											D.O.	D.O.	pH	pH	
Day	A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day	A	B	C	D	E	F	G	H	I	J	old	new	old	new	
0	0	0	0	0	0	0	0	0	0	0	8.1	8.1	7.3	7.3	0	0	0	0	0	0	0	0	0	0	0	8.0	8.0	7.4	7.4	
1	0	0	0	0	0	0	0	0	0	0	8.5	8.4	7.5	7.4	1	0	0	0	0	0	0	0	0	0	0	8.4	8.4	7.6	7.4	
2	0	0	0	0	0	0	0	0	0	0	8.8	8.8	8.0	8.2	2	0	0	X	0	0	0	0	0	0	0	8.7	8.8	8.0	8.1	
3	0	0	0	0	0	0	0	4	0	0	8.4	8.5	7.8	7.8	3	0	0	X	0	0	0	0	0	0	0	8.4	8.5	7.8	7.8	
4	3	3	4	0	0	0	4	0	4	3	9.9	10	7.5	7.7	4	3	3	X	2	0	0	0	0	2	4	9.8	10	7.6	7.6	
5	0	0	7	4	5	3	6	7	0	7	9.6	9.6	7.8	7.6	5	7	0	X	6	6	4	6	8	7	8	9.5	9.5	7.8	7.4	
6	8	8	0	6	6	3	0	0	6	0	10	10	7.8	7.4	6	0	6	X	7	6	6	0	0	0	0	10	10	7.6	7.2	
7	6	9	11	10	0	6	12	10	7	10	9.4	7.5	7.5	7.5	7	14	10	X	9	11	8	9	13	9	7	9.4	7.5	7.5	7.5	
TOT17	20	22	20	11	12	22	21	17	20	18					TOT24	19	0	24	23	18	15	21	18	19	18					

TEST CONCENTRATION 50%											D.O.	D.O.	pH	pH	TEST CONCENTRATION 100%											D.O.	D.O.	pH	pH	
Day	A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day	A	B	C	D	E	F	G	H	I	J	old	new	old	new	
0	0	0	0	0	0	0	0	0	0	0	8.1	8.1	6.9	6.9	0	X	X	X	X	X	X	X	X	X	X	8.0	8.0	5.5	5.5	
1	0	0	0	0	0	0	0	0	0	0	8.4	8.4	7.6	7.0	1	X	X	X	X	X	X	X	X	X	X	8.4	7.3	7.3	7.3	
2	0	0	0	0	0	0	0	0	0	0	8.8	8.9	8.0	8.1	2	X	X	X	X	X	X	X	X	X	X					
3	0	0	0	0	0	0	0	3	0	0	8.6	8.5	7.8	7.8	3	X	X	X	X	X	X	X	X	X	X					
4	4	3	3	0	2	0	3	0	4	4	9.9	10	7.7	7.4	4	X	X	X	X	X	X	X	X	X	X					
5	0	0	0	3	5	0	7	4	4	7	9.5	9.6	7.7	7.1	5	X	X	X	X	X	X	X	X	X	X					
6	8	7	6	8	7	3	0	0	X	0	10	10	7.6	7.0	6	X	X	X	X	X	X	X	X	X	X					
7	10	9	8	10	0	7	9	13	X	10	9.3	7.6	7.6	7.6	7	X	X	X	X	X	X	X	X	X	X					
TOT22	19	17	21	14	10	19	20	8	21	17					TOT	0	0	0	0	0	0	0	0	0	0	0				

TEM. °C	Time	TEM. °C	Time	TEM. °C	Time	TEM. °C	Time
Day 0 24.3	03:40 PM	Day 2 24.3	03:45 PM	Day 4 24.0	12:00 PM	Day 6 24.0	11:30 AM
Day 1 24.3	03:30 PM	Day 3 24.0	12:27 PM	Day 5 24.0	01:30 PM	Day 7 24.0	04:15 PM

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	8-16-95		84.0	66.9	220		
Final Eff. 1	Comp	8-16-95	7:10AM	6.0	2.03	10	<0.05	0.8°C
Final Eff. 2	Comp	8-18-95	8:50AM	8.0	2.04	11.5	<0.05	0.4°C
Final Eff. 3	Comp	8-21-95	7:30AM	10.0	<0.1	13.5	<0.05	0.7°C

Results

Client: WSRC		Sample ID: BG001		
Log # : T4390	Start Date: 8-17-95		Time: 3:40 PM	

SURVIVAL EFFECTS

Effluent Conc.	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	0%	10%	0%	100%
7 Day Mortality	0%	0%	0%	10%	10%	100%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	FAIL
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	FAIL
No-Observed-Effect Concentration (NOEC):		50%				
Lowest-Observed-Effect Concentration (LOEC):		100%				
7 Day LC50:		61.56%				

QUALITY CONTROL

Standard Toxicant:		NaCl		
Central Tendency:	1.98	g/L		
Current Value:	1.91	g/L		
Deviation:	0.29	Std Dev units.		

Results

Client: WSRC		Sample ID: BG001		IWC:
Log # : T4390	Start Date: 8-17-95		Time: 3:40 PM	

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	19.5	20.4	18.2	18.1	17.1	0
Standard Deviation:	1.65	2.41	3.94	7	4.86	0.00
t =		-0.5	0.66	0.71	1.22	0.00
Steel's =		121	102	104	94.5	55
MSD= 4.39						

Normality: Data Not Normal W = 0.86

Homogeneity: Data Not Homogeneous B = 19.4

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.23

Chronic Toxicity

6.25% No Chronic Toxicity

12.5% No Chronic Toxicity

25% No Chronic Toxicity

50% No Chronic Toxicity

100% Chronically Toxic

No-Observed-Effect Concentration (NOEC): 50%
 Lowest-Observed-Effect Concentration (LOEC): 100%
 7 Day EC50: 61.56%

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

Test Organisms: *Ceriodaphnia dubia*

Method: EPA/600/4-89/001

Facility: Westinghouse Savannah River Corporation
Sample ID: BG 002 Effluent

Date: 8-17-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client:WSRC										Start Date: 8-17-95										Start Time: 4:00 PM									
Log #: T4391										Sample ID: BG002										End Date: 8-24-95									
																				End Time: 5:00 PM									
																				IWC:									

TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
0	0	0	0	0	0	0	0	0	0	8.8	9.1	7.9	7.9	0	0	0	0	0	0	0	0	0	0	8.0	8.1	7.4	7.3	
1	0	0	0	0	0	0	0	0	0	8.8	8.9	7.9	7.9	1	0	0	0	0	0	0	0	0	0	8.0	8.2	7.4	7.4	
2	0	0	0	0	0	0	0	0	0	8.4	8.6	7.9	7.9	2	0	0	0	0	0	0	0	0	0	8.6	8.6	8.0	8.0	
3	0	0	0	0	0	0	0	2	0	8.5	8.5	8.2	8.0	3	0	0	0	0	0	0	2	0	0	8.6	8.6	7.9	7.6	
4	3	3	3	2	3	2	4	3	4	9.2	8.7	7.7	8.0	4	0	0	0	0	0	0	0	0	0	9.8	9.7	7.7	6.9	
5	6	3	2	2	0	6	0	7	8	8.1	8.8	7.6	8.2	5	5	4	3	4	1	4	5	5	4	4	9.6	9.5	7.5	7.2
6	9	6	8	4	5	0	6	0	0	10	9.3	8.0	8.3	6	7	0	0	0	10	0	0	0	0	0	10	10	7.5	7.4
7	0	9	7	11	10	9	9	10	9	9.2	8.0	8.0	8.0	7	5	7	7	10	3	7	9	7	8	7	9.3	7.3	7.3	7.3
TOT18	21	20	19	18	17	19	22	21	17	19				TOT17	11	10	14	14	11	14	14	12	11	13				

TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
0	0	0	0	0	0	0	0	0	0	8.1	8.1	7.1	7.1	0	0	0	0	0	0	0	0	0	0	8.1	8.1	7.2	7.2	
1	0	0	0	0	0	0	0	0	0	8.2	8.4	7.5	7.2	1	0	0	0	0	0	0	0	0	0	8.0	8.0	7.5	7.2	
2	0	0	0	0	0	0	0	0	0	8.8	8.8	8.0	8.1	2	0	0	0	0	0	0	0	0	0	8.7	8.8	8.0	8.1	
3	0	0	0	0	0	0	0	0	0	8.6	8.6	7.9	7.6	3	0	0	0	0	0	0	0	0	0	8.4	8.5	7.9	7.5	
4	0	0	0	1	1	0	0	0	0	9.8	9.8	7.6	7.1	4	0	0	0	2	0	1	1	4	0	9.8	9.7	7.5	6.9	
5	2	4	3	4	0	2	3	0	0	9.4	9.6	7.7	7.4	5	6	3	2	2	0	3	2	5	4	0	9.5	9.5	7.7	7.3
6	0	6	0	0	3	0	0	6	3	10	10	7.7	7.5	6	0	5	0	0	4	0	0	0	5	10	10	7.8	7.5	
7	5	0	7	9	5	6	5	5	7	9.4	7.5	7.5	7.5	7	3	0	4	4	0	5	5	7	8	7	9.4	7.3	7.3	7.3
TOT 7	10	10	14	9	8	8	11	10	8	10				TOT 9	8	6	6	6	8	8	13	16	12	9				

TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new
0	0	0	0	0	0	0	0	0	0	8.1	8.1	6.8	6.8	0	X	X	X	X	X	X	X	X	X	8.1	8.1	5.0	5.0
1	0	0	0	0	0	0	0	0	0	8.4	8.4	7.6	7.0	1	X	X	X	X	X	X	X	X	X	8.0	8.0	6.4	6.4
2	0	0	0	0	0	0	0	0	0	8.6	8.6	7.9	8.0	2	X	X	X	X	X	X	X	X	X	8.0	8.0	6.4	6.4
3	0	0	0	0	0	0	0	0	0	8.4	8.4	7.8	7.1	3	X	X	X	X	X	X	X	X	X	8.0	8.0	6.4	6.4
4	0	0	0	0	2	0	1	1	4	10	10	7.1	6.5	4	X	X	X	X	X	X	X	X	X	8.0	8.0	6.4	6.4
5	4	3	3	2	0	2	5	6	5	9.3	9.5	7.8	7.1	5	X	X	X	X	X	X	X	X	X	8.0	8.0	6.4	6.4
6	6	0	0	0	5	0	0	0	X	10	10	7.8	7.2	6	X	X	X	X	X	X	X	X	X	8.0	8.0	6.4	6.4
7	0	6	5	3	6	4	9	0	X	9.3	7.2	7.2	7.2	7	X	X	X	X	X	X	X	X	X	8.0	8.0	6.4	6.4
TOT10	9	8	5	13	6	15	7	9	7	9				TOT 0	0	0	0	0	0	0	0	0	0	0			

TEM. °C	Time	TEM. °C	Time	TEM. °C	Time	TEM. °C	Time
Day 0	24.3 03:40 PM	Day 2	24.3 03:45 PM	Day 4	24.0 12:00 PM	Day 6	24.0 11:30 AM
Day 1	24.3 03:30 PM	Day 3	24.0 12:27 PM	Day 5	24.0 01:30 PM	Day 7	24.0 04:15 PM

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	8-16-95		84.0	66.9	220		
Final Eff. 1	Comp	8-16-95	7:20AM	6.0	<0.1	15	<0.05	0.8°C
Final Eff. 2	Comp	8-18-95	8:00AM	8.0	<0.1	19.8	<0.05	0.4°C
Final Eff. 3	Comp	8-21-95	7:40AM	16.0	<0.1	25.7	<0.05	0.7°C

Results

Client: WSRC		Sample ID: BG002		
Log # : T4391	Start Date: 8-17-95		Time:	4:00 PM

SURVIVAL EFFECTS

	Control	Effluent				
Effluent Conc.	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	0%	0%	0%	100%
7 Day Mortality	0%	0%	0%	0%	10%	100%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	FAIL
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	FAIL
No-Observed-Effect Concentration (NOEC):				50%		
Lowest-Observed-Effect Concentration (LOEC):				100%		
7 Day LC50:	65.98%					

QUALITY CONTROL

Standard Toxicant:		NaCl	
Central Tendency:	1.98	g/L	
Current Value:	1.91	g/L	
Deviation:	0.29	Std Dev units.	

Results

Client: WSRC		Sample ID: BG002		IWC:
Log # : T4391	Start Date: 8-17-95		Time: 4:00 PM	

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	19.2	12.8	9.5	9.2	8.9	0
Standard Deviation:	1.75	2.15	2.01	3.39	3.11	0.00
t =		5.58	8.45	8.72	8.98	0.00

MSD= 2.56

Normality: Data Normal W = 0.94

Homogeneity: Data Homogeneous B = 5.68

Test Used: Dunnett's t Test

Critical Steel's Value: 75

Critical t Value: 2.23

Chronic Toxicity

6.25% Chronically Toxic

12.5% Chronically Toxic

25% Chronically Toxic

50% Chronically Toxic

100% Chronically Toxic

No-Observed-Effect Concentration (NOEC): <6.25%

Lowest-Observed-Effect Concentration (LOEC): 6.25%

7 Day EC50: 18.95%

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

Test Organisms: *Ceriodaphnia dubia*

Method: EPA/600/4-89/001

Facility: Westinghouse Savannah River Corporation
Sample ID: BG 003

Date: 8-17-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client:WSRC		Start Date: 8-17-95	Start Time: 4:00 PM
Log #: T4392	Sample ID: BG003	End Date: 8-24-95	End Time: 3:45 PM IWC:

TEST CONCENTRATION: 0%														D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%														D.O	D.O	pH	pH															
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new									
0	0	0	0	0	0	0	0	0	0	8.8	9.1	8.8	7.9	0	0	0	0	0	0	0	0	0	0	8.4	8.1	8.4	7.7	1	0	0	0	0	0	0	0	0	0	8.4	8.4	7.4	7.5									
2	0	0	0	0	0	0	0	0	0	8.4	8.6	7.9	7.9	2	0	0	0	0	0	0	0	0	0	8.6	8.7	7.9	8.0	3	0	0	0	0	0	0	0	0	0	8.5	8.6	7.8	7.6									
3	0	3	0	0	0	0	0	0	0	8.5	8.5	8.2	8.0	3	0	0	0	0	0	0	0	0	0	8.5	8.6	7.8	7.6	4	4	6	2	3	3	5	3	3	2	3	9.2	8.7	7.7	8.0								
4	4	6	2	3	3	5	3	3	2	3	9.2	8.7	7.7	8.0	4	2	3	1	3	0	0	0	3	0	0	9.9	9.9	7.4	7.1	5	0	0	6	6	3	0	0	0	4	8.1	8.8	7.6	8.2							
5	0	0	6	6	3	0	0	0	0	4	8.1	8.8	7.6	8.2	5	7	6	2	8	1	2	3	0	4	4	9.4	9.4	7.8	7.7	6	8	0	0	0	6	8	5	5	0	10	9.3	8.0	8.3							
6	8	0	0	0	0	6	8	5	5	0	10	9.3	8.0	8.3	6	0	0	5	0	5	0	0	9	0	0	10	10	7.6	7.6	7	10	9	8	9	11	9	9	8	10	11	9.2	8.0								
7	10	9	8	9	11	9	9	8	10	11	9.2	8.0	8.3	7	8	8	9	10	10	8	8	9	6	10	9.2	9.2	7.6	7.6	TOT22	18	16	18	17	20	20	16	17	18	18	TOT17	17	17	21	16	10	11	21	10	14	15

TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
0	0	0	0	0	0	0	0	0	0	8.2	8.2	7.5	7.5	0	0	0	0	0	0	0	0	0	0	8.2	8.2	7.5	7.5	
1	0	0	0	0	0	0	0	0	0	8.3	8.2	7.5	7.6	1	0	0	0	0	0	0	0	0	0	8.3	8.4	7.4	7.6	
2	0	0	0	0	0	0	0	0	0	8.6	8.7	8.0	8.0	2	0	0	0	0	0	0	0	0	0	8.6	8.7	7.9	8.0	
3	0	3	0	0	0	0	0	0	0	8.4	8.5	7.8	7.7	3	0	0	0	0	0	0	0	0	0	8.4	8.6	7.8	7.7	
4	4	0	0	2	3	2	0	0	0	9.9	10.0	7.6	7.5	4	3	4	3	3	3	2	3	3	3	9.9	9.9	7.7	7.5	
5	6	6	0	6	0	0	4	2	3	9.5	9.4	7.8	7.7	5	6	6	3	8	7	0	0	1	0	9.5	9.5	7.8	7.6	
6	0	0	3	0	8	8	0	0	0	10.0	10.0	7.6	7.6	6	0	0	0	0	5	8	7	8	6	10.0	10.0	7.7	7.6	
7	6	0	0	6	9	10	6	8	7	9.3	7.6	7.6	7.6	7	11	0	0	5	5	5	8	9	6	1	9.3	7.7	7.7	7.6
TOT16	9	3	14	20	20	10	10	10	10	12				TOT20	10	6	16	15	13	18	19	18	10	15				

TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH															
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
0 0	0	0	0	0	0	0	0	0	0	8.2	8.2	7.2	7.2	0 0	0	0	0	0	0	0	0	0	0	8.2	8.2	7.2	7.2	0 0	0	0	0	0	0	0	0	0	0	8.2	8.2	7.2	7.2	
1 0	0	0	0	0	0	0	0	0	0	8.3	8.3	6.9	7.7	1 0	0	0	0	0	0	0	0	0	0	8.4	8.3	6.2	7.4	1 0	0	0	0	0	0	0	0	0	0	8.4	8.3	6.2	7.4	
2 0	0	0	X	0	0	X	0	0	0	8.6	8.6	7.9	7.9	2 0	0	0	X	X	0	X	0	0	X	8.5	8.6	7.5	7.6	2 0	0	0	X	X	0	X	0	0	X	8.5	8.6	7.5	7.6	
3 0	0	0	X	0	0	X	0	0	0	8.4	8.6	7.8	7.6	3 0	2	0	X	X	0	X	0	0	X	8.4	8.4	7.3	6.9	3 0	2	0	X	X	0	X	0	0	X	8.4	8.4	7.3	6.9	
4 4	3	0	X	3	0	X	3	0	0	10	10	7.7	7.5	4 0	0	0	X	X	0	X	0	0	X	9.9	10	7.7	7.2	4 0	0	0	X	X	0	X	0	0	X	9.9	10	7.7	7.2	
5 7	0	1	X	0	0	X	0	6	0	9.4	9.5	7.8	7.5	5 0	3	3	X	X	0	X	0	3	X	9.4	9.5	7.7	7.2	5 0	3	3	X	X	0	X	0	3	X	9.4	9.5	7.7	7.2	
6 0	5	2	X	5	2	X	6	7	6	10	10	7.7	7.5	6 0	0	0	X	X	5	X	1	0	X	10	10	7.2	6.9	6 0	0	0	X	X	5	X	1	0	X	10	10	7.2	6.9	
7 10	8	4	X	0	3	X	8	0	6	9.3	7.6	7.6	7.6	7 3	0	3	X	X	2	X	4	3	X	9.3	7.6	7.6	7.6	7 3	0	3	X	X	2	X	4	3	X	9.3	7.6	7.6	7.6	
TOT21	16	7	0	8	5	0	17	13	12	9				TOT 3	5	6	0	0	7	0	5	6	0	3				TOT 3	5	6	0	0	7	0	5	6	0	3				

TEM. °C			Time			TEM. °C			Time			TEM. °C			Time			TEM. °C			Time		
Day 0	24.3	04:00 PM	Day 2	24.0	04:30 PM	Day 4	24.0	02:30 PM	Day 6	24.0	01:00 PM	Day 0	24.3	04:00 PM	Day 2	24.0	04:30 PM	Day 4	24.0	02:30 PM	Day 6	24.0	01:00 PM
Day 1	24.0	04:00 PM	Day 3	24.0	01:00 PM	Day 5	24.0	04:00 PM	Day 7	24.0	03:45 PM	Day 1	24.0	04:00 PM	Day 3	24.0	01:00 PM	Day 5	24.0	04:00 PM	Day 7	24.0	03:45 PM

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	8-16-95		84.0	66.9	220		
Final Eff. 1	Grab	8-16-95	7:00AM	8.0	6.09	19.0	<0.05	0.8°C
Final Eff. 2	Grab	8-18-95	8:50AM	8.0	4.08	29.3	<0.05	0.4°C
Final Eff. 3	Grab	8-21-95	7:30AM	6.0	8.16	32.4	<0.05	0.7°C

Results

Client: WSRC	Sample ID: BG003	
Log # : T4392	Start Date: 8-17-95	Time: 4:00 PM

SURVIVAL EFFECTS

	Control	Effluent				
Effluent Conc.	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	0%	0%	20%	40%
7 Day Mortality	0%	0%	0%	0%	20%	40%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
No-Observed-Effect Concentration (NOEC):					100%	
Lowest-Observed-Effect Concentration (LOEC):					>100%	
7 Day LC50:						>100%

QUALITY CONTROL

Standard Toxicant:	NaCl
Central Tendency:	1.98 g/L
Current Value:	1.91 g/L
Deviation:	0.29 Std Dev units.

Results

Client: WSRC		Sample ID: BG003		IWC:	
Log # : T4392	Start Date: 8-17-95		Time: 4:00 PM		

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	18.2	15.4	12.2	14.5	9.9	3.2
Standard Deviation:	1.93	4.09	5.31	4.62	7.13	2.94
t =		1.35	2.89	1.78	4	7.22
Steel's =		83	72	82	68	55
MSD= 4.8						

Normality: Data Not Normal W = 0.86

Homogeneity: Data Not Homogeneous B = 15.6

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.31

Chronic Toxicity

6.25%	No Chronic Toxicity
12.5%	Chronically Toxic
25%	No Chronic Toxicity
50%	Chronically Toxic
100%	Chronically Toxic

No-Observed-Effect Concentration (NOEC): 6.25%
 Lowest-Observed-Effect Concentration (LOEC): 12.5%
 7 Day EC50: 40.61

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

Test Organisms: *Ceriodaphnia dubia*

Method: EPA/600/4-89/001

Facility: Westinghouse Savannah River Corporation
Sample ID: BG 004

Date: 8-17-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client:WSRC										Start Date: 8-17-95				Start Time: 4:00 PM														
Log #: T4393 Sample ID: BG004										End Date: 8-24-95				End Time: 3:45 PM IWC:														
TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
0	0	0	0	0	0	0	0	0	0	8.8	9.1	7.9	7.9	0	0	0	0	0	0	0	0	0	0	8.4	8.1	7.5	7.6	
1	0	0	0	0	0	0	0	0	0	8.4	8.9	7.9	7.9	1	0	0	0	0	0	0	0	0	0	8.4	8.4	7.5	7.7	
2	0	0	0	0	0	0	0	0	0	8.4	8.6	7.9	7.9	2	0	0	0	0	0	0	0	0	0	8.6	8.7	7.9	7.9	
3	0	3	0	0	0	0	0	0	0	8.5	8.5	8.2	8.0	3	0	0	0	0	0	0	0	0	0	8.5	8.6	7.8	7.7	
4	4	6	2	3	3	5	3	3	2	9.2	8.7	7.7	8.0	4	4	4	3	3	0	0	0	0	0	9.7	9.8	7.7	7.7	
5	0	0	6	6	3	0	0	0	4	8.1	8.8	7.6	8.2	5	6	7	5	7	3	3	2	3	4	3	9.5	9.6	7.7	7.3
6	8	0	0	0	0	6	8	5	5	10	9.3	8.0	8.3	6	0	0	0	0	6	4	5	5	6	6	10	10.	7.8	7.8
7	10	9	8	9	11	9	9	8	10	9.2	8.0	8.0	8.0	7	9	8	11	9	9	10	9	9	8	8	9.2	7.5	7.5	7.5
TOT22	18	16	18	17	20	20	16	17	18	18				TOT19	19	19	19	18	17	16	17	18	17	18				
TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
0	0	0	0	0	0	0	0	0	0	8.4	8	7.6	8	0	0	0	0	0	0	0	0	0	0	8.1	8.1	7	7	
1	0	0	0	0	0	0	0	0	0	8.4	8.5	7.6	7.6	1	0	0	0	0	0	0	0	0	0	8.2	8.4	7.5	7.6	
2	0	0	0	0	0	0	0	0	0	8.7	8.7	8.0	8.0	2	0	0	0	0	0	0	0	0	0	8.6	8.7	7.9	8.0	
3	0	0	0	0	0	0	0	3	0	8.5	8.6	7.8	7.7	3	3	0	0	0	0	0	0	0	0	8.5	8.5	7.7	7.7	
4	3	3	2	0	0	3	4	0	2	9.8	9.9	7.7	7.7	4	0	3	0	0	0	0	0	0	0	9.6	9.7	7.7	7.9	
5	5	8	3	2	2	0	6	5	3	9.6	9.6	7.8	7.4	5	2	5	3	0	4	4	3	2	2	4	9.6	9.5	7.9	7.9
6	0	0	0	2	X	6	0	0	0	10	10	7.6	7.6	6	0	0	0	0	6	7	0	10	9	9	10	10	7.9	7.6
7	11	7	10	7	X	9	10	11	12	9.3	7.5	7.5	7.5	7	10	10	9	0	5	0	13	0	0	9.3	7.6	7.6	7.6	
TOT19	18	15	11	2	18	20	19	15	18	16				TOT15	18	12	0	15	11	16	12	11	13	14				
TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
0	0	0	0	0	0	0	0	0	0	8.1	8.1	7.1	7.1	0	0	0	0	0	0	0	0	0	0	8	8	6.3	6.3	
1	0	0	0	0	0	0	0	0	0	8.2	8.2	7.4	7.2	1	0	0	0	0	0	0	0	0	0	8.1	8.2	7.3	6.8	
2	X	0	0	0	0	X	0	0	0	8.6	8.7	7.9	7.9	2	X	0	0	0	X	X	0	0	0	X	8.4	8.5	7.6	7.7
3	X	0	0	0	0	X	0	0	0	8.4	8.5	7.7	7.4	3	X	0	0	0	X	X	X	0	0	X	8.4	8.4	7.5	6.8
4	X	4	3	3	0	X	0	4	3	9.6	9.6	7.8	7.4	4	X	0	0	0	X	X	X	0	0	X	9.6	9.7	7.5	6.4
5	X	4	0	7	3	X	4	0	0	9.5	9.5	7.9	7.3	5	X	0	3	4	X	X	X	0	0	X	9.6	9.6	7.9	7.1
6	X	0	5	0	0	X	0	10	6	10	10	7.8	7.4	6	X	3	0	3	X	X	X	3	0	X	10	10.	7.8	7.1
7	X	9	9	9	10	X	10	9	8	9.3	7.5	7.5	7.5	7	X	5	7	0	X	X	X	5	5	X	9.2	7.6	7.6	7.6
TOT 0	17	17	19	13	0	14	23	17	17	14				TOT 0	8	10	7	0	0	0	8	5	0	4				
TEM. °C Time				TEM. °C Time				TEM. °C Time				TEM. °C Time																
Day 0 24.3 04:00 PM				Day 2 24.0 05:10 PM				Day 4 24.0 11:30 AM				Day 6 24.0 10:45 AM																
Day 1 24.0 02:00 PM				Day 3 24.0 01:20 PM				Day 5 24.0 05:00 PM				Day 7 24.0 04:40 PM																

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	8-16-95		84.0	66.9	220		
Final Eff. 1	Grab	8-16-95	7:40AM	10.0	8.12	19.0	<0.05	0.8°C
Final Eff. 2	Grab	8-18-95	8:20AM	14.0	10.2	34.2	<0.05	0.4°C
Final Eff. 3	Grab	8-21-95	8:00AM	14.0	14.28	38.1	<0.05	0.7°C

Results

Client: WSRC	Sample ID: BG004	
Log # : T4393	Start Date: 8-17-95	Time: 4:00 PM

SURVIVAL EFFECTS

	Control	Effluent				
Effluent Conc.	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	0%	0%	20%	40%
7 Day Mortality	0%	0%	10%	0%	20%	50%

Method: Fishers Exact Test

	Control	Effluent				
Acute Toxicity		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	FAIL
No-Observed-Effect Concentration (NOEC):				50%		
Lowest-Observed-Effect Concentration (LOEC):				100%		
7 Day LC50:	100%					

QUALITY CONTROL

Standard Toxicant:	NaCl
Central Tendency:	1.98 g/L
Current Value:	1.91 g/L
Deviation:	0.29 Std Dev units.

Results

Client: WSRC		Sample ID: BG004		IWC:
Log # : T4393	Start Date: 8-17-95		Time: 4:00 PM	

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	18.2	17.9	15.5	13.7	13.7	3.8
Standard Deviation:	1.93	1.1	5.44	2.45	7.7	4.18
t =		0.13	1.16	1.89	1.93	0.00
Steel's =		104	93.5	61.5	84	55
MSD= 5.23						

Normality: Data Not Normal W = 0.7

Homogeneity: Data Not Homogeneous B = 35.7

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.23

Chronic Toxicity

6.25%	No Chronic Toxicity
12.5%	No Chronic Toxicity
25%	Chronically Toxic
50%	No Chronic Toxicity
100%	Chronically Toxic

No-Observed-Effect Concentration (NOEC): 12.5%
 Lowest-Observed-Effect Concentration (LOEC): 25%
 7 Day EC50: 55.48

7 Day Chronic Definitive Survival and Reproduction Bioassay

Test Organisms: Ceriodaphnia dubia

Method: EPA/600/4-89/001

Facility: Westinghouse Savannah River Company
Sample ID: FHB-006 Effluent

Date: 8-24-95

Client:WSRC										Start Date: 8-24-95				Start Time: 2:00 PM															
Log #: T4436										Sample ID: FHB 006				End Date: 8-31-95				End Time: 3:15 PM				IWC:							
TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH		
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new		
0	0	0	0	0	0	0	0	0	0	9.2	9.2	8.1	8.1	0	0	0	0	0	0	0	0	0	0	9.3	9.3	7.6	7.6		
1	0	0	0	0	0	0	0	0	0	10	10	8.0	7.9	1	0	0	0	0	0	0	0	0	0	9.1	9.0	7.8	7.7		
2	0	0	0	0	0	0	0	0	0	8.2	8.4	8.0	8.1	2	0	0	0	0	0	0	0	0	0	8.0	8.0	7.5	7.5		
3	0	0	0	0	0	0	0	0	0	8.2	8.5	8.3	8.1	3	0	0	0	0	0	0	0	0	0	7.8	7.8	8.1	7.5		
4	4	2	3	4	0	5	5	3	2	0	8.6	9.0	7.7	8.0	4	6	0	6	4	4	3	4	0	0	8.8	8.9	7.7	7.7	
5	0	0	0	0	4	0	0	0	0	3	8.8	8.4	7.6	7.9	5	2	4	0	0	0	0	3	3	3	8.9	8.8	7.8	7.7	
6	8	4	5	6	7	5	6	4	4	8	8.6	9.4	7.7	7.9	6	0	5	3	4	3	5	4	6	3	0	8.8	8.8	7.7	7.7
7	11	10	9	8	8	9	8	9	11	9	7.8	7.8	7.8	7	12	8	9	9	8	7	8	10	10	X	8.6	7.8	7.8	7.8	
TOT23	16	17	18	19	19	19	16	17	20	18				TOT20	17	18	17	15	15	16	19	16	3	16					
TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH		
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new		
0	0	0	0	0	0	0	0	0	0	9.4	9.4	7.5	7.5	1	0	0	0	0	0	0	0	0	0	9.5	9.5	7.3	7.3		
1	0	0	0	0	0	0	0	0	0	9.0	9.0	7.8	7.6	2	0	0	0	0	0	0	0	0	0	9.0	8.8	7.8	7.5		
2	0	0	0	0	0	0	0	0	0	7.9	8.0	7.7	7.6	3	0	0	0	0	0	0	0	0	0	8.0	8.0	7.8	7.5		
3	0	0	0	0	0	0	0	0	0	8.0	8.0	8.1	7.6	4	4	5	4	4	3	4	6	0	6	2	8.0	8.0	8.1	7.4	
4	5	4	0	4	4	4	3	0	6	2	8.9	8.9	7.7	7.7	5	0	0	6	1	6	0	0	0	3	8.9	9.0	7.8	7.6	
5	0	0	4	0	6	0	0	0	0	0	8.9	8.9	7.7	7.8	6	0	4	0	0	0	6	0	0	1	8.7	8.9	7.7	7.7	
6	4	3	0	0	0	6	0	0	0	1	8.8	8.9	7.8	7.6	7	10	1	9	10	9	9	5	10	10	9	8.9	8.9	7.8	7.6
7	8	9	12	10	7	9	8	5	7	5	8.6	7.7	7.7	8	0	0	0	0	0	0	0	0	0	0	8.6	7.7	7.7	7.6	
TOT17	16	16	14	17	19	11	5	13	8	14				TOT14	10	19	15	18	19	11	10	16	15	15					
TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH		
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new		
0	0	0	0	0	0	0	0	0	0	9.5	9.5	7.0	7.0	0	0	0	0	0	0	0	0	0	0	10	10	5.8	5.8		
1	0	0	0	0	0	0	0	0	0	8.9	8.8	7.7	7.2	1	0	0	0	0	0	0	0	0	0	8.8	8.0	7.7	6.8		
2	0	0	0	0	0	0	0	0	0	7.9	7.8	7.7	7.2	2	0	0	0	0	0	0	0	0	0	8.0	8.0	7.7	6.9		
3	0	0	0	0	0	0	0	0	0	8.0	8.0	8.0	7.3	3	0	0	0	0	0	0	0	0	0	8.0	9.0	8.0	6.8		
4	4	5	5	3	4	4	4	5	0	3	8.9	9.0	7.8	7.5	4	0	0	0	0	0	X	0	0	0	9.0	8.9	7.4	7.1	
5	6	0	0	7	6	0	0	3	0	0	8.8	8.9	7.4	7.2	5	0	X	X	0	0	0	0	X	0	8.9	8.9	7.3	6.2	
6	0	5	0	0	0	7	8	0	0	1	8.9	9.0	7.9	7.3	6	X	X	X	X	0	X	X	X	X	0	8.9	8.7	7.8	6.5
7	0	8	3	0	2	0	0	8	3	5	8.7	7.7	7.7	7	X	X	X	X	X	X	X	X	X	X	8.7	7.6	7.6	7.6	
TOT10	18	8	10	12	11	12	16	3	9	11				TOT 0	0	0	0	0	0	0	0	0	0	0	0				
TEM.°C		Time		TEM.°C		Time		TEM.°C		Time		TEM.°C		Time		TEM.°C		Time		TEM.°C		Time		TEM.°C		Time			
Day 0	24.0	02:00 PM		Day 2	24.0	01:20 PM		Day 4	24.2	11:38 AM		Day 6	24.0	11:45 AM															
Day 1	24.0	02:00 PM		Day 3	25.6	02:50 PM		Day 5	24.0	11:45 AM		Day 7	24.8	03:15 PM															

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	08-24-95		90	73.4	194.3		
Final Eff. 1	Grab	8-23-95	08:40AM	6.0	8.16	34.5	<0.05	0.9°C
Final Eff. 2	Grab	8-25-95	09:50AM	4.0	8.16	35.0	<0.05	0.9°C
Final Eff. 3	Grab	8-28-95	08:40AM	8.0	4.08	29.9	<0.05	0.9°C

Results

Client: WSRC		Sample ID: FHB 006		
Log # : T4436	Start Date: 8-24-95		Time: 2:00 PM	

SURVIVAL EFFECTS

	Control	Effluent				
Effluent Conc.	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	0%	0%	0%	0%
7 Day Mortality	0%	10%	0%	0%	0%	100%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	FAIL
No-Observed-Effect Concentration (NOEC):				50%		
Lowest-Observed-Effect Concentration (LOEC):				100%		
7 Day LC50:	70.7%					

QUALITY CONTROL

Standard Toxicant:		NaCl	
Central Tendency:	1.98	g/L	
Current Value:	1.91	g/L	
Deviation:	0.29	Std Dev units.	

Results

Client: WSRC	Sample ID: FHB 006	IWC:
Log # : T4436	Start Date: 8-24-95	Time: 2:00 PM

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	18.4	15.6	13.6	14.7	10.9	0
Standard Deviation:	2.12	4.72	4.43	3.47	4.15	0.00
t =		1.61	2.76	2.13	4.31	N/A

MSD= 3.88

Normality: Data Normal W = 0.95

Homogeneity: Data Homogeneous B = 5.75

Test Used: Dunnett's t Test

Critical Steel's Value: 75

Critical t Value: 2.23

Chronic Toxicity

6.25% No Chronic Toxicity

12.5% Chronically Toxic

25% No Chronic Toxicity

50% Chronically Toxic

100% Chronically Toxic

No-Observed-Effect Concentration (NOEC): 6.25%

Lowest-Observed-Effect Concentration (LOEC): 12.5%

7 Day EC50: 57.4%

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

Test Organisms: Ceriodaphnia dubia

Method: EPA/600/4-89/001

Facility: WSRC
Sample ID: FHB-012

Date: 9-7-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client:WSRC										Start Date: 9-7-95										Start Time: 4:45 PM																													
Log #: T4471										Sample ID: FHB-012										End Date: 9-15-95										End Time: 10:30 AM										IWC:									
TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH																						
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new																						
1	0	0	0	0	0	0	0	0	0	8.1	9.3	7.8	8.0	1	0	0	0	0	0	0	0	0	0	8.6	8.6	7.9	7.6																						
2	L	0	0	0	0	0	0	0	0	8.1	8.7	7.8	7.9	2	0	0	0	0	0	0	0	0	0	8.6	8.6	7.9	7.5																						
3	L	0	0	0	0	0	0	0	0	8.4	8.5	7.8	7.9	3	0	0	0	0	0	0	0	0	0	8.4	8.4	7.4	7.4																						
4	L	3	4	4	3	5	4	3	3	8.5	9.3	7.8	7.9	4	3	3	2	3	4	4	3	0	0	0	9.4	9.2	7.8	7.7																					
5	L	0	0	0	0	0	0	0	0	9.2	9.0	8.1	8.1	5	0	0	0	0	0	0	0	0	0	0	8.8	8.6	7.8	7.6																					
6	L	0	0	6	6	7	6	7	6	8.1	8.8	7.6	8.0	6	6	0	0	7	6	6	0	0	0	0	8.4	8.5	7.9	7.9																					
7	L	1	6	10	0	8	0	0	0	8.4	8.4	7.7	7.9	7	6	0	0	10	0	0	8	0	3	0	9.3	9.4	8.0	8.0																					
8	L	8	9	0	9	0	8	10	8	8.0	7.8	7.8	7.8	8	0	8	8	0	8	10	9	0	4	0	8.6	7.9	7.9	7.9																					
TOT	0	12	19	20	18	20	18	20	17	18	18			TOT	15	11	10	20	18	20	20	0	7	0	12																								
TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH																						
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new																						
1	0	0	0	0	0	0	0	0	0	8.7	8.7	7.5	7.5	1	0	0	0	0	0	0	0	0	0	8.7	8.7	7.8	7.8																						
2	0	0	0	0	0	0	0	0	0	8.5	8.6	7.9	7.3	2	0	0	0	0	0	0	0	0	0	8.5	8.5	7.9	7.2																						
3	0	0	0	0	0	0	0	0	0	8.5	8.6	7.6	7.5	3	0	0	0	0	0	0	0	0	0	8.4	8.5	7.7	7.5																						
4	0	4	3	3	3	4	4	0	0	9.3	9.2	7.9	7.8	4	5	4	4	4	4	3	4	0	0	0	9.2	9.2	7.9	7.8																					
5	0	0	0	0	0	0	0	3	0	8.8	8.8	7.9	7.6	5	0	0	0	0	0	0	0	0	0	0	8.8	8.5	7.1	7.2																					
6	0	0	0	0	7	3	7	0	3	8.6	8.6	8.0	8.0	6	6	0	0	1	8	7	7	0	0	0	8.5	8.6	8.0	8.0																					
7	0	6	0	9	9	0	8	0	0	9.4	9.4	8.1	8.1	7	0	9	0	9	8	0	10	0	0	0	9.4	9.5	8.1	8.1																					
8	0	9	8	8	0	7	0	0	2	8.6	7.8	7.8	7.8	8	6	8	8	0	0	8	0	0	2	2	8.8	7.9	7.9	7.9																					
TOT	0	19	11	20	19	14	19	3	5	2	11			TOT	17	21	12	14	20	18	21	0	2	2	13																								
TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH																						
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new																						
1	0	0	0	0	0	0	0	0	0	8.7	8.7	7.6	7.6	1	0	0	0	0	0	0	0	0	0	8.6	8.6	7.4	7.4																						
2	0	0	0	0	0	0	0	0	0	8.5	8.5	7.8	6.8	2	0	0	0	0	0	0	0	0	0	8.4	8.5	7.8	6.1																						
3	0	0	0	0	0	0	0	0	0	8.4	8.5	7.8	7.4	3	0	0	0	0	0	0	0	0	0	8.5	8.5	7.8	6.2																						
4	3	4	0	3	3	0	3	0	3	9.2	9.2	7.9	7.8	4	0	0	0	4	0	0	0	2	0	9.2	9.1	7.9	7.7																						
5	0	8	0	0	0	0	0	0	3	8.6	8.4	7.4	7.4	5	3	0	4	0	4	0	2	0	4	8.5	8.8	7.7	5.9																						
6	6	0	0	8	6	0	1	0	3	8.5	8.6	7.9	7.9	6	0	3	6	3	6	4	2	0	5	1	8.4	8.8	7.9	7.7																					
7	9	10	0	10	6	0	0	0	0	9.4	9.5	8.1	8.0	7	0	5	0	0	0	0	0	0	0	9.3	9.4	8.1	8.1																						
8	0	0	0	0	4	3	0	0	3	8.8	8.0	8.0	8.0	8	0	0	4	0	0	4	3	0	0	8.8	8.0	8.0	8.0																						
TOT	18	22	0	21	15	4	7	0	6	6	10			TOT	3	8	10	7	10	8	6	5	7	5	7																								
TEM. °C Time										TEM. °C Time										TEM. °C Time										TEM. °C Time																			
Day 0	24.5	04:45 PM			Day 2	24.1	01:00 PM			Day 4	24.6	05:00 PM			Day 6	24.7	01:30 PM																																
Day 1	24.6	03:00 PM			Day 3	24.3	02:45 PM			Day 5	24.9	12:00 PM			Day 7	24.6	02:45 PM																																

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	9-6-95		82	69.3	183.1		
Final Eff. 1	Grab	09-06-95	09:00AM	12.0	6.12	40.8	<0.05	2.3°C
Final Eff. 2	Grab	09-08-95	08:45AM	8.0	4.08	42.7	<0.05	3.9°C
Final Eff. 3	Grab	09-11-95	07:50AM	8.0	4.08	43.3	N/A	2.7°C

Results

Client: WSRC		Sample ID: FHB-012		
Log # : T4471	Start Date: 9-7-95		Time: 4:45 PM	

SURVIVAL EFFECTS

Effluent Conc.	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	0%	0%	0%	0%
7 Day Mortality	0%	0%	0%	0%	0%	0%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
No-Observed-Effect Concentration (NOEC):		100%				
Lowest-Observed-Effect Concentration (LOEC):		>100%				
7 Day LC50:		>100%				

QUALITY CONTROL

Standard Toxicant:		NaCl		
Central Tendency:	1.98	g/L		
Current Value:	1.91	g/L		
Deviation:	0.29	Std Dev units.		

Results

Client: WSRC	Sample ID: FHB-012	IWC:
Log # : T4471	Start Date: 9-7-95	Time: 4:45 PM

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	18	12.1	11.2	12.7	9.9	6.9
Standard Deviation:	2.5	7.85	8.05	8.37	8.37	2.23
t =		1.87	2.16	1.68	2.57	3.52
Steel's =		82	80	87	77.5	55
MSD= 7.28						

Normality: Data Not Normal W = 0.83

Homogeneity: Data Not Homogeneous B = 22.9

Test Used: Wilcoxon Test

Critical Steel's Value: 71

Critical t Value: 2.31

Chronic Toxicity

6.25%	No Chronic Toxicity
12.5%	No Chronic Toxicity
25%	No Chronic Toxicity
50%	No Chronic Toxicity
100%	Chronically Toxic

No-Observed-Effect Concentration (NOEC): 50%
 Lowest-Observed-Effect Concentration (LOEC): 100%
 7 Day EC50: 10.56%

(803) 877-6942 • FAX (803) 877-6938

P.O. Box 16414, Greenville, SC 29606 • 4 Craftsman Court, Greer, SC 29650

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

Test Organisms: *Ceriodaphnia dubia*

Method: EPA/600/4-89/001

Facility: WSRC

Sample ID: FHB-013

Date: 09-07-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client:WSRC		Start Date: 09-07-95	Start Time: 5:00 PM
Log #: T4472	Sample ID: FHB-013	End Date: 09-15-95	End Time: 10:40 AM IWC:

TEST CONCENTRATION: 0%														D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%														D.O	D.O	pH	pH
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new								
1	0	0	0	0	0	0	0	0	0	7.8	9.3	7.8	8.0	1	0	0	0	0	0	0	0	0	0	7.8	8.6	7.8	7.6								
2	0	0	0	0	0	0	0	0	0	7.8	8.7	7.8	7.9	2	0	0	0	0	0	0	0	0	0	8.4	8.5	7.4	7.2								
3	0	0	0	0	0	0	0	0	0	7.8	8.5	7.8	7.9	3	0	0	0	0	0	0	0	0	0	8.2	8.4	7.6	7.3								
4	3	3	5	4	3	2	3	3	4	7.8	9.3	7.8	7.9	4	3	3	2	3	4	3	3	4	5	4	9.3	9.2	7.7	7.6							
5	0	0	0	0	0	0	0	0	0	8.1	9.0	8.1	8.1	5	0	0	5	0	1	0	0	4	0	4	8.6	8.6	7.9	7.6							
6	0	0	4	6	6	5	7	7	0	7.6	8.8	7.6	8.0	6	6	6	7	6	2	0	0	6	6	3	8.4	8.6	7.9	7.9							
7	6	6	0	8	0	0	0	0	7	7.7	8.4	7.7	7.9	7	0	0	8	8	0	6	7	0	10	9.4	9.4	7.9	8.0								
8	8	8	9	0	8	7	9	10	9	7.8	7.8	7.8	7.8	8	9	8	0	0	9	10	8	8	9	0	8.6	7.9	7.9	8.0							
TOT17	17	18	18	17	14	19	20	19	19	18				TOT18	17	22	17	16	19	18	22	20	21	19											

TEST CONCENTRATION 12.5%														D.O	D.O	pH	pH	TEST CONCENTRATION 25%														D.O	D.O	pH	pH
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new								
1	0	0	0	0	0	0	0	0	0	8.5	8.6	7.6	7.5	1	0	0	0	0	0	0	0	0	0	8.4	8.6	7.6	7.6								
2	0	0	0	0	0	0	0	0	0	8.5	8.5	7.6	7.2	2	0	0	0	0	0	0	0	0	0	8.4	8.4	7.6	7.1								
3	0	0	0	0	0	0	0	0	0	8.3	8.4	7.7	7.4	3	0	0	0	0	0	0	0	0	0	8.4	8.4	7.8	7.4								
4	3	4	3	3	4	0	3	3	2	3	9.4	9.2	7.8	7.7	4	3	2	2	2	3	4	3	3	5	9.7	9.1	7.9	7.8							
5	0	0	3	3	2	0	0	1	0	0	8.4	8.6	7.9	7.5	5	4	0	0	0	0	0	0	0	0	8.4	8.5	7.9	7.4							
6	5	6	4	6	6	0	2	0	6	8	8.5	8.6	8.0	8.0	6	0	6	6	7	7	0	7	7	7	8.5	8.6	7.9	8.0							
7	0	0	0	0	0	0	0	0	0	0	9.4	9.5	8.1	8.1	7	0	8	8	8	7	7	8	7	6	9.4	9.6	8.1	8.1							
8	7	8	6	8	7	8	6	8	8	7	8.8	8.0	8.0	8	6	0	0	0	0	0	0	0	0	8.8	8.0	8.0	8.0								
TOT15	18	16	20	19	8	11	12	16	18	15				TOT13	16	16	17	17	11	18	17	17	18	16											

TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH		
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new		
1	0	0	0	0	0	0	0	0	0	8.4	8.6	7.5	7.4	1	X	0	X	0	0	0	0	0	0	8.4	8.6	7.4	7.6		
2	0	0	0	0	0	0	0	0	0	8.4	8.4	7.5	6.6	2	X	0	X	0	0	0	0	0	0	8.4	8.4	7.4	5.8		
3	0	0	0	0	0	0	0	0	0	8.2	8.4	7.8	7.3	3	X	0	X	0	0	0	0	0	0	8.2	8.4	7.9	6.7		
4	3	3	5	3	3	0	0	4	5	3	9.1	8.9	7.9	7.7	4	X	0	X	0	0	0	0	0	0	9.0	8.9	7.9	7.7	
5	0	0	0	0	0	0	0	0	0	0	8.5	8.4	7.8	6.7	5	X	0	X	0	0	0	0	0	0	8.2	8.4	8.0	6.1	
6	0	6	8	7	4	1	6	8	8	6	8.4	8.6	7.9	7.9	6	X	0	X	3	1	3	0	0	3	0	8.4	8.6	7.9	7.5
7	0	8	8	8	0	8	6	7	10	9	9.4	9.6	8.1	8.1	7	X	X	X	X	0	X	X	X	X	9.4	9.6	8.2	8.0	
8	7	0	0	0	0	0	0	0	0	0	8.6	7.9	7.9	8	X	X	X	X	0	X	X	X	X	8.8	8.0	8.0	8.0		
TOT10	17	21	18	7	9	12	19	23	18	15				TOT 0	0	0	3	1	3	0	0	3	0	1					

TEM.°C		Time		TEM.°C		Time		TEM.°C		Time		TEM.°C		Time	
Day 0	24.5	05:00 PM		Day 2	24.1	01:30 PM		Day 4	24.6	05:00 PM		Day 6	24.7	02:00 PM	
Day 1	24.6	03:30 PM		Day 3	24.3	03:15 PM		Day 5	24.9	01:50 PM		Day 7	24.6	03:00 PM	

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	09-06-95		82	69.3	183.1		
Final Eff. 1	Grab	09-06-95	09:30AM	14.0	6.12	41.4	<0.05	2.3°C
Final Eff. 2	Grab	09-08-95	08:00AM	8.0	6.12	38.3	<0.05	3.9°C
Final Eff. 3	Grab	09-11-95	08:00AM	6.0	8.16	38.3	N/A	2.7°C

Results

Client: WSRC		Sample ID: FHB-013		
Log # : T4472	Start Date: 09-07-95		Time: 5:00 PM	

SURVIVAL EFFECTS

Effluent Conc.	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	0%	0%	0%	20%
7 Day Mortality	0%	0%	0%	0%	0%	90%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	FAIL
No-Observed-Effect Concentration (NOEC):		50%				
Lowest-Observed-Effect Concentration (LOEC):		100%				
7 Day LC50:		78.92%				

QUALITY CONTROL

Standard Toxicant:		NaCl	
Central Tendency:	1.98	g/L	
Current Value:	1.91	g/L	
Deviation:	0.29	Std Dev units.	

Results

Client: WSRC		Sample ID: FHB-013		IWC:	
Log # : T4472	Start Date: 09-07-95		Time: 5:00 PM		

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	17.8	19	15.3	16	15.4	1
Standard Deviation:	1.69	2.16	3.86	2.26	5.48	1.41
t =		-0.8	1.6	1.16	1.54	0.00

MSD= 3.47

Normality: Data Normal W = 0.93

Homogeneity: Data Not Homogeneous B = 16.3

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.23

Chronic Toxicity

6.25% No Chronic Toxicity

12.5% No Chronic Toxicity

25% No Chronic Toxicity

50% No Chronic Toxicity

100% Chronically Toxic

No-Observed-Effect Concentration (NOEC): 50%

Lowest-Observed-Effect Concentration (LOEC): 100%

7 Day EC50: 57.43%

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

Test Organisms: Ceriodaphnia dubia

Method: EPA/600/4-89/001

Facility: Westinghouse Savannah River Company
Sample ID: FHB-014 Effluent

Date: 8-24-95

Client:WSRC	Start Date: 8-24-95	Start Time: 2:00 PM
Log #: T4437	Sample ID: FHB 014	End Date: 8-31-95
		End Time: 3:15 PM IWC:

TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH		
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new		
0	0	0	0	0	0	0	0	0	0	9.2	9.2	8.1	8.1	0	0	0	0	0	0	0	0	0	0	9.4	9.4	7.7	7.7		
1	0	0	0	0	0	0	0	0	0	10	10	8.0	7.9	1	0	0	0	0	0	0	0	0	0	9.0	9.2	7.6	7.3		
2	0	0	0	0	0	0	0	0	0	8.2	8.4	8.0	8.1	2	0	0	L	0	0	0	0	0	0	7.9	7.9	7.8	7.5		
3	0	0	0	0	0	0	0	0	0	8.2	8.5	8.3	8.1	3	2	0	L	0	0	0	0	0	0	7.8	7.9	8.4	8.1		
4	4	2	3	4	0	5	5	3	2	0	8.6	9.0	7.7	8.0	4	0	4	L	2	4	0	2	3	0	0	9.0	9.0	7.6	7.1
5	0	0	0	0	4	0	0	0	0	3	8.8	8.4	7.6	7.9	5	3	5	L	8	0	3	0	0	0	0	8.6	8.6	7.7	7.4
6	8	4	5	6	7	5	6	4	4	8	8.6	9.4	7.7	7.9	6	0	0	L	0	6	0	5	7	0	0	8.7	8.8	7.7	7.4
7	11	10	9	8	8	9	8	9	11	9	7.8	7.8	7.8	7	0	2	L	3	0	6	7	7	3	4	8.4	7.8	7.8	7.8	
TOT23	16	17	18	19	19	19	16	17	20	18				TOT 5	11	0	13	10	9	14	17	3	4	10					

TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH		
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new		
0	0	0	0	0	0	0	0	0	0	9.3	9.3	7.5	7.5	1	0	0	0	0	0	0	0	0	0	9.4	9.4	7.1	7.1		
1	0	0	0	0	0	0	0	0	0	9.0	9.0	7.8	7.4	2	0	0	0	0	0	0	0	0	0	9.2	9.1	7.8	7.3		
2	0	0	0	0	0	0	0	0	0	7.9	7.8	7.8	7.5	3	0	0	0	0	0	0	0	0	0	7.8	7.8	7.3	7.6		
3	0	0	0	0	0	0	0	0	0	7.8	7.8	8.1	7.6	4	5	1	2	4	0	1	0	4	2	0	8.0	8.0	7.6	7.5	
4	4	5	4	2	4	4	4	0	0	4	8.8	8.9	7.8	7.4	5	0	0	0	0	0	0	7	0	0	8.8	9.0	7.5	7.3	
5	2	4	0	5	0	0	0	0	0	0	8.6	8.6	7.7	7.4	6	0	0	0	0	6	5	1	0	0	0	8.6	8.6	7.3	7.3
6	0	0	0	0	6	4	0	0	0	0	8.8	8.8	7.7	7.5	7	5	0	0	3	5	6	3	7	0	0	8.9	8.9	7.3	7.4
7	0	7	0	1	0	0	0	0	4	0	8.4	7.8	7.8	8	0	0	0	0	0	0	0	0	0	0	8.4	7.4	7.4	7.4	
TOT 6	16	4	8	10	8	4	0	4	4	6				TOT10	1	2	7	11	12	4	18	2	0	7					

TEST CONCENTRATION 50%														D.O	D.O	pH	pH	TEST CONCENTRATION 100%														D.O	D.O	pH	pH
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new								
0	0	0	0	0	0	0	0	0	0	9.4	9.4	6.8	6.8	0	0	0	0	0	0	0	0	0	0	9.3	9.3	5.6	5.6								
1	0	0	0	0	0	0	0	0	0	9.1	9.1	7.7	6.9	1	0	0	0	0	0	0	0	0	0	9.1	9.2	7.7	6.1								
2	0	0	0	X	X	0	0	0	0	7.9	7.8	7.9	7.5	2	X	0	0	0	X	X	0	0	0	7.9	7.9	8.0	7.3								
3	0	0	0	X	X	0	0	0	0	7.8	8.0	7.7	7.2	3	X	0	0	0	X	X	0	0	0	7.8	7.9	7.9	6.4								
4	3	1	0	X	X	3	5	0	4	0	8.8	8.9	7.7	7.2	4	X	3	4	4	1	X	X	1	X	0	8.9	9.1	7.7	6.4						
5	0	0	0	X	X	0	0	0	0	0	8.6	8.6	7.7	7.0	5	X	0	0	0	0	X	X	0	X	4	8.5	8.6	7.7	6.0						
6	0	0	0	X	X	2	0	0	0	0	8.9	8.9	7.8	7.3	6	X	0	0	0	0	X	X	0	X	0	8.9	8.9	7.9	6.5						
7	0	0	0	X	X	5	0	0	0	0	8.5	7.8	7.8	7	X	0	X	0	X	X	X	0	X	2	8.5	7.7	7.7	7.7							
TOT 3	1	0	0	0	10	5	0	4	0	2				TOT 0	3	4	4	1	0	0	1	0	6	2											

TEM.°C	Time	TEM.°C	Time	TEM.°C	Time	TEM.°C	Time
Day 0 24.0	02:15 PM	Day 2 24.0	01:30 PM	Day 4 24.2	01:30 PM	Day 6 24.0	10:45 AM
Day 1 24.0	02:30 PM	Day 3 25.6	02:10 PM	Day 5 24.0	03:15 PM	Day 7 24.8	04:00 PM

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	08-24-95		90	73.4	194.3		
Final Eff. 1	Grab	8-23-95	08:30AM	4.0	8.16	39.1	<0.05	0.9°C
Final Eff. 2	Grab	8-25-95		4.0	6.12	36.6	<0.05	0.9°C
Final Eff. 3	Grab	8-28-95	08:20AM	4.0	6.12	35.8	<0.05	0.9°C

Results

Client: WSRC	Sample ID: FHB 014	
Log # : T4437	Start Date: 8-24-95	Time: 2:00 PM

SURVIVAL EFFECTS

Effluent Conc.	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	0%	0%	20%	30%
7 Day Mortality	0%	0%	0%	0%	20%	60%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	FAIL
No-Observed-Effect Concentration (NOEC):				50%		
Lowest-Observed-Effect Concentration (LOEC):				100%		
7 Day LC50:	81.2%					

QUALITY CONTROL

Standard Toxicant:	NaCl
Central Tendency:	1.98 g/L
Current Value:	1.91 g/L
Deviation:	0.29 Std Dev units.

Results

Client: WSRC		Sample ID: FHB 014		IWC:
Log # : T4437	Start Date: 8-24-95		Time: 2:00 PM	

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	18.4	9.56	6.4	6.7	2.3	1.9
Standard Deviation:	2.12	4.8	4.4	5.91	3.3	2.18
t =		4.28	5.97	5.82	8	0.00
Steel's =		58	56	59.5	55	55
MSD= 4.52						

Normality: Data Not Normal W = 0.9

Homogeneity: Data Homogeneous B = 9.06

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.23

Chronic Toxicity

6.25% Chronically Toxic

12.5% Chronically Toxic

25% Chronically Toxic

50% Chronically Toxic

100% Chronically Toxic

No-Observed-Effect Concentration (NOEC): <6.25%

Lowest-Observed-Effect Concentration (LOEC): 6.25%

7 Day EC50: <6.25%

7 Day Chronic Definitive Survival and Reproduction Bioassay

Test Organisms: Ceriodaphnia dubia

Method: EPA/600/4-89/001

Facility: WSRC
Sample ID: FHB-018

Date: 09-07-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client:WSRC										Start Date: 09-07-95										Start Time: 5:20 PM																													
Log #: T4473										Sample ID: FHB-018										End Date: 09-15-95										End Time: 10:50 AM										IWC:									
TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH																						
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new																						
1	0	0	0	0	0	0	0	0	0	8.1	9.3	7.8	8.0	1	0	0	0	0	0	0	0	0	0	8.6	8.6	7.6	7.6																						
2	0	0	0	0	0	0	0	0	0	8.1	8.7	7.8	7.9	2	0	0	0	0	0	0	0	0	0	8.2	8.2	7.5	7.1																						
3	0	0	0	0	0	0	0	0	0	8.4	8.5	7.8	7.9	3	0	0	0	0	0	0	0	0	0	8.2	8.2	7.6	7.2																						
4	3	3	2	3	4	4	5	3	4	8.5	9.3	7.8	7.9	4	3	0	3	0	0	0	3	3	0	1	9.2	9.2	7.2	7.6																					
5	0	0	1	3	0	0	0	0	0	9.2	9.0	8.1	8.1	5	0	0	0	2	5	3	0	0	4	4	8.4	8.5	7.6	7.2																					
6	0	6	4	6	7	0	7	6	4	8.1	8.8	7.6	8.0	6	6	4	4	6	6	5	6	6	6	0	8.5	8.6	7.2	7.9																					
7	0	0	6	0	8	0	8	8	8	8.4	8.4	7.7	7.9	7	8	8	7	0	8	0	8	8	8	7	9.2	9.3	7.9	8.0																					
8	8	9	6	7	0	8	0	0	0	8.0	7.8	7.8	7.8	8	0	4	3	9	0	9	0	0	0	9	8.6	8.0	7.8	7.8																					
TOT11	18	19	19	19	12	20	17	16	20	17				TOT17	16	17	17	19	17	17	17	18	21	18																									
TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH																						
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new																						
1	0	0	0	0	0	0	0	0	0	8.6	8.6	7.4	7.4	1	0	0	0	0	0	0	0	0	0	8.6	8.6	7.7	7.7																						
2	0	0	0	0	0	0	0	0	0	8.5	8.3	7.6	7.2	2	0	0	0	0	0	0	0	0	0	8.2	8.3	7.7	7.1																						
3	0	0	0	0	0	0	0	0	0	8.2	8.3	7.7	7.4	3	0	0	0	0	0	0	0	0	0	8.3	8.3	7.7	7.4																						
4	4	2	0	0	5	0	3	4	0	9.3	9.2	7.8	7.7	4	4	3	4	0	0	0	4	3	4	3	9.2	9.2	7.9	7.8																					
5	0	0	3	3	2	0	0	1	0	8.5	8.5	7.8	7.2	5	0	0	0	0	0	0	0	0	0	0	8.4	8.5	7.8	7.0																					
6	6	5	6	6	6	3	5	6	7	8.6	8.7	7.9	7.9	6	3	4	3	2	3	2	0	4	4	L	8.6	8.7	8.0	8.0																					
7	8	8	7	0	8	0	8	0	6	9.2	9.3	8.0	8.1	7	8	0	0	0	0	0	0	8	8	L	9.3	9.3	8.1	8.1																					
8	0	0	0	6	0	7	0	0	0	8.8	7.8	7.8	7.8	8	0	4	0	4	0	1	0	0	0	L	8.6	8.0	7.8	7.8																					
TOT18	15	16	15	21	10	16	11	13	12	15				TOT15	11	7	6	3	3	4	15	16	3	9																									
TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH																						
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new																						
1	0	0	0	0	0	0	0	0	0	8.6	8.6	7.5	7.5	1	0	0	0	0	0	0	0	0	0	8.6	8.6	3.8	3.8																						
2	0	0	0	0	0	0	0	0	0	8.4	8.4	7.7	6.9	2	0	X	0	0	X	0	0	0	0	8.3	8.2	7.6	5.5																						
3	0	0	0	0	0	0	0	0	0	8.3	8.4	7.7	7.2	3	0	X	0	X	0	X	0	0	0	8.2	8.3	7.8	6.4																						
4	3	2	0	0	0	0	3	3	4	9.2	9.1	7.9	7.8	4	X	X	X	X	X	X	X	X	X	X	9.0	9.0	7.8	7.8																					
5	0	0	0	0	0	0	0	0	0	8.4	8.3	7.9	6.8	5	X	X	X	X	X	X	X	X	X	X	8.4	6.9	7.8	7.8																					
6	0	0	0	0	0	0	0	0	0	8.6	8.6	8.0	7.9	6	X	X	X	X	X	X	X	X	X	X	8.4	6.9	7.8	7.8																					
7	0	0	0	0	0	0	0	0	0	9.4	9.4	8.0	8.0	7	X	X	X	X	X	X	X	X	X	X	8.4	6.9	7.8	7.8																					
8	0	0	0	0	0	0	0	0	0	8.8	7.9	7.9	7.9	8	X	X	X	X	X	X	X	X	X	X	8.4	6.9	7.8	7.8																					
TOT 3	2	0	0	0	0	3	3	4	3	2				TOT 0	0	0	0	0	0	0	0	0	0	0																									
TEM. °C Time										TEM. °C Time										TEM. °C Time										TEM. °C Time																			
Day 0	24.5	05:00 PM	Day 2	24.1	01:50 PM	Day 4	24.6	05:30 PM	Day 6	24.7	02:40 PM	Day 1	24.6	04:00 PM	Day 3	24.3	03:45 PM	Day 5	24.9	02:20 PM	Day 7	24.6	10:50 AM																										

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	09-06-95		82	69.3	183.1		
Final Eff. 1	Grab	09-06-95	09:45AM	8.0	4.08	44.1	<0.05	2.3°C
Final Eff. 2	Grab	09-08-95	09:15AM	10.0	32.6	86.5	<0.05	3.9°C
Final Eff. 3	Grab	09-11-95	08:10AM	6.0	8.16	48.7	N/A	2.7°C

Results

Client: WSRC		Sample ID: FHB-018		
Log # : T4473	Start Date: 09-07-95		Time:	5:20 PM

SURVIVAL EFFECTS

Effluent Conc.	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	0%	0%	0%	30%
7 Day Mortality	0%	0%	0%	0%	0%	100%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
Day Acute Results:	PASS	PASS	PASS	PASS	PASS	FAIL
No-Observed-Effect Concentration (NOEC):				50%		
Lowest-Observed-Effect Concentration (LOEC):				100%		
7 Day LC50:	70.71%					

QUALITY CONTROL

Standard Toxicant: NaCl

Central Tendency: 1.98 g/L
 Current Value: 1.91 g/L
 Deviation: 0.29 Std Dev units.

Results

Client: WSRC		Sample ID: FHB-018		IWC:	
Log # : T4473	Start Date: 09-07-95		Time: 5:20 PM		

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	17.1	17.6	14.7	8.89	1.8	0
Standard Deviation:	3.21	1.43	3.33	5.42	1.62	0.00
t =		-0.3	1.64	5.47	10.5	0.00
Steel's		99.5	82.5	62	55	
MSD= 3.28						

Normality: Data Normal W = 0.96

Homogeneity: Data Not Homogeneous B = 18.5

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.23

Chronic Toxicity

6.25% No Chronic Toxicity

12.5% No Chronic Toxicity

25% Chronically Toxic

50% Chronically Toxic

100% Chronically Toxic

No-Observed-Effect Concentration (NOEC): 12.5%

Lowest-Observed-Effect Concentration (LOEC): 25%

7 Day EC50: 24.06%

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

Test Organisms: *Ceriodaphnia dubia*

Method: EPA/600/4-89/001

Facility: Westinghouse Savannah River Company
Sample ID: FHB-020 Effluent

Date: 8-24-95

Client:WSRC	Start Date: 8-24-95	Start Time: 3:00 PM
Log #: T4438	Sample ID: FHB 020	End Date: 8-31-95
		End Time: 3:45 PM IWC:

TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
0	0	0	0	0	0	0	0	0	0	9.2	9.2	8.1	8.1	0	0	0	0	0	0	0	0	0	0	9.3	9.3	7.5	7.5	
1	0	0	0	0	0	0	0	0	0	10	10	8.0	7.9	1	0	0	0	0	0	0	0	0	0	10	10	8.0	7.8	
2	0	0	0	0	0	0	0	0	0	8.2	8.4	8.0	8.1	2	0	0	0	0	0	0	0	0	0	7.6	7.8	8.4	8.6	
3	0	0	0	0	0	0	0	0	0	8.2	8.5	8.3	8.1	3	0	0	0	0	0	0	0	0	0	8.0	8.0	7.9	7.2	
4	3	2	0	0	0	3	3	4	3	8.6	9.0	7.7	8.0	4	4	3	0	3	0	3	3	4	8.9	8.8	7.6	7.3		
5	0	1	4	3	3	4	5	4	5	8.8	8.4	7.6	7.9	5	0	8	4	0	3	4	5	1	5	0	8.6	8.6	7.6	7.3
6	5	3	3	4	6	4	0	0	0	8.6	9.4	7.7	7.9	6	2	0	0	0	0	0	0	0	0	8.6	8.6	7.8	7.6	
7	10	9	10	9	8	8	9	10	9	7.8	7.8	7.8	7.8	7	10	9	10	9	7	8	6	9	6	10	8.4	7.6	7.6	7.6
TOT18	15	17	16	17	16	17	17	18	15	17				TOT16	20	14	12	10	12	14	13	14	14	14				

TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH		
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new		
0	0	0	0	0	0	0	0	0	0	9.3	9.3	7.4	7.4	0	0	0	0	0	0	0	0	0	0	9.2	9.2	7.0	7.0		
1	0	0	0	0	0	0	0	0	0	10	10	8.0	7.6	1	0	0	0	0	0	0	0	0	0	10	10	8.0	7.4		
2	0	0	0	0	0	0	0	0	0	7.7	7.8	8.0	7.9	2	0	0	0	0	0	0	0	0	0	7.8	7.8	8.0	7.8		
3	0	0	0	0	0	0	0	0	0	8.0	8.0	8.1	7.5	3	L	4	5	4	3	4	4	3	3	8.0	8.0	8.1	7.3		
4	3	2	6	4	0	4	1	4	3	3	8.8	8.8	7.8	7.4	4	L	3	4	4	2	0	6	5	1	7	8.8	8.8	7.8	7.3
5	0	2	0	7	3	0	3	4	5	0	8.6	8.6	7.7	7.3	5	L	0	0	0	0	0	0	0	0	8.6	8.6	7.7	7.2	
6	4	0	4	0	0	0	0	0	1	3	8.6	8.5	7.8	7.5	6	L	0	6	6	0	0	4	4	2	7	8.4	8.4	7.8	7.4
7	8	6	5	2	2	5	2	0	3	2	8.5	7.7	7.7	7	L	0	0	0	0	0	0	0	0	8.6	7.7	7.7	7.7		
TOT15	10	15	13	5	9	6	8	12	8	10				TOT 0	7	15	14	5	4	14	13	6	17	11					

TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
0	0	0	0	0	0	0	0	0	0	9.3	9.3	6.7	6.7	0	0	0	0	0	0	0	0	0	0	9.0	9.0	6.0	6.0	
1	0	0	0	0	0	0	0	0	0	10	10	7.9	7.0	1	0	0	0	0	0	0	0	0	0	10	10	7.7	6.3	
2	0	0	0	0	0	0	0	0	0	7.9	7.8	7.9	7.5	2	0	0	0	0	0	0	0	0	0	7.8	7.8	8.0	7.2	
3	0	0	0	0	0	0	0	0	0	8.0	8.0	8.0	7.0	3	0	0	0	0	0	0	0	0	0	8.0	7.9	7.8	6.6	
4	1	4	0	4	4	4	0	4	4	4	8.8	8.8	7.8	7.0	4	0	0	0	0	0	0	0	0	0	8.7	8.8	7.6	6.4
5	3	7	4	5	7	5	7	4	6	7	8.6	8.6	7.7	6.8	5	0	0	0	3	3	0	0	0	0	8.4	8.2	7.6	5.9
6	4	5	0	0	0	0	0	0	0	0	8.4	8.4	7.8	7.1	6	0	1	2	0	0	0	0	1	1	8.3	8.3	7.8	5.9
7	2	0	4	0	0	5	3	1	3	0	8.5	7.6	7.6	7	0	1	0	1	0	0	0	0	0	0	8.5	7.5	7.5	7.5
TOT10	16	8	9	11	14	10	9	13	11	11				TOT 0	2	2	1	3	3	0	0	1	1	1				

TEM. °C	Time	TEM. °C	Time	TEM. °C	Time	TEM. °C	Time
Day 0 24.0	03:00 PM	Day 2 24.0	02:05 PM	Day 4 24.2	02:45 PM	Day 6 24.0	02:00 PM
Day 1 24.0	10:30 AM	Day 3 25.6	03:15 PM	Day 5 24.0	03:40 PM	Day 7 24.8	03:45 PM

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	08-24-95		90	73.4	194.3		
Final Eff. 1	Grab	8-23-95	08:20AM	6.0	12.24	37.7	<0.05	0.9°C
Final Eff. 2	Grab	8-25-95		6.0	12.24	41.1	<0.05	0.9°C
Final Eff. 3	Grab	8-28-95	08:10AM	10.0	4.08	36.7	<0.05	0.9°C

Results

Client: WSRC	Sample ID: FHB 020	
Log # : T4438	Start Date: 8-24-95	Time: 3:00 PM

SURVIVAL EFFECTS

Effluent Conc.	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	0%	0%	0%	0%
7 Day Mortality	0%	0%	0%	0%	0%	0%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
No-Observed-Effect Concentration (NOEC):		100%				
Lowest-Observed-Effect Concentration (LOEC):		>100%				
7 Day LC50:		>100%				

QUALITY CONTROL

Standard Toxicant:	NaCl
Central Tendency:	1.98 g/L
Current Value:	1.91 g/L
Deviation:	0.29 Std Dev units.

Results

Client: WSRC		Sample ID: FHB 020		IWC:
Log # : T4438	Start Date: 8-24-95		Time: 3:00 PM	

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	16.6	13.9	10.1	10.6	11.1	1.3
Standard Deviation:	1.07	2.69	3.54	4.98	2.51	1.16
t =		2.06	4.96	4.49	4.2	11.67
Steel's =		68	57	62	58	55
MSD= 3.05						

Normality: Data Not Normal W = 0.87

Homogeneity: Data Not Homogeneous B = 26.1

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.31

Chronic Toxicity

6.25%	Chronically Toxic
12.5%	Chronically Toxic
25%	Chronically Toxic
50%	Chronically Toxic
100%	Chronically Toxic

No-Observed-Effect Concentration (NOEC): <6.25%
 Lowest-Observed-Effect Concentration (LOEC): 6.25%
 7 Day EC50: 36.74%

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

Test Organisms: Ceriodaphnia dubia

Method: EPA/600/4-89/001

Facility: WSRC
Sample ID: FHB-021

Date: 09-07-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client:WSRC										Start Date: 09-07-95										Start Time: 5:40 PM																			
Log #: T4474										Sample ID: FHB-021										End Date: 09-15-95										End Time: 11:00 AM IWC:									
TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH												
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new												
1	0	0	0	0	0	0	0	0	0	8.1	9.3	7.8	8.0	1	0	0	0	0	0	0	0	0	0	8.5	8.5	7.5	7.5												
2	0	0	0	0	0	0	0	0	0	8.1	8.7	7.8	7.9	2	0	0	0	0	0	0	0	0	0	8.3	8.3	7.5	7.2												
3	0	0	0	0	0	0	0	0	0	8.4	8.5	7.8	7.9	3	0	0	0	0	0	0	0	0	0	8.4	8.5	7.7	7.4												
4	3	3	2	3	4	3	5	3	3	8.5	9.3	7.8	7.9	4	4	5	4	3	2	2	3	2	3	2	9.0	9.1	7.9	7.7											
5	0	0	3	3	0	0	0	0	6	9.2	9.0	8.1	8.1	5	0	0	0	0	0	0	0	0	0	0	9.2	9.2	7.8	7.7											
6	7	0	0	4	6	1	6	4	0	8.1	8.8	7.6	8.0	6	5	6	7	0	0	6	2	0	0	0	8.5	8.4	7.8	7.8											
7	0	8	7	0	0	0	8	8	9	8.4	8.4	7.7	7.9	7	0	0	0	4	7	0	0	0	6	0	9.0	9.2	8.0	8.0											
8	8	8	4	8	8	7	0	0	0	8.0	7.8	7.8	7.8	8	8	7	7	8	3	8	0	8	8	9	8.6	8.0	8.0	8.0											
TOT18	19	16	18	18	11	19	15	18	17	17				TOT17	18	18	15	12	16	5	10	17	11	14															
TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH												
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new												
1	0	0	0	0	0	0	0	0	0	8.5	8.5	7.4	7.4	1	0	0	0	0	0	0	0	0	0	8.4	8.4	7.5	7.5												
2	0	0	0	0	0	0	0	0	0	8.3	8.4	7.6	7.4	2	0	0	0	0	0	0	0	0	0	8.4	8.4	7.6	7.4												
3	0	0	0	0	0	0	0	0	0	8.4	8.5	7.8	7.6	3	0	0	0	0	0	0	0	0	0	8.4	8.4	7.8	7.6												
4	3	4	3	4	6	3	3	3	4	9.2	9.1	7.9	7.8	4	0	3	2	3	0	5	0	4	3	0	9.2	9.1	7.9	7.8											
5	0	0	7	0	0	0	0	6	7	9.1	9.2	7.9	7.8	5	7	0	0	0	0	1	3	0	0	0	9.3	9.2	8.0	7.8											
6	5	5	0	0	0	6	6	0	0	8.5	8.6	7.9	7.9	6	0	3	0	0	0	2	5	5	4	6	8.6	8.6	7.9	7.9											
7	0	0	8	8	0	0	0	8	8	9.1	9.2	8.0	8.1	7	0	0	0	0	0	0	0	0	8	8	9.2	9.2	8.0	8.1											
8	0	7	0	0	7	0	0	0	0	8.8	7.8	7.8	7.8	8	4	6	3	4	0	0	0	0	0	0	8.6	7.8	7.8	7.8											
TOT 8	16	18	12	13	9	9	17	19	19	14				TOT11	12	5	7	0	8	8	9	15	14	9															
TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH												
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new												
1	0	0	0	0	0	0	0	0	0	8.5	8.5	7.5	7.5	1	0	0	0	0	0	0	0	0	0	8.5	8.5	7.7	7.7												
2	0	0	0	0	0	0	0	0	0	8.5	8.4	7.8	7.4	2	0	0	0	0	0	0	0	0	0	8.5	8.5	7.8	7.5												
3	0	0	0	0	0	0	0	0	0	8.5	8.5	7.9	7.6	3	0	0	0	0	0	0	0	0	0	8.5	8.5	7.9	7.4												
4	3	3	3	5	3	3	0	0	4	9.3	9.2	7.9	7.8	4	3	3	3	4	3	4	0	0	3	0	9.0	9.1	7.9	7.7											
5	0	0	1	0	0	0	3	2	0	9.0	9.3	8.0	7.7	5	0	0	0	6	0	0	3	2	0	3	8.8	9.7	8.0	7.3											
6	3	5	0	2	5	2	7	0	5	8.5	8.6	7.9	7.9	6	0	0	1	0	0	6	3	3	0	4	8.6	8.6	8.0	7.8											
7	0	0	0	0	0	0	0	0	0	9.2	9.2	8.0	8.0	7	0	0	0	0	0	0	0	0	0	0	9.2	9.2	8.0	7.9											
8	0	0	4	0	0	0	0	3	0	8.6	8.0	8.0	8.0	8	0	0	0	0	0	0	0	0	0	0	8.8	8.1	8.1	8.1											
TOT 6	8	8	7	8	5	10	5	9	5	7				TOT 3	3	4	10	3	10	6	5	3	7	5															
TEM. °C Time										TEM. °C Time										TEM. °C Time																			
Day 0	24.5	05:40 PM	Day 2	24.1	02:30 PM	Day 4	24.6	04:15 PM	Day 6	24.7	03:20 PM	Day 1	24.6	04:20 PM	Day 3	24.3	04:15 PM	Day 5	24.9	03:00 PM	Day 7	24.6	11:00 AM																

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	09-06-95		82	69.3	183.1		
Final Eff. 1	Grab	09-06-95	10:15AM	4.0	6.12	46.1	<0.05	2.3°C
Final Eff. 2	Grab	09-08-95	09:30AM	8.0	6.12	44.7	<0.05	3.9°C
Final Eff. 3	Grab	09-11-95	08:30AM	6.0	6.12	45.4	N/A	2.7°C

Results

Client: WSRC		Sample ID: FHB-021		
Log # : T4474	Start Date: 09-07-95	Time: 5:40 PM		

SURVIVAL EFFECTS

Effluent Conc.	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	0%	0%	0%	0%
7 Day Mortality	0%	0%	0%	0%	0%	0%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
No-Observed-Effect Concentration (NOEC):		100%				
Lowest-Observed-Effect Concentration (LOEC):		>100%				
7 Day LC50:		>100%				

QUALITY CONTROL

Standard Toxicant:		NaCl	
Central Tendency:	1.98	g/L	
Current Value:	1.91	g/L	
Deviation:	0.29	Std Dev units.	

Results

Client: WSRC		Sample ID: FHB-021	IWC:
Log # : T4474	Start Date: 09-07-95	Time: 5:40 PM	

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	16.9	13.9	14	8.9	7.1	5.4
Standard Deviation:	2.42	4.28	4.35	4.43	1.79	2.80
t =		1.91	1.85	5.1	6.25	7.33
Steel's =		79.5	87	59	55	55
MSD= 3.62						

Normality: Data Not Normal W = 0.84

Homogeneity: Data Homogeneous B = 10.7

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.31

Chronic Toxicity

6.25% No Chronic Toxicity

12.5% No Chronic Toxicity

25% Chronically Toxic

50% Chronically Toxic

100% Chronically Toxic

No-Observed-Effect Concentration (NOEC): 12.5%

Lowest-Observed-Effect Concentration (LOEC): 25%

7 Day EC50: 24.05%

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

Method: EPA/600/4-89/001

Test Organism: *Ceriodaphnia dubia*

Facility: Westinghouse Savannah River Company
Sample ID: FHB-022

Date: 8/24/95

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: Westinghouse Savannah River Company
 Sample Identification: FHB-022
 Test Date: 8/24/95

Reproduction at 0.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	3	0	4	0	10	17
2	0	4	5	0	9	18
3	0	4	5	0	9	18
4	1	3	6	0	9	19
5	0	3	7	0	8	18
6	0	4	6	9	0	19
7	2	3	5	7	0	17
8	4	1	6	0	9	20
9	0	7	3	9	0	19
10	4	5	0	7	0	16

Reproduction at 6.25% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	2	1	0	7	13	23
2	0	3	2	5	9	19
3	0	3	0	8	8	19
4	4	0	4	0	6	14
5	4	0	0	0	5	9
6	2	0	3	0	10	15
7	4	5	0	0	9	18
8	4	3	0	5	8	20
9	3	4	0	0	8	15
10	3	0	0	6	11	20

Reproduction at 12.5% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	1	3	0	0	7	11
2	0	4	0	0	5	9
3	0	3	0	0	2	5
4	0	3	0	0	6	9
5	0	4	0	0	7	11
6	0	3	0	8	9	20
7	4	2	0	0	6	12
8	4	X	X	X	X	4
9	4	0	0	0	7	11
10	3	0	0	0	5	8

Reproduction at 25.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	2	2	0	0	6	10
2	4	0	8	0	2	14
3	4	0	0	0	0	4
4	3	1	0	0	6	10
5	3	0	0	0	0	3
6	0	0	0	4	4	8
7	5	3	0	5	2	15
8	0	4	0	0	0	4
9	5	0	2	0	1	8
10	4	0	0	0	7	11

Reproduction at 50.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	0	0	0	0	0
2	0	3	7	0	2	12
3	5	1	0	5	7	18
4	1	3	0	0	5	9
5	0	3	0	0	6	9
6	0	4	0	0	1	5
7	5	0	0	0	0	5
8	4	1	0	5	1	11
9	X	X	X	X	X	0
10	3	2	0	3	4	12

Reproduction at 100.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	4	0	0	0	4
2	4	0	6	8	0	18
3	2	5	0	5	3	15
4	2	3	0	4	3	12
5	0	3	5	5	0	13
6	3	0	0	5	3	11
7	0	0	4	5	5	14
8	3	2	0	4	3	12
9	X	X	X	X	X	0
10	2	2	0	2	0	6

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Statistical Analyses

Client: Westinghouse Savannah River Company
Sample Identification: FHB-022
Test Date: 8/24/95

Test for Normality

Test Used: Shapiro Wilks W= 0.976
critical 0.93

The data are normal in distribution

Test for Homogeneity of Variance

Test Used: Bartlett's Test	B=	17.63
	critical	15.1

The data are not homogeneous in variance

Test for Differences in Reproduction

Test Type Used: Wilcoxon's Test

t Test

Test Concentration

	Control	6.25%	12.5%	25%	50%	100%
t Value		0.46	4.15	4.82	5.13	3.90
critical		2.33	2.33	2.33	2.33	
mean	18.1	17.2	10	8.7	8.1	10.5

MSD= 4.54

Wilcoxon's Test

Test Concentration

	6.25%	12.5%	25%	50%	100%
Rank Sum	103.5	64.5	55		
critical	75	75	75

Summary

The No Observed Effect Concentration (NOEC) was 6.25%
The Lowest Observed Effect Concentration (LOEC) was 12.5%
The Chronic Value (ChV) was 8.8%

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Water Chemistry

Client: Westinghouse Savannah River Company
 Sample Identification: FHB-022
 Test Date: 8/24/95

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	8.12	7.74	7.61	7.53	7.30	6.65
Day 1	7.97	7.77	7.71	7.51	7.46	7.32
Day 2	8.19	7.48	7.62	7.63	7.57	7.44
Day 3	8.15	7.17	7.46	7.51	7.40	7.11
Day 4	8.01	7.68	7.68	7.58	7.29	6.91
Day 5	7.95	7.53	7.59	7.59	7.11	7.10
Day 6	7.96	7.66	7.66	7.58	7.50	7.20

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.08	7.85	7.93	7.95	7.95	7.82
Day 2	8.05	7.73	7.86	7.91	7.92	7.92
Day 3	8.31	7.93	8.07	8.10	8.09	8.03
Day 4	7.73	7.77	7.90	7.93	7.88	7.82
Day 5	7.66	7.74	7.79	7.81	7.55	7.58
Day 6	7.73	7.72	7.79	7.81	7.82	7.74
Final	7.86	8.12	7.98	8.14	8.01	7.98

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	9.2	9.3	9.3	9.3	9.4	9.3
Day 1	7.5	8.4	7.8	8.5	8.5	8.5
Day 2	8.4	7.7	7.8	7.8	7.9	7.9
Day 3	8.5	7.8	8.6	7.8	7.8	7.9
Day 4	9.0	8.5	8.4	8.6	8.8	9.3
Day 5	8.4	8.5	8.4	8.4	8.2	8.4
Day 6	9.4	8.4	8.5	8.2	8.3	8.2

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.0	8.4	8.4	8.5	8.4	8.5
Day 2	8.2	7.6	7.7	7.8	7.8	7.9
Day 3	8.2	7.8	7.8	7.8	7.8	7.8
Day 4	8.6	8.6	8.6	8.6	8.6	8.7
Day 5	8.8	8.5	8.6	8.4	8.3	8.4
Day 6	8.6	8.4	8.4	8.3	8.3	8.3
Final	7.8	8.4	8.4	8.2	8.4	8.1

Dilution Water & Effluent Parameters

	Res Cl.	Alkalinity	Hard.	Cond.	
	mg/L	mg/L	mg/L	µmhos	
Eff. Sample 1	<0.05	28.56	20	69.3	
Eff. Sample 2	<0.05	30.6	20	67.6	
Eff. Sample 3	<0.05	8.16	10	39.9	
Dilution Water		66.9	100	189.2	

Temperature

Incubator °C	
Initial	24.0
Day 1	24.0
Day 2	24.0
Day 3	25.6
Day 4	24.2
Day 5	24.0
Day 6	24.0
Final	24.8

7 Day Chronic Definitive Survival and Reproduction Bioassay

Test Organisms: Ceriodaphnia dubia

Method: EPA/600/4-89/001

Facility: Westinghouse Savannah River Company
Sample ID: FHB-023 Effluent

Date: 8-24-95

Client:WSRC				Start Date: 8-24-95				Start Time: 4:30 PM											
Log #: T4440				Sample ID: FHB 023				End Date: 8-31-95				End Time: 2:00 PM				IWC:			

TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH		
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new		
0	0	0	0	0	0	0	0	0	0	10	9.2	10	8.1	0	0	0	0	0	0	0	0	0	0	10	9.3	10	7.6		
1	0	0	0	0	0	0	0	0	0	10	10	8.0	7.9	1	0	0	0	0	0	0	0	0	0	8.9	9.0	7.6	6.8		
2	0	0	0	0	0	0	0	0	0	8.2	8.4	8.0	8.1	2	0	0	0	0	0	0	0	0	0	7.9	7.9	8.1	7.9		
3	0	0	0	0	0	0	0	0	0	8.2	8.5	8.3	8.1	3	0	0	0	0	0	0	0	0	0	8.0	8.0	8.0	7.5		
4	3	0	0	3	3	4	4	4	5	4	8.6	9.0	7.7	8.0	4	4	2	0	0	0	4	4	4	3	3	8.6	8.5	7.9	7.7
5	5	3	4	5	5	0	0	0	5	0	8.8	8.4	7.6	7.9	5	0	4	3	4	3	0	0	0	0	8.7	8.8	7.7	7.5	
6	0	4	6	9	5	6	7	6	2	6	8.6	9.4	7.7	7.9	6	5	10	0	1	6	6	8	6	5	8.4	8.4	7.5	7.3	
7	10	9	9	0	6	8	9	8	10	9	7.8	7.8	7.8	7	7	0	12	7	6	5	5	8	7	10	8.4	7.5	7.5	7.3	
TOT18	16	19	17	19	18	20	18	22	19	19				TOT16	16	15	12	15	15	17	18	16	18	16					

TEST CONCENTRATION 12.5%														D.O	D.O	pH	pH	TEST CONCENTRATION 25%														D.O	D.O	pH	pH
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new								
0	0	0	0	0	0	0	0	0	0	9.3	9.3	7.5	7.5	0	0	0	0	0	0	0	0	0	0	9.4	9.4	7.4	7.4								
1	0	0	0	0	0	0	0	0	0	9.0	9.0	7.7	7.4	1	0	0	0	0	0	0	0	0	0	9.0	9.0	7.7	7.4								
2	0	0	0	0	0	0	0	0	0	7.9	7.9	8.0	7.7	2	0	0	0	0	0	0	0	0	0	7.8	7.9	7.4	7.5								
3	0	0	0	0	0	0	0	0	0	8.0	8.0	8.1	7.7	3	0	0	0	0	0	0	0	0	0	8.1	8.0	7.5	7.7								
4	4	3	0	5	0	3	4	5	4	5	8.4	8.5	7.8	7.7	4	4	0	1	5	0	4	3	4	3	0	8.5	8.5	7.7	7.6						
5	0	0	4	0	3	0	0	0	0	8.7	8.8	7.7	7.5	5	6	2	2	0	3	0	0	0	0	3	8.8	8.8	7.6	7.2							
6	0	7	0	2	0	4	0	0	5	0	8.4	8.4	7.6	7.3	6	0	3	0	2	0	3	0	0	4	2	8.4	8.3	7.2	7.2						
7	12	5	9	10	11	7	7	9	0	8	8.4	7.3	7.3	7	4	5	6	4	7	6	9	7	5	0	8.3	7.2	7.2	7.2							
TOT16	15	13	17	14	14	11	14	9	13	14				TOT14	10	9	11	10	13	12	11	12	5	11											

TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
0	0	0	0	0	0	0	0	0	0		9.4		7.2	0	0	0	0	0	0	0	0	0	0		9.4		7.0	
1	0	0	0	0	0	0	0	0	0	8.8	8.9	7.3	7.1	1	0	0	0	0	0	0	0	0	0	8.9	8.9	7.7	7.2	
2	0	0	0	0	0	0	0	0	0	7.9	8.0	8.0	7.1	2	0	0	0	0	0	0	0	0	0	7.7	7.8	7.2	7.3	
3	0	0	0	0	0	0	0	0	0	8.1	8.2	8.1	7.6	3	0	0	0	0	0	0	0	0	0	7.8	8.0	7.3	7.2	
4	2	0	2	4	3	4	4	4	4	8.4	8.6	7.7	7.3	4	3	4	4	4	3	3	3	2	3	4	8.4	8.8	7.2	6.9
5	0	2	0	0	0	0	0	0	0	8.7	8.7	7.7	6.9	5	0	0	0	0	0	0	0	0	0	8.7	8.8	6.9	5.3	
6	0	6	2	8	4	7	0	0	10	0	8.4	8.4	7.7	7.0	6	0	6	0	7	4	0	0	0	0	8.1	8.0	5.3	6.0
7	6	2	3	0	5	0	8	7	0	9	8.4		7.6	7	X	0	X	3	5	X	0	5	6	X	8.4		6.0
TOT 8	10	7	12	12	11	12	11	14	13	11				TOT 3	10	4	14	12	3	3	7	9	4	7				

TEM.°C	Time	TEM.°C	Time	TEM.°C	Time	TEM.°C	Time
Day 0 24.0	04:30 PM	Day 2 24.0	02:50 PM	Day 4 24.2	04:00 PM	Day 6 24.0	03:50 PM
Day 1 24.0	01:00 PM	Day 3 25.6	01:40 PM	Day 5 24.0	02:30 PM	Day 7 24.8	02:00 PM

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	08-24-95		90	73.4	194.3		
Final Eff. 1	Grab	8-23-95	09:00AM	10.0	12.24	37.3	<0.05	0.9°C
Final Eff. 2	Grab	8-25-95	09:25AM	10.0	8.16	8.16	<0.05	0.9°C
Final Eff. 3	Grab	8-28-95	07:50AM	12.0	2.04	29.4	<0.05	0.9°C

Results

Client: WSRC		Sample ID: FHB 023		
Log # : T4440	Start Date: 8-24-95		Time: 4:30 PM	

SURVIVAL EFFECTS

Effluent Conc.	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	0%	0%	0%	0%
7 Day Mortality	0%	0%	0%	0%	0%	40%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
No-Observed-Effect Concentration (NOEC):		100%				
Lowest-Observed-Effect Concentration (LOEC):		>100%				
7 Day LC50:		>100%				

QUALITY CONTROL

Standard Toxicant:		NaCl	
Central Tendency:	1.98	g/L	
Current Value:	1.91	g/L	
Deviation:	0.29	Std Dev units.	

Results

Client: WSRC		Sample ID: FHB 023		IWC:
Log # : T4440	Start Date: 8-24-95		Time: 4:30 PM	

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	18.6	15.8	13.6	10.7	11	6.9
Standard Deviation:	1.65	1.75	2.32	2.5	2.16	4.12
t =		2.45	4.38	6.92	6.66	10.26
Steel's =		65	57	55	55	55
MSD= 2.64						

Normality: Data Not Normal W = 0.87

Homogeneity: Data Homogeneous B = 10.7

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.31

Chronic Toxicity

6.25%	Chronically Toxic
12.5%	Chronically Toxic
25%	Chronically Toxic
50%	Chronically Toxic
100%	Chronically Toxic

No-Observed-Effect Concentration (NOEC): <6.25%
 Lowest-Observed-Effect Concentration (LOEC): 6.25%
 7 Day EC50: 63.73%

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

Test Organisms: *Ceriodaphnia dubia*

Method: EPA/600/4-89/001

Facility: Westinghouse Savannah River Corporation

Sample ID: FMC 002H

Date: 8-17-95

DEFINITIVE SURVIVAL AND REPRODUCTION

Client:WSRC		Start Date: 8-17-95	Start Time: 4:30 PM
Log #: T4394	Sample ID: FMC002H	End Date: 8-24-95	End Time: 3:30 PM IWC:

TEST CONCENTRATION: 0%										D.O	D.O	pH	pH	TEST CONCENTRATION: 6.25%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
0	0	0	0	0	0	0	0	0	0	8.8	9.1	7.9	7.9	0	0	0	0	0	0	0	0	0	0	8.4	8.1	7.5	7.4	
1	0	0	0	0	0	0	0	0	0	8.8	8.9	7.9	7.9	1	0	0	0	0	0	0	0	0	0	8.4	8.4	7.5	7.3	
2	0	0	0	0	0	0	0	0	0	8.4	8.6	7.9	7.9	2	0	0	0	0	0	0	0	0	0	8.6	8.6	7.7	7.9	
3	3	0	0	0	0	0	0	0	0	8.5	8.5	8.2	8.0	3	0	0	0	0	3	0	0	0	3	8.6	8.6	7.7	7.9	
4	0	3	2	3	3	3	2	3	0	9.2	8.7	7.7	8.0	4	0	0	4	0	2	0	3	0	4	0	9.6	9.6	7.8	6.8
5	9	0	5	7	7	8	5	5	6	8.1	8.8	7.6	8.2	5	4	0	0	3	6	5	6	0	0	5	9.5	9.4	7.8	7.2
6	0	5	8	0	0	0	0	0	0	10	9.3	8.0	8.3	6	0	3	8	0	0	0	0	3	7	0	10	10	7.6	7.4
7	9	10	6	9	9	10	8	10	8	9.2	8.0	8.0	8.0	7	6	5	0	X	8	7	9	6	9	10	9.2	7.7	7.7	7.7
TOT21	18	21	19	19	21	16	17	19	18	19				TOT10	8	12	3	16	15	18	9	20	18	13				

TEST CONCENTRATION 12.5%										D.O	D.O	pH	pH	TEST CONCENTRATION 25%										D.O	D.O	pH	pH	
Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day A	B	C	D	E	F	G	H	I	J	old	new	old	new	
0	0	0	0	0	0	0	0	0	0	8.3	8.3	7.1	7.1	0	0	0	0	0	0	0	0	0	0	8.1	8.1	7.4	7.4	
1	0	0	0	0	0	0	0	0	0	8.3	8.4	7.5	7.5	1	0	0	0	0	0	0	0	0	0	8.3	8.2	7.5	7.4	
2	0	0	0	0	0	0	0	0	0	8.6	8.6	7.9	8.0	2	0	0	0	0	0	0	0	0	0	8.6	8.6	7.8	8.0	
3	0	0	0	0	0	0	0	0	0	8.4	8.6	7.8	7.8	3	0	0	0	0	0	0	0	0	3	8.6	8.6	7.8	7.6	
4	0	3	4	4	4	3	2	0	0	9.8	9.6	7.8	7.2	4	3	3	3	0	2	0	0	0	0	9.7	9.7	7.6	6.9	
5	3	0	0	8	7	5	4	7	6	9.5	9.5	7.8	7.4	5	0	5	0	3	5	2	6	0	6	6	9.6	9.5	7.8	7.4
6	0	6	7	0	0	0	0	0	0	10	10	7.8	7.6	6	3	0	6	0	0	0	0	0	0	10	10	7.9	7.6	
7	8	5	0	5	4	7	6	10	8	9.4	7.6	7.6	7.6	7	0	5	6	3	6	5	8	0	5	6	9.4	7.7	7.7	7.7
TOT11	14	11	17	15	15	12	17	14	17	14				TOT 6	13	15	6	13	7	14	0	11	15	10				

TEST CONCENTRATION 50%										D.O	D.O	pH	pH	TEST CONCENTRATION 100%										D.O	D.O	pH	pH			
Day	A	B	C	D	E	F	G	H	I	J	old	new	old	new	Day	A	B	C	D	E	F	G	H	I	J	old	new	old	new	
0	0	0	0	0	0	0	0	0	0	0	8.2	8.2	7.1	7.1	0	0	0	0	0	0	0	0	0	0	0	8.1	8.1	6.7	6.7	
1	0	0	0	0	0	0	0	0	0	0	8.1	8.2	7.5	7.2	1	0	0	0	0	0	0	0	0	0	0	8.2	8.2	7.4	7.0	
2	0	0	0	0	0	0	0	0	0	0	8.6	8.6	7.8	8.0	2	X	X	0	X	0	0	0	0	0	0	8.6	8.6	7.8	7.9	
3	0	0	0	0	0	0	0	0	0	0	8.6	8.6	7.8	7.4	3	X	X	0	X	0	0	0	0	0	0	8.6	8.6	7.8	7.1	
4	0	0	3	2	3	0	4	4	3	3	9.8	9.7	7.5	6.7	4	X	X	0	X	3	0	0	0	0	0	9.7	9.7	7.5	6.4	
5	4	3	0	0	5	3	0	0	0	0	9.3	9.5	7.7	7.4	5	X	X	0	X	0	2	3	0	3	3	9.5	9.5	7.7	7.1	
6	0	0	5	4	0	0	0	0	4	0	10	10	7.9	7.4	6	X	X	2	X	0	2	2	4	4	0	10	10	7.9	7.2	
7	0	5	5	0	3	5	5	4	2	7	9.4	7.6	7.6	7.6	7	X	X	0	X	0	0	0	0	1	4	9.3	7.6	7.6	7.6	
TOT	4	8	13	6	11	8	9	8	9	10	9				TOT	0	0	2	0	3	4	5	4	8	7	3				

TEM. °C	Time	TEM. °C	Time	TEM. °C	Time	TEM. °C	Time
Day 0 24.3	04:30 PM	Day 2 24.0	05:00 PM	Day 4 24.0	03:00 PM	Day 6 24.0	10:15 AM
Day 1 24.0	04:15 PM	Day 3 24.0	01:30 PM	Day 5 24.0	04:00 PM	Day 7 24.0	03:30 PM

SAMPLING INFORMATION

	Type	Start Date	Time	Hardness Mg/L	Alkalinity	Conductivity	Res. Cl	Rec.Temp.
Dilution Water	20%DMW	8-16-95		84.0	66.9	220		
Final Eff. 1	Grab	8-16-95	8:00AM	24.0	30.4	40.0	<0.05	0.8°C
Final Eff. 2	Grab	8-18-95	8:30AM	20.0	34.68	43.6	<0.05	0.4°C
Final Eff. 3	Grab	8-21-95	8:20AM	22.0	30.6	68.3	<0.05	0.7°C

Results

Client: WSRC		Sample ID: FMC002H		
Log # : T4394	Start Date: 8-17-95		Time: 4:30 PM	

SURVIVAL EFFECTS

Effluent Conc.	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
48 hr. Mortality	0%	0%	0%	0%	0%	30%
7 Day Mortality	0%	10%	0%	0%	0%	30%

Method: Fishers Exact Test

Acute Toxicity	Control	Effluent				
		6.25%	12.5%	25%	50%	100%
48 Hr. Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
7 Day Acute Results:	PASS	PASS	PASS	PASS	PASS	PASS
No-Observed-Effect Concentration (NOEC):		100%				
Lowest-Observed-Effect Concentration (LOEC):		>100%				
7 Day LC50:		>100%				

QUALITY CONTROL

Standard Toxicant:		NaCl	
Central Tendency:	1.98	g/L	
Current Value:	1.91	g/L	
Deviation:	0.29	Std Dev units.	

Results

Client: WSRC		Sample ID: FMC002H		IWC:
Log # : T4394	Start Date: 8-17-95		Time: 4:30 PM	

CHRONIC EFFECTS

TEST CONCENTRATION	Control	Effluent				
	SC.DMW	6.25%	12.5%	25%	50%	100%
Average young / female:	18.9	12.9	14.3	10	8.6	3.3
Standard Deviation:	1.73	5.4	2.36	5.01	2.5	2.87
t =		3.74	2.86	5.54	6.41	9.71
Steel's =		68.5	59.5	55	55	55
MSD= 3.71						

Normality: Data Not Normal W = 0.85

Homogeneity: Data Not Homogeneous B = 17.2

Test Used: Steel's Test

Critical Steel's Value: 75

Critical t Value: 2.31

Chronic Toxicity

6.25% Chronically Toxic

12.5% Chronically Toxic

25% Chronically Toxic

50% Chronically Toxic

100% Chronically Toxic

No-Observed-Effect Concentration (NOEC): <6.25%

Lowest-Observed-Effect Concentration (LOEC): 6.25%

7 Day EC50: 27.71

APPENDIX C

WATER TOXICITY RESULTS, FEBRUARY-APRIL 1996

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

Method: EPA/600/4-89/001

Test Organism: *Ceriodaphnia dubia*

Facility: Westinghouse Savannah River Company
Sample ID: BG001

Date: 2/22/96

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: Westinghouse Savannah River Company
 Sample Identification: BG001
 Test Date: 2/22/96

Reproduction at 0.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	5	0	9	11	25
2	6	3	8	0	0	17
3	5	8	8	0	0	21
4	4	7	8	0	0	19
5	3	0	9	12	0	24
6	5	0	8	0	14	27
7	5	0	7	11	0	23
8	5	6	9	0	0	20
9	5	8	0	9	0	22
10	5	8	0	10	0	23

Reproduction at 6.25% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	5	6	0	0	13	24
2	4	7	8	0	0	19
3	5	6	9	0	0	20
4	6	6	10	0	0	22
5	4	8	10	0	0	22
6	5	0	8	12	0	25
7	5	0	9	0	12	26
8	6	8	10	0	0	24
9	5	9	0	12	0	26
10	5	8	0	11	0	24

Reproduction at 1.25% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	5	10	0	8	0	23
2	3	6	8	0	0	17
3	5	9	10	0	0	24
4	4	8	8	0	0	20
5	5	0	9	12	0	26
6	4	7	8	0	0	19
7	4	0	9	0	10	23
8	4	0	9	0	8	21
9	5	8	0	12	0	25
10	4	L	L	L	L	L

Reproduction at 25.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	5	8	0	13	0	26
2	4	4	9	0	0	17
3	5	6	7	0	0	18
4	5	4	0	12	0	21
5	4	0	10	12	0	26
6	4	0	0	6	14	24
7	4	0	9	0	10	23
8	4	6	9	0	0	19
9	3	8	0	10	0	21
10	4	8	0	11	0	23

Reproduction at 50.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	7	10	0	0	21
2	5	7	7	0	0	19
3	4	9	10	0	0	23
4	4	5	0	10	0	19
5	3	0	12	11	0	26
6	4	0	0	7	0	11
7	4	0	0	0	7	11
8	2	6	6	0	10	24
9	2	5	0	8	0	15
10	4	9	0	10	0	23

Reproduction at 100.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	X	X	X	X	X	0
2	X	X	X	X	X	0
3	X	X	X	X	X	0
4	X	X	X	X	X	0
5	X	X	X	X	X	0
6	X	X	X	X	X	0
7	X	X	X	X	X	0
8	X	X	X	X	X	0
9	X	X	X	X	X	0
10	X	X	X	X	X	0

Statistical Analyses

Client: Westinghouse Savannah River Company
Sample Identification: BG001
Test Date: 2/22/96

Test for Normality

Test Used: Shapiro Wilks	W=	0.973
	critical	0.93

The data are normal in distribution

Test for Homogeneity of Variance

Test Used: Bartlett's Test	B=	6.95
	critical	13.28

The data are homogeneous in variance

Test for Differences in Reproduction

Test Type Used: t Test

t Test

Test Concentration

	Control	6%	1%	25%	50%	100%
t Value		-0.70	0.06	0.19	1.84	N/A
critical		2.33	2.33	2.33	2.33	
mean	22.1	23.2	22.0	21.8	19.2	0

MSD=	3.66
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NOEC 50% effluent concentration

LOEC 100% effluent concentration

Effluent Conc. vs. Reproduction

Summary

Sample pH was acidic; toxicity may be due to acidity

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Water Chemistry

Client: Westinghouse Savannah River Company
 Sample Identification: BG001
 Test Date: 2/22/96

pH (After Renewal)

	Test Concentration					
	Control	6.25%	1.25%	25%	50.0%	100%
Initial	8.04	6.79	7.55	6.23	7.06	4.97
Day 1	8.09	7.19	7.36	7.31	6.98	4.90
Day 2	8.00	6.87	7.46	7.18	6.97	4.99
Day 3	8.02	7.89	7.98	8.03	8.01	
Day 4	8.03	7.73	7.58	7.31	6.71	
Day 5	8.08	7.69	7.47	7.34	6.81	
Day 6	8.11	7.83	7.61	7.41	7.20	

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	1.25%	25%	50.0%	100%
Day 1	7.93	7.48	7.61	7.65	7.71	7.02
Day 2	8.14	7.37	7.86	7.73	7.80	6.98
Day 3	8.26	8.12	8.17	8.16	8.02	
Day 4	7.73	8.01	8.06	8.10	7.96	
Day 5	8.07	7.96	8.01	7.99	7.89	
Day 6	8.05	8.02	7.93	7.90	7.88	
Final	8.20	8.31	8.24	8.35	8.10	

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	1.25%	25%	50.0%	100%
Initial	8.6	8.4	8.6	8.4	8.4	8.2
Day 1	8.4	8.6	8.4	8.4	8.4	8.0
Day 2	8.6	8.4	8.4	8.3	8.3	8.1
Day 3	8.5	8.5	8.5	8.6	8.6	
Day 4	8.7	8.6	8.6	8.5	8.6	
Day 5	8.2	8.6	8.4	8.5	8.6	
Day 6	8.9	8.4	8.4	8.6	8.4	

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	1.25%	25%	50.0%	100%
Day 1	8.3	8.3	8.4	8.2	8.3	8.0
Day 2	8.2	8.4	8.3	8.0	8.2	8.0
Day 3	8.5	8.6	8.6	8.6	8.5	
Day 4	8.2	8.4	8.4	8.2	8.3	
Day 5	8.4	8.3	8.2	8.3	8.4	
Day 6	8.5	8.2	8.0	8.2	8.1	
Final	8.6	8.1	8.0	8.2	8.0	

Dilution Water & Effluent Parameters

	Res Cl.	Alkaline	Hard.	Cond.	
	mg/L	mg/L	mg/L	µmhos	
Eff. Sample 1	0.2	0.01	16	29.5	
Eff. Sample 2	<.05	2.03	10	16.0	
Eff. Sample 3	<.05	2.03	4	15.9	
Dilution Water		100	69	209	

Temperature

	Incubator °C
Initial	26.0
Day 1	25.8
Day 2	24.8
Day 3	24.1
Day 4	26.0
Day 5	24.0
Day 6	25.1
Final	24.4

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

Method: EPA/600/4-89/001

Test Organism: *Ceriodaphnia dubia*

Facility: Westinghouse Savannah River Company
Sample ID: BG-002

Date: 2/22/96

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: Westinghouse Savannah River Company
 Sample Identification: BG-002
 Test Date: 2/22/96

Reproduction at 0.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	5	0	0	10	12	27
2	4	6	0	11	0	21
3	5	7	8	0	0	20
4	4	7	0	9	0	20
5	3	0	8	0	8	19
6	4	5	8	0	0	17
7	4	0	0	12	10	26
8	5	0	0	0	9	14
9	4	0	0	6	10	20
10	6	7	8	0	0	21

Reproduction at 6.25% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	9	8	0	0	21
2	5	6	0	11	0	22
3	5	0	8	14	0	27
4	4	7	0	8	0	19
5	6	0	10	10	0	26
6	5	9	10	0	0	24
7	5	3	0	13	0	21
8	5	0	8	10	0	23
9	4	0	0	8	0	12
10	6	8	9	0	0	23

Reproduction at 12.5% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	5	7	0	12	0	24
2	5	0	0	13	0	18
3	5	0	8	14	0	27
4	4	4	0	13	0	21
5	5	0	10	0	0	15
6	6	6	8	0	0	20
7	5	0	0	8	0	13
8	4	0	7	12	0	23
9	5	0	0	13	6	24
10	6	8	0	0	0	14

Reproduction at 25.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	6	0	13	0	23
2	5	0	0	12	0	17
3	5	0	10	12	0	27
4	4	4	10	0	0	18
5	6	0	10	10	0	26
6	3	9	8	0	0	20
7	4	5	0	14	0	23
8	5	0	x	x	x	5
9	5	7	0	10	0	22
10	5	7	7	0	0	19

Reproduction at 50.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	4	8	0	0	16
2	5	6	0	24	0	35
3	4	0	0	16	0	20
4	4	6	0	18	0	28
5	5	1	6	10	0	22
6	4	8	7	0	0	19
7	3	0	0	10	0	13
8	4	5	0	14	0	23
9	4	6	8	0	0	18
10	6	6	0	0	0	12

Reproduction at 100.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	5	x	x	x	x	5
2	0	x	x	x	x	0
3	4	x	x	x	x	4
4	0	x	x	x	x	0
5	5	x	x	x	x	5
6	4	x	x	x	x	4
7	0	x	x	x	x	0
8	0	x	x	x	x	0
9	0	x	x	x	x	0
10	6	x	x	x	x	6

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Client: Westinghouse Savannah River Company
Sample Identification: BG-002
Test Date: 2/22/96

Test for Normality

Test Used: Shapiro Wilks	W=	0.984
	critical	0.93

The data are normal in distribution

Test for Homogeneity of Variance

Test Used: Bartlett's Test	B=	10.24
	critical	15.1

The data are homogeneous in variance

Test for Differences in Reproduction

Test Type Used: t Test

t Test	Test Concentration					
	Control	6%	13%	25%	50%	100%
t Value		-0.59	0.27	0.23	-0.05	8.22
critical		2.33	2.33	2.33	2.33	
mean	20.5	21.8	19.9	20.0	20.6	2.4
MSD=	5.13					

MSD= 5.13

NOEC 50% effluent concentration

LOEC 100% effluent concentration

Effluent Conc. vs. Reproduction

Summary

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Water Chemistry

Client: Westinghouse Savannah River Company
 Sample Identification: BG-002
 Test Date: 2/22/96

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Initial	8.04	7.77	7.04	7.55	7.14	6.52
Day 1	8.09	7.78	7.81	7.77	7.71	6.38
Day 2	8.00	7.69	7.70	7.65	7.61	6.19
Day 3	8.02	8.06	8.12	8.12	8.15	7.23
Day 4	8.03	8.01	8.01	8.05	8.06	
Day 5	8.08	7.93	7.84	7.97	7.81	
Day 6	8.11	8.04	7.98	8.07	7.93	

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Day 1	7.93	8.15	8.23	8.41	8.47	7.48
Day 2	8.14	8.03	8.17	8.46	8.39	7.53
Day 3	8.26	8.23	8.20	8.19	8.14	7.22
Day 4	7.73	8.17	8.14	8.09	8.07	
Day 5	8.07	8.31	8.26	8.11	8.19	
Day 6	8.05	8.19	8.24	8.26	8.23	
Final	8.20	8.28	8.27	8.16	8.29	

Dissolved Oxygen (After Renewal)

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

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Day 1	8.3	8.6	8.6	8.7	8.7	8.8
Day 2	8.2	8.3	8.4	8.2	8.4	8.4
Day 3	8.5	8.5	8.5	8.5	8.5	8.5
Day 4	8.2	8.4	8.4	8.4	8.4	
Day 5	8.4	8.3	8.2	8.3	8.4	
Day 6	8.5	8.2	8.0	8.4	8.4	
Final	8.6	8.3	8.2	8.2	8.2	

Dilution Water & Effluent Parameters

	Res Cl.	Alkaline	Hard.	Cond.	
	mg/L	mg/L	mg/L	µmhos	
Eff. Sample 1	0.08	2.03	18	17.2	
Eff. Sample 2	<.05	<.01	26	30.4	
Eff. Sample 3	<.05	<.01	10	31.6	
Dilution Water		69	100	209	

Temperature

Incubator °C	
Initial	26.0
Day 1	25.8
Day 2	24.8
Day 3	24.1
Day 4	26.0
Day 5	24.0
Day 6	25.1
Final	24.4

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

Method: EPA/600/4-89/001

Test Organism: *Ceriodaphnia dubia*

Facility: Westinghouse Savannah River Company
Sample ID: BG-003

Date: 2/22/96

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: Westinghouse Savannah River Company
 Sample Identification: BG-003
 Test Date: 2/22/96 T5100

Reproduction at 0.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	5	6	10	0	0	21
2	6	8	10	0	0	24
3	6	5	0	13	0	24
4	5	6	0	0	13	24
5	5	8	0	0	13	26
6	5	9	0	13	0	27
7	0	0	0	2	10	12
8	4	0	0	0	12	16
9	13	0	0	0	11	24
10	3	5	0	0	10	18

Reproduction at 6.25% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	3	6	5	0	0	14
2	6	9	12	0	0	27
3	5	6	0	7	0	18
4	6	0	0	5	11	22
5	1	0	0	9	15	25
6	5	7	0	13	0	25
7	0	0	3	0	11	14
8	5	0	0	5	10	20
9	10	0	0	0	12	22
10	3	0	0	0	10	13

Reproduction at 12.5% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	5	0	6	0	12	23
2	3	6	0	0	10	19
3	0	5	0	9	10	24
4	4	6	0	2	0	12
5	1	8	0	11	0	20
6	4	5	0	9	0	18
7	4	6	0	4	0	14
8	0	0	0	3	11	14
9	10	0	0	0	10	20
10	4	0	4	0	11	19

Reproduction at 25.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	6	4	10	0	0	20
2	4	7	x	0	0	11
3	3	6	0	10	0	19
4	4	0	0	0	12	16
5	2	7	0	12	0	21
6	2	3	0	0	12	17
7	3	3	0	0	13	19
8	5	0	0	0	11	16
9	14	0	0	10	0	24
10	1	3	0	2	13	19

Reproduction at 50.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	6	6	6	0	0	18
2	2	1	9	0	0	12
3	3	4	0	9	0	16
4	3	0	6	0	9	18
5	3	2	0	4	0	9
6	5	6	0	1	6	18
7	2	0	0	0	10	12
8	4	0	0	3	9	16
9	9	0	5	0	0	14
10	0	6	0	0	7	13

Reproduction at 100.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	5	5	0	6	0	16
2	3	0	0	3	12	18
3	2	0	4	4	0	10
4	1	0	2	7	0	10
5	0	0	0	4	5	9
6	2	2	6	7	0	17
7	2	4	0	5	0	11
8	5	0	6	5	0	16
9	2	6	7	0	0	15
10	0	2	6	0	0	8

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Statistical Analyses

Client: Westinghouse Savannah River Company
Sample Identification: BG-003
Test Date: 2/22/96

Test for Normality

Test Used: Shapiro Wilks	W=	0.928
	critical	0.93

The data are not normal in distribution

Test for Homogeneity of Variance

Test Used: Bartlett's Test	B=	3.23
	critical	15.1

The data are homogeneous in variance

Test for Differences in Reproduction

Test Type Used: t Test

t Test		Test Concentration				
		Control	6%	13%	25%	50%
t Value		0.88	1.82	1.88	3.87	4.75
critical		2.33	2.33	2.33	2.33	
mean	21.6	20.0	18.3	18.2	14.6	13.0
MSD=		4.22				

NOEC 25% effluent concentration

LOEC 50% effluent concentration

Effluent Conc. vs. Reproduction

Summary

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

Client: Westinghouse Savannah River Company
 Sample Identification: BG-003
 Test Date: 2/22/96

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Initial	8.04	7.27	7.59	7.36	7.62	7.51
Day 1	8.09	7.78	7.82	7.81	7.81	7.86
Day 2	8.00	7.68	7.91	7.76	7.69	7.94
Day 3	8.02	7.64	7.77	7.90	7.95	8.01
Day 4	8.03	7.75	7.82	7.85	7.88	8.15
Day 5	8.08	7.74	7.81	7.84	7.86	7.84
Day 6	8.11	7.85	8.01	8.03	7.88	7.85

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Day 1	7.93	7.99	8.12	8.14	8.17	8.26
Day 2	8.14	8.06	8.09	8.21	8.30	8.46
Day 3	8.26	8.16	8.17	8.14	8.03	7.04
Day 4	7.73	8.12	8.12	8.10	8.07	8.13
Day 5	8.07	8.25	8.28	8.19	8.16	7.44
Day 6	8.05	8.20	8.15	8.16	7.87	7.24
Final	8.20					

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Initial	8.6	8.6	8.6	8.6	8.6	8.6
Day 1	8.4	8.8	8.8	8.9	8.9	9.0
Day 2	8.6	8.6	8.6	8.6	8.5	9.0
Day 3	8.5	8.6	8.6	8.5	8.5	8.4
Day 4	8.7	8.4	8.4	8.4	8.4	8.4
Day 5	8.2	8.4	8.4	8.4	8.4	8.4
Day 6	8.9	8.1	8.2	8.3	8.4	8.4

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25.0%	50.0%	100%
Day 1	8.3	8.9	8.9	9.0	9.1	9.1
Day 2	8.2	8.6	8.4	8.4	8.4	8.6
Day 3	8.5	8.5	8.4	8.2	8.2	8.2
Day 4	8.2	8.4	8.4	8.4	8.4	8.4
Day 5	8.4	8.4	8.4	8.4	8.4	8.4
Day 6	8.5	8.2	8.2	8.3	8.4	8.4
Final	8.6					

Dilution Water & Effluent Parameters

	Res Cl.	Alkalinity	Hard.	Cond.	
	mg/L	mg/L	mg/L	µmhos	
Eff. Sample 1	0.06	2.03	8	24.1	
Eff. Sample 2	<.05	2.03	14	24.3	
Eff. Sample 3	<.05	2.03	8	23.3	
Dilution Water		69	100	209	

Temperature

Incubator °C	
Initial	26.0
Day 1	25.8
Day 2	24.0
Day 3	24.1
Day 4	26.0
Day 5	24.0
Day 6	25.1
Final	24.4

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

Method: EPA/600/4-89/001

Test Organism: *Ceriodaphnia dubia*

Facility: Westinghouse Savannah River Company
Sample ID: BG-004

Date: 2/29/96

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST **Survival and Reproduction Results**

Client: Westinghouse Savannah River Company
Sample Identification: BG-004
Test Date: 2/29/96 T5145

Reproduction at 0.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	6	9	0	10	25
2	0	4	10	9	0	23
3	6	0	8	15	0	29
4	0	3	7	14	0	24
5	4	0	10	8	0	22
6	4	0	10	13	0	27
7	0	5	9	12	0	26
8	4	0	10	7	0	21
9	0	7	0	8	0	15
10	0	4	0	9	11	24

Reproduction at 6.25% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	6	9	0	10	25
2	0	6	8	11	0	25
3	6	0	10	12	0	28
4	0	5	8	13	0	26
5	5	0	10	10	0	25
6	4	0	8	9	0	21
7	0	4	0	8	9	21
8	4	0	11	12	0	27
9	4	0	11	0	9	24
10	0	5	8	0	10	23

Reproduction at 12.5% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	5	10	0	11	26
2	4	0	9	12	0	25
3	6	0	8	11	0	25
4	4	0	8	12	0	24
5	4	9	0	10	0	23
6	5	0	8	16	0	29
7	0	5	10	11	0	26
8	4	0	9	10	0	23
9	0	5	8	0	10	23
10	0	4	2	11	0	17

Reproduction at 25.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	4	10	12	0	26
2	4	0	8	9	0	21
3	6	0	12	12	0	30
4	0	6	10	11	0	27
5	6	9	0	10	0	25
6	4	0	11	11	0	26
7	0	1	9	10	0	20
8	4	0	10	10	0	24
9	0	5	3	0	8	16
10	0	5	8	0	10	23

Reproduction at 50.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	5	11	13	0	29
2	0	5	9	10	0	24
3	0	5	9	13	0	27
4	4	0	8	13	0	25
5	4	0	8	12	0	24
6	5	0	9	11	0	25
7	0	1	8	0	9	18
8	4	0	9	13	0	26
9	4	0	9	10	0	23
10	0	5	8	10	0	23

Reproduction at 100.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	4	0	0	2	6
2	0	3	0	0	0	3
3	0	4	3	0	4	11
4	0	3	4	0	4	11
5	2	0	4	6	0	12
6	0	4	5	0	0	9
7	0	4	0	0	1	5
8	0	0	4	4	0	8
9	0	0	1	0	0	1
10	0	4	4	0	X	8

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Statistical Analyses

Client: Westinghouse Savannah River Company
 Sample Identification: BG-004
 Test Date: 2/29/96

Test for Normality

Test Used: Shapiro Wilks W= 0.955
 critical 0.93

The data are normal in distribution

Test for Homogeneity of Variance

Test Used: Bartlett's Test B= 3.43
 critical 15.1

The data are homogeneous in variance

Test for Differences in Reproduction

Test Type Used: t Test

t Test	Test Concentration					
	Control	6%	13%	25%	50%	100%
t Value		-0.61	-0.34	-0.13	-0.54	10.91
critical		2.33	2.33	2.33	2.33	2.33
mean	23.6	24.5	24.1	23.8	24.4	7.4
MSD=	3.46					

NOEC 50% effluent concentration

LOEC 100% effluent concentration

Effluent Conc. vs. Reproduction

Summary

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Water Chemistry

Client: Westinghouse Savannah River Company
 Sample Identification: BG-004
 Test Date: 2/29/96

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	8.12	8.14	8.13	8.15	7.95	6.26
Day 1	7.98	8.10	7.87	7.66	7.29	7.19
Day 2	7.97	8.01	7.85	7.65	7.34	6.74
Day 3	7.98	8.11	7.97	7.91	7.65	6.17
Day 4	8.06	7.88	7.73	7.65	7.35	6.71
Day 5	8.05	8.03	7.96	7.75	7.53	6.06
Day 6	8.14	8.12	7.99	7.88	7.37	5.84

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.10	8.12	7.49	8.12	7.87	7.35
Day 2	8.27	8.16	8.08	8.00	7.93	8.27
Day 3	8.44	8.38	8.41	8.45	8.41	6.76
Day 4	8.09	8.17	8.19	8.21	8.03	7.18
Day 5	8.33	8.38	8.34	8.22	7.81	6.51
Day 6	8.30	8.19	8.20	7.90	7.72	7.56
Final	8.21	8.28	8.22	8.19	8.14	7.35

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	8.6	8.4	8.2	8.4	8.3	8.0
Day 1	8.6	8.8	8.8	8.9	8.9	9.0
Day 2	8.5	8.8	8.6	8.8	8.4	8.8
Day 3	8.6	8.4	8.4	8.6	8.6	8.7
Day 4	8.8	8.2	8.2	8.3	8.3	8.4
Day 5	8.9	8.6	8.6	8.6	8.7	8.7
Day 6	8.7	8.6	8.6	8.6	8.8	8.8

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.3	8.9	8.9	9.0	9.0	9.1
Day 2	8.2	8.6	8.4	8.6	8.7	8.8
Day 3	8.8	8.4	8.5	8.5	8.6	8.6
Day 4	8.6	8.4	8.4	8.6	8.6	8.8
Day 5	8.5	8.4	8.4	8.4	8.4	8.5
Day 6	8.6	8.8	8.8	8.9	9.0	9.0
Final	8.3	8.0	8.0	8.0	8.2	8.2

Dilution Water & Effluent Parameters

	Res Cl.	Alkaline	Hard.	Cond.	
	mg/L	mg/L	mg/L	µmhos	
Eff. Sample 1	<0.05	4.06	14	29.9	
Eff. Sample 2	<0.05	2.03	8	27.8	
Eff. Sample 3	<0.05	4.06	20	27.1	
Dilution Water		71.1	84	222	

Temperature

Incubator °C	
Initial	24.4
Day 1	24.3
Day 2	25.7
Day 3	25.1
Day 4	24.2
Day 5	25.7
Day 6	25.1
Final	25.3

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

Method: EPA/600/4-89/001

Test Organism: *Ceriodaphnia dubia*

Facility: Westinghouse Savannah River Company

Sample ID: FHB-006

Date: 2/29/96

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: Westinghouse Savannah River Company
 Sample Identification: FHB-006
 Test Date: 2/29/96 T5141

Reproduction at 0.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	5	7	9	0	21
2	0	5	8	0	12	25
3	0	6	7	12	0	25
4	0	7	9	0	10	26
5	3	7	0	13	0	23
6	5	7	0	10	0	22
7	6	0	11	13	0	30
8	0	6	9	10	0	25
9	5	0	9	12	0	26
10	0	8	7	10	0	25

Reproduction at 6.25% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	5	7	0	0	12
2	5	0	8	9	0	22
3	0	6	7	10	0	23
4	0	6	0	0	12	18
5	0	6	10	10	0	26
6	5	10	0	5	8	28
7	6	0	7	6	0	19
8	0	4	0	0	10	14
9	6	0	11	10	0	27
10	0	1	8	0	12	21

Reproduction at 12.50% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	4	0	9	10	0	23
2	5	0	8	9	0	22
3	0	5	8	14	0	27
4	5	0	9	11	0	25
5	5	7	0	11	0	23
6	6	7	0	9	0	22
7	0	0	3	0	0	3
8	0	6	9	0	10	25
9	0	7	8	0	8	23
10	4	0	9	10	0	23

Reproduction at 25.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	4	0	9	8	0	21
2	5	0	8	12	0	25
3	0	4	8	0	2	14
4	0	7	7	0	0	14
5	4	6	0	11	0	21
6	6	8	0	10	0	24
7	5	0	8	10	0	23
8	0	4	2	0	10	16
9	0	5	5	0	8	18
10	4	0	10	10	0	24

Reproduction at 50.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	4	0	8	11	0	23
2	5	0	9	5	0	19
3	0	5	5	3	0	13
4	0	5	7	0	6	18
5	3	0	6	5	0	14
6	4	7	0	13	0	24
7	4	0	11	14	0	29
8	0	7	0	8	0	15
9	0	0	8	2	0	10
10	0	0	2	0	8	10

Reproduction at 100.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	4	3	0	4	11
2	3	X	X	X	X	3
3	0	2	0	0	3	5
4	0	4	0	0	0	4
5	0	0	3	X	X	3
6	0	0	0	X	X	0
7	0	3	0	0	2	5
8	L	L	L	L	L	L
9	0	2	4	0	0	6
10	0	3	4	0	4	11

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Statistical Analyses

Client: Westinghouse Savannah River Company
Sample Identification: FHB-006
Test Date: 2/29/96

Test for Normality

Test Used: Shapiro Wilks	W=	0.962
	critical	0.93

The data are normal in distribution

Test for Homogeneity of Variance

Test Used: Bartlett's Test	B=	10.22
	critical	15.1

The data are homogeneous in variance

Test for Differences in Reproduction

Test Type Used: t Test

t Test	Test Concentration					
	Control	6%	13%	25%	50%	100%
t Value		1.70	1.43	2.15	3.27	8.49
critical		2.33	2.33	2.33	2.33	
mean	24.8	21.0	21.6	20.0	17.5	5.3
MSD=	5.20					

NOEC 25% effluent concentration

LOEC 50% effluent concentration

Summary

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Water Chemistry

Client: Westinghouse Savannah River Company
 Sample Identification: FHB-006
 Test Date: 2/29/96

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	8.12	7.83	7.57	7.06	6.76	5.79
Day 1	7.98	7.88	7.84	7.52	6.91	6.58
Day 2	7.97	7.93	7.81	7.50	7.08	6.77
Day 3	7.98	7.97	7.92	7.53	7.04	5.83
Day 4	8.06	7.89	7.70	7.67	7.11	6.11
Day 5	8.05	7.99	7.78	7.48	6.87	5.54
Day 6	8.14	7.89	7.67	7.33	6.89	5.71

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.10	8.28	8.24	8.21	7.76	7.27
Day 2	8.27	8.16	7.83	7.68	7.21	7.40
Day 3	8.44	8.48	8.49	8.52	7.86	7.50
Day 4	8.09	8.31	8.39	8.44	7.89	7.76
Day 5	8.33	8.29	8.16	8.18	7.85	6.88
Day 6	8.30	8.37	8.18	8.05	7.86	7.89
Final	8.21	7.92	8.14	8.00	8.11	8.19

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	8.6	8.2	8.3	8.2	8.2	7.9
Day 1	8.6	8.2	8.2	8.3	8.3	8.5
Day 2	8.5	8.4	8.3	8.4	8.6	8.4
Day 3	8.6	8.4	8.4	8.5	8.6	8.8
Day 4	8.8	8.2	8.2	8.4	8.4	8.5
Day 5	8.9	8.4	8.2	8.3	8.4	8.6
Day 6	8.7	8.4	8.3	8.4	8.6	8.5

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.3	8.4	8.4	8.5	8.5	8.6
Day 2	8.2	8.0	8.1	8.2	8.0	8.1
Day 3	8.8	8.2	8.2	8.4	8.7	9.0
Day 4	8.6	8.0	8.2	8.3	8.2	8.3
Day 5	8.5	8.1	8.0	8.2	8.4	8.4
Day 6	8.6	8.2	8.1	8.3	8.3	8.2
Final	8.3	8.2	8.0	8.3	8.2	8.4

Dilution Water & Effluent Parameters

	Res Cl.	Alkaline	Hard.	Cond.	
	mg/L	mg/L	mg/L	µmhos	
Eff. Sample 1	<0.05	4.06	14	34.3	
Eff. Sample 2	<0.05	4.06	6	32.2	
Eff. Sample 3	<0.05	6.09	14	35.8	
Dilution Water		71.1	84	222	

Temperature

Incubator °C	
Initial	24.4
Day 1	24.3
Day 2	25.7
Day 3	25.1
Day 4	24.2
Day 5	25.7
Day 6	25.1
Final	25.3

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

Method: EPA/600/4-89/001

Test Organism: *Ceriodaphnia dubia*

Facility: Westinghouse Savannah River Company
Sample ID: FHB-012

Date: 4/11/96

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST **Survival and Reproduction Results**

Client: WSRC
Sample Identification: FHB-012
Test Date: 4/11/96 T5364

Reproduction at 0.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	1	6	9	0	20
2	5	9	7	0	0	21
3	4	6	0	9	0	19
4	5	4	0	6	0	15
5	0	3	6	4	0	13
6	0	7	8	10	0	25
7	4	6	0	6	0	16
8	3	5	0	10	0	18
9	0	5	7	8	0	20
10	0	8	0	9	0	17

Reproduction at 6.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	4	0	9	0	17
2	4	11	9	0	0	24
3	3	0	7	8	0	18
4	2	3	7	8	0	20
5	4	2	0	7	0	13
6	0	7	0	8	0	15
7	0	6	9	11	0	26
8	3	8	0	9	0	20
9	4	6	0	8	0	18
10	3	5	0	7	0	15

Reproduction at 12.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	3	5	0	7	0	15
2	5	7	9	0	0	21
3	4	0	10	6	0	20
4	0	8	0	9	0	17
5	0	5	7	8	0	20
6	L	L	L	L	0	L
7	5	5	0	10	0	20
8	4	6	0	9	0	19
9	0	6	8	0	0	14
10	3	4	0	8	0	15

Reproduction at 25.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	7	0	9	0	20
2	4	7	0	7	0	18
3	3	0	6	6	0	15
4	5	5	0	8	0	18
5	3	0	6	9	0	18
6	2	4	0	8	0	14
7	0	4	6	0	0	10
8	1	6	0	6	0	13
9	4	0	7	8	0	19
10	4	6	0	9	0	19

Reproduction at 50.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	7	1	0	0	12
2	3	2	6	0	0	11
3	3	0	6	4	0	13
4	4	2	4	3	0	13
5	4	0	0	6	0	10
6	0	2	4	0	0	6
7	0	5	5	0	0	10
8	0	4	8	0	0	12
9	0	4	6	4	0	14
10	4	0	7	0	0	11

Reproduction at 100.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	4	0	3	0	11
2	4	5	4	0	0	13
3	3	0	6	2	0	11
4	0	3	0	1	0	4
5	1	2	0	X	0	3
6	2	2	0	5	0	9
7	0	3	0	4	0	7
8	3	4	8	0	0	15
9	0	1	0	3	0	4
10	4	0	0	3	0	7

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Statistical Analyses

Client: WSRC
 Sample Identification: FHB-012
 Test Date: 4/11/96

Test for Normality

Test Used: Shapiro Wilks W= 0.934
 critical 0.93

The data are normal in distribution

Test for Homogeneity of Variance

Test Used: Bartlett's Test B= 9.94
 critical 15.1

The data are homogeneous in variance

Test for Differences in Reproduction

Test Type Used: t Test

t Test	Test Concentration					
	Control	6%	12%	25%	50%	100%
t Value		-0.11	1.28	1.11	4.01	5.56
critical		2.33	2.33	2.33	2.33	
mean	18.4	18.6	16.1	16.4	11.2	8.4
MSD=	4.19					

NOEC 25% effluent concentration

LOEC 50% effluent concentration

Effluent Conc. vs. Reproduction

Summary

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

Client: Westinghouse Savannah River Company
 Sample Identification: FHB-012
 Test Date: 4/11/96

pH (After Renewal)

	Test Concentration					
	Control	6%	12%	25%	50%	100%
Initial	8.30	6.97	6.43	6.29	6.17	6.08
Day 1	8.10	7.96	7.23	6.99	6.37	6.14
Day 2	7.95	7.02	7.00	6.48	6.27	6.18
Day 3	8.03	7.35	7.10	6.89	6.57	6.39
Day 4	8.09	7.89	7.54	6.79	6.08	5.59
Day 5	8.07	7.04	7.19	7.23	7.13	5.77
Day 6	8.08	7.91	7.65	7.24	6.57	5.59

pH (Before Renewal)

	Test Concentration					
	Control	6%	12%	25%	50%	100%
Day 1	8.18	7.79	7.48	7.24	7.19	7.04
Day 2	8.14	7.97	7.71	7.53	7.31	7.11
Day 3	8.20	7.47	7.27	7.10	6.79	6.53
Day 4	8.26	7.97	7.56	7.22	6.84	6.18
Day 5	8.33	7.81	7.50	7.10	6.67	6.03
Day 6	8.11	7.79	7.47	7.34	6.81	6.13
Final	8.07	7.73	7.58	7.31	6.71	6.12

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6%	12%	25%	50%	100%
Initial	8.7	8.4	8.5	8.4	8.3	8.4
Day 1	8.8	8.5	8.5	8.5	8.6	8.6
Day 2	8.7	8.2	8.4	8.4	8.6	8.8
Day 3	8.6	8.7	8.6	8.7	8.6	8.8
Day 4	8.5	8.4	8.4	8.5	8.5	8.7
Day 5	8.7	8.4	8.5	8.5	8.6	8.6
Day 6	8.7	8.4	8.4	8.6	8.6	8.8

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6%	12%	25%	50%	100%
Day 1	8.6	8.5	8.5	8.6	8.6	8.8
Day 2	8.5	8.3	8.4	8.4	8.6	8.7
Day 3	8.2	8.4	8.6	8.5	8.6	8.4
Day 4	8.6	8.4	8.4	8.5	8.5	8.5
Day 5	8.6	8.5	8.5	8.5	8.6	8.6
Day 6	8.5	8.4	8.4	8.5	8.6	8.7
Final	8.6	8.2	8.2	8.6	8.6	8.8

Dilution Water & Effluent Parameters

	Res Cl.	Alkaline	Hard.	Cond.
	mg/L	mg/L	mg/L	µmhos
Eff. Sample 1	<0.05	no data	10	no data
Eff. Sample 2			10	
Eff. Sample 3			6	
Dilution Water		69	86	178

Temperature

Incubator °C	
Initial	24.5
Day 1	24.5
Day 2	25.3
Day 3	24.9
Day 4	25.5
Day 5	25.0
Day 6	26.0
Final	24.8

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

Method: EPA/600/4-89/001

Test Organism: *Ceriodaphnia dubia*

Facility: Westinghouse Savannah River Company

Sample ID: FHB-013

Date: 4/11/96

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST **Survival and Reproduction Results**

Client: WSRC
Sample Identification: FHB-013
Test Date: 4/11/96 TS365

Reproduction at 0.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	3	0	7	9	0	19
2	0	4	0	7	10	21
3	0	4	0	8	6	18
4	3	6	0	10	0	19
5	3	6	0	8	0	17
6	2	0	6	10	0	18
7	0	4	6	0	9	19
8	0	4	5	0	8	17
9	0	3	7	0	10	20
10	4	0	6	10	0	20

Reproduction at 6.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	5	0	6	12	23
2	0	0	0	5	6	11
3	4	6	4	0	12	26
4	2	5	0	10	0	17
5	4	5	0	9	0	18
6	0	0	0	6	11	17
7	0	4	7	0	6	17
8	0	5	8	0	7	20
9	3	4	0	10	0	17
10	0	2	7	0	12	21

Reproduction at 12.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	0	3	6	0	9
2	0	0	4	7	0	11
3	0	3	0	8	8	19
4	0	8	4	0	10	22
5	0	7	0	6	12	25
6	0	0	8	0	14	22
7	0	3	0	5	0	8
8	0	0	4	0	7	11
9	0	4	7	0	8	19
10	0	4	8	0	12	24

Reproduction at 25.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	1	0	3	0	4
2	4	2	0	4	3	13
3	3	1	0	0	1	5
4	0	1	3	0	0	4
5	2	3	0	0	9	14
6	4	6	0	0	X	10
7	0	0	3	0	6	9
8	0	0	2	3	5	10
9	0	4	4	0	0	8
10	0	2	6	2	4	14

Reproduction at 50.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	4	0	0	3	7
2	0	4	0	3	0	7
3	0	3	2	0	2	7
4	0	0	3	0	1	4
5	2	3	0	4	0	9
6	3	3	0	0	4	10
7	0	0	0	3	0	3
8	0	0	3	0	1	4
9	0	1	0	0	0	1
10	0	3	0	4	3	10

Reproduction at 100.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	2	0	0	3	5
2	0	0	0	0	0	0
3	0	0	0	0	2	2
4	0	4	0	0	1	5
5	L	L	L	L	L	L
6	0	3	0	0	0	3
7	0	2	0	0	3	5
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	4	0	0	2	6

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Statistical Analyses

Client: WSRC
 Sample Identification: FHB-013
 Test Date: 4/11/96

Test for Normality

Test Used: Shapiro Wilks W= 0.968
 critical 0.93

The data are normal in distribution

Test for Homogeneity of Variance

Test Used: Bartlett's Test B= 21.36
 critical 15.1

The data are not homogeneous in variance

Test for Differences in Reproduction

Test Type Used: Wilcoxon's Test

NOEC 12.5% effluent concentration

LOEC 25% effluent concentration

Wilcoxon's Test	Test Concentration				
	6%	12%	25%	50%	100%
Rank Sum		100	52	50	
critical		75	75	75	

MSD= 4.07

Effluent Conc. vs. Reproduction

Summary

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Water Chemistry

Client: Westinghouse Savannah River Company
 Sample Identification: FHB-013
 Test Date: 4/11/96

pH (After Renewal)

	Test Concentration					
	Control	6%	12%	25%	50%	100%
Initial	8.30	7.02	6.53	6.14	5.81	5.63
Day 1	8.10	7.54	6.97	6.35	6.27	6.04
Day 2	7.95	no data	no data	no data	no data	no data
Day 3	8.03	7.48	7.66	7.14	6.90	5.79
Day 4	8.09	7.09	6.98	6.81	6.40	5.58
Day 5	8.07	7.10	7.25	6.93	6.28	5.39
Day 6	8.08	7.06	7.31	7.04	6.19	5.43

pH (Before Renewal)

	Test Concentration					
	Control	6%	12%	25%	50%	100%
Day 1	8.18	7.59	7.03	6.48	6.25	6.07
Day 2	8.14	no data	no data	no data	no data	no data
Day 3	8.20	7.85	7.88	7.68	7.43	6.34
Day 4	8.26	7.56	7.39	7.18	7.21	6.14
Day 5	8.33	7.44	7.63	6.98	6.73	6.19
Day 6	8.11	7.40	7.68	7.04	6.68	5.97
Final	8.07	7.41	7.73	6.96	6.18	6.14

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6%	12%	25%	50%	100%
Initial	8.7	8.4	8.5	8.6	8.4	8.6
Day 1	8.8	8.6	8.6	8.6	8.8	8.8
Day 2	8.7	no data	no data	no data	no data	no data
Day 3	8.6	8.6	8.7	8.6	8.7	8.7
Day 4	8.5	8.6	8.6	8.4	8.8	8.6
Day 5	8.7	8.7	8.7	8.6	8.7	8.6
Day 6	8.7	8.6	8.6	8.7	8.6	8.6

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6%	12%	25%	50%	100%
Day 1	8.6	8.4	8.4	8.4	8.5	8.6
Day 2	8.5	no data	no data	no data	no data	no data
Day 3	8.2	8.4	8.4	8.5	8.4	8.5
Day 4	8.6	8.5	8.4	8.6	8.4	8.6
Day 5	8.6	8.3	8.6	8.4	8.6	8.4
Day 6	8.5	8.4	8.4	8.5	8.6	8.6
Final	8.6	8.2	8.3	8.2	8.4	8.4

Dilution Water & Effluent Parameters

	Res Cl.	Alkaline	Hard.	Cond.	
	mg/L	mg/L	mg/L	µmhos	
Eff. Sample 1	<0.05	no data	16	no data	
Eff. Sample 2			10		
Eff. Sample 3			8		
Dilution Water		69	86	178	

Temperature

	Incubator °C
Initial	24.5
Day 1	24.5
Day 2	25.3
Day 3	24.9
Day 4	25.5
Day 5	25.0
Day 6	26.0
Final	24.8

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

Method: EPA/600/4-89/001

Test Organism: *Ceriodaphnia dubia*

Facility: Westinghouse Savannah River Company
Sample ID: FHB-014

Date: 2/29/96

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST **Survival and Reproduction Results**

Client: Westinghouse Savannah River Company
Sample Identification: FHB-014
Test Date: 2/29/96 T5142

Reproduction at 0.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	6	10	11	0	27
2	0	5	8	13	0	26
3	4	0	6	12	0	22
4	0	7	9	11	0	27
5	5	7	0	11	0	23
6	5	10	0	12	0	27
7	0	6	5	0	8	19
8	0	7	7	0	8	22
9	0	0	7	12	10	29
10	5	0	9	0	10	24

Reproduction at 6.25% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	8	8	0	12	28
2	0	7	9	12	0	28
3	5	0	8	10	0	23
4	5	1	5	0	0	11
5	5	0	8	9	0	22
6	6	10	0	10	0	26
7	0	6	6	0	0	12
8	0	9	6	10	0	25
9	4	0	8	0	6	18
10	4	0	8	10	0	22

Reproduction at 12.5% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	8	8	0	6	22
2	0	7	8	10	0	25
3	0	4	7	12	0	23
4	6	0	9	10	0	25
5	0	7	6	11	0	24
6	3	9	0	12	0	24
7	0	3	7	10	0	20
8	0	6	8	0	0	14
9	0	6	0	0	10	16
10	5	0	8	11	0	24

Reproduction at 25.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	6	8	0	8	22
2	0	7	9	0	0	16
3	5	0	10	10	0	25
4	5	0	7	13	0	25
5	5	6	0	12	0	23
6	6	8	0	10	0	24
7	0	3	9	9	0	21
8	0	5	8	11	0	24
9	0	0	7	10	0	17
10	4	0	8	10	0	22

Reproduction at 50.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	6	9	0	0	15
2	0	5	8	0	0	13
3	5	0	8	10	0	23
4	0	2	9	11	0	22
5	6	7	0	11	0	24
6	4	8	0	9	0	21
7	0	7	8	10	0	25
8	0	3	6	0	0	9
9	0	0	8	0	0	8
10	0	0	9	0	0	9

Reproduction at 100.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	X	X	X	X	X	0
2	X	X	X	X	X	0
3	X	X	X	X	X	0
4	X	X	X	X	X	0
5	X	X	X	X	X	0
6	X	X	X	X	X	0
7	X	X	X	X	X	0
8	X	X	X	X	X	0
9	X	X	X	X	X	0
10	X	X	X	X	X	0

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Water Chemistry

Client: Westinghouse Savannah River Company
 Sample Identification: FHB-014
 Test Date: 2/29/96

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	8.12	7.89	7.55	7.32	6.58	5.24
Day 1	7.98	7.81	7.69	7.31	7.65	5.46
Day 2	7.97	7.97	7.81	7.67	7.29	
Day 3	7.98	7.99	7.52	7.31	6.84	
Day 4	8.06	7.84	7.62	7.52	8.94	
Day 5	8.05	7.86	7.41	7.12	6.64	
Day 6	8.14	7.79	7.59	7.16	6.80	

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.10	7.73	7.80	7.69	8.03	8.31
Day 2	8.27	8.28	8.26	8.22	8.29	8.23
Day 3	8.44	8.41	8.31	8.54	8.48	
Day 4	8.09	8.11	8.27	8.21	8.23	
Day 5	8.33	8.31	8.32	8.07	8.21	
Day 6	8.30	8.36	8.34	8.30	8.34	
Final	8.21	7.89	8.36	8.28	8.26	

Dissolved Oxygen (After Renewal)

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

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.3	8.0	8.2	8.3	8.2	8.3
Day 2	8.2	8.1	8.3	8.2	8.0	8.2
Day 3	8.8	8.6	8.6	8.8	8.9	
Day 4	8.6	8.4	8.4	8.6	8.6	
Day 5	8.5	8.0	8.2	8.0	8.1	
Day 6	8.6	8.2	8.3	8.3	8.2	
Final	8.3	8.4	8.4	8.4	8.0	

Dilution Water & Effluent Parameters

	Res Cl.	Alkaline	Hard.	Cond.	
	mg/L	mg/L	mg/L	µmhos	
Eff. Sample 1	<0.05	6.09	12	38.8	
Eff. Sample 2	<0.05	4.06	6	38.7	
Eff. Sample 3	<0.05	6.09	6	39.4	
Dilution Water		71.1	84	222	

Temperature

Incubator °C	
Initial	24.4
Day 1	24.3
Day 2	25.7
Day 3	25.1
Day 4	24.2
Day 5	25.7
Day 6	25.1
Final	25.3

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Statistical Analyses

Client: Westinghouse Savannah River Company
Sample Identification: FHB-014
Test Date: 2/29/96

Test for Normality

Test Used: Shapiro Wilks W= 0.949
critical 0.93

The data are normal in distribution

Test for Homogeneity of Variance

Test Used: Bartlett's Test	B=	9.80
	critical	13.28

The data are homogeneous in variance

Test for Differences in Reproduction

Test Type Used: t Test

t Test	Test Concentration					
	Control	6%	13%	25%	50%	100%
t Value		1.43	1.34	1.24	3.55	N/A
critical		2.33	2.33	2.33	2.33	
mean	24.6	21.5	21.7	21.9	16.9	0

MSD= 5.06

NOEC 25% effluent concentration

LOEC 50% effluent concentration

Effluent Conc. vs. Reproduction

Comments:

The pH of the sample was acidic; mortality may have been due to acidity. Alkalinity and hardness were low.

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

Method: EPA/600/4-89/001

Test Organism: *Ceriodaphnia dubia*

Facility: Westinghouse Savannah River Company

Sample ID: FHB-018

Date: 4/11/96

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: WSRC
 Sample Identification: FHB-018
 Test Date: 4/11/96

Reproduction at 0.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	1	6	9	0	20
2	5	9	7	0	0	21
3	4	6	0	9	0	19
4	5	4	0	6	0	15
5	0	3	6	4	0	13
6	0	7	8	10	0	25
7	4	6	0	6	0	16
8	3	5	0	10	0	18
9	0	5	7	8	0	20
10	0	8	0	9	0	17

Reproduction at 6.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	3	0	7	8	0	18
2	0	0	9	10	0	19
3	0	0	5	10	0	15
4	0	6	9	6	0	21
5	0	3	6	9	0	18
6	2	0	7	11	0	20
7	0	0	0	10	0	10
8	0	4	8	12	0	24
9	0	4	0	11	0	15
10	0	0	6	12	0	18

Reproduction at 12.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	0	9	5	0	14
2	1	3	0	7	0	11
3	0	3	6	4	0	13
4	0	5	0	9	0	14
5	3	4	0	7	0	14
6	0	3	5	6	0	14
7	0	4	6	7	0	17
8	0	2	7	6	0	15
9	4	6	0	7	0	17
10	0	0	7	8	0	15

Reproduction at 25.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	0	0	2	0	2
2	0	3	0	4	0	7
3	X	X	X	X	X	0
4	0	0	0	3	0	3
5	0	1	0	4	0	5
6	0	3	2	5	0	10
7	0	3	0	6	0	9
8	0	0	0	4	0	4
9	0	0	0	4	0	4
10	0	0	0	5	0	5

Reproduction at 50.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	X	X	X	X	X	0
2	0	0	0	0	0	0
3	X	X	X	X	X	0
4	0	0	0	0	0	0
5	X	X	X	X	X	0
6	X	X	X	X	X	0
7	0	0	0	0	0	0
8	X	X	X	X	X	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0

Reproduction at 100.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	X	X	X	X	X	0
2	X	X	X	X	X	0
3	X	X	X	X	X	0
4	X	X	X	X	X	0
5	X	X	X	X	X	0
6	X	X	X	X	X	0
7	X	X	X	X	X	0
8	X	X	X	X	X	0
9	X	X	X	X	X	0
10	X	X	X	X	X	0

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Statistical Analyses

Client: WSRC
 Sample Identification: FHB-018
 Test Date: 4/11/96 T5266

Test for Normality

Test Used: Shapiro Wilks W= 0.952
 critical 0.93

The data are normal in distribution.

Test for Homogeneity of Variance

Test Used: Bartlett's Test B= 5.03
 critical 13.28

The data are homogeneous in variance.

Test for Differences in Reproduction

Test Type Used: t Test

t Test	Test Concentration					
	Control	6%	12%	25%	50%	100%
t Value		0.48	3.21	10.83	N/A	N/A
critical		2.33	2.33	2.33	2.33	
mean	18.4	17.8	14.4	4.9	0	0
MSD=	2.90					

NOEC 6% effluent concentration

LOEC 12.5% effluent concentration

Effluent Conc. vs. Reproduction

Summary

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Water Chemistry

Client: Westinghouse Savannah River Company
 Sample Identification: FHB-018
 Test Date: 4/11/96

pH (After Renewal)

	Test Concentration					
	Control	6%	12%	25%	50%	100%
Initial	8.30	7.17	7.46	7.78	6.21	6.16
Day 1	8.10	7.96	7.54	7.48	6.79	*
Day 2	7.95	7.73	7.58	7.31	6.71	
Day 3	8.03	7.01	7.57	7.16	6.56	
Day 4	8.09	7.87	7.21	6.58	6.19	
Day 5	8.07	7.31	7.13	6.82	6.51	
Day 6	8.08	7.69	7.47	7.34	6.81	

pH (Before Renewal)

	Test Concentration					
	Control	6%	12%	25%	50%	100%
Day 1	8.18	7.81	7.59	7.43	7.22	6.90
Day 2	8.14	7.96	7.71	7.65	6.97	*
Day 3	8.20	7.16	7.42	7.10	6.95	
Day 4	8.26	7.94	7.43	6.99	6.25	
Day 5	8.33	7.99	7.71	7.59	7.22	
Day 6	8.11	8.04	7.74	7.56	7.24	
Final	8.07	7.89	7.67	7.44	7.19	

* All test organisms dead

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6%	12%	25%	50%	100%
Initial	8.7	8.6	8.5	8.6	8.5	8.6
Day 1	8.8	8.4	8.4	8.5	8.5	*
Day 2	8.7	8.2	8.2	8.4	8.4	
Day 3	8.6	8.6	8.7	8.7	8.6	
Day 4	8.5	8.4	8.4	8.5	8.6	
Day 5	8.7	8.3	8.3	8.3	8.4	
Day 6	8.7	8.2	8.3	8.4	8.4	

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6%	12%	25%	50%	100%
Day 1	8.6	8.4	8.4	8.6	8.6	8.6
Day 2	8.5	8.4	8.5	8.6	8.6	*
Day 3	8.2	8.3	8.4	8.5	8.4	
Day 4	8.6	8.4	8.4	8.5	8.5	
Day 5	8.6	8.4	8.4	8.4	8.4	
Day 6	8.5	8.4	8.4	8.6	8.8	
Final	8.6	8.2	8.2	8.4	8.6	

Dilution Water & Effluent Parameters

	Res Cl.	Alkalinity	Hard.	Cond.
	mg/L	mg/L	mg/L	µmhos
Eff. Sample 1	<0.05	no data	10	no data
Eff. Sample 2			12	
Eff. Sample 3			6	
Dilution Water		69	86	178

Temperature

	Incubator °C
Initial	24.5
Day 1	24.5
Day 2	25.3
Day 3	24.9
Day 4	25.5
Day 5	25.0
Day 6	26.0
Final	24.8

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

Method: EPA/600/4-89/001

Test Organism: *Ceriodaphnia dubia*

Facility: Westinghouse Savannah River Company
Sample ID: FHB-020

Date: 2/29/96

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: Westinghouse Savannah River Company
 Sample Identification: FHB-020
 Test Date: 2/29/96 T5143

Reproduction at 0.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	5	10	10	0	0	25
2	5	9	7	0	0	21
3	5	0	0	0	11	16
4	4	10	0	0	10	24
5	5	8	0	0	8	21
6	4	9	2	0	10	25
7	5	10	5	0	0	20
8	6	3	0	0	11	20
9	5	10	10	0	0	25
10	4	12	0	0	10	26

Reproduction at 6.25% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	5	9	13	0	0	27
2	5	0	0	0	10	15
3	4	8	0	7	0	19
4	6	8	0	5	0	19
5	0	10	9	0	0	19
6	13	0	12	0	0	25
7	4	10	14	0	0	28
8	4	9	11	0	0	24
9	6	10	10	0	0	26
10	3	8	0	0	12	23

Reproduction at 12.5% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	7	9	0	13	0	29
2	0	4	14	0	0	18
3	4	7	0	3	10	24
4	12	0	0	0	10	22
5	0	9	12	0	0	21
6	14	0	16	0	0	30
7	6	8	17	0	0	31
8	4	9	3	0	8	24
9	4	11	9	0	0	24
10	2	12	8	0	0	22

Reproduction at 25.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	3	9	13	0	0	25
2	0	4	12	12	0	28
3	3	2	8	4	0	17
4	7	9	0	12	0	28
5	4	9	11	0	0	24
6	9	0	8	0	0	17
7	5	12	0	0	0	17
8	5	7	12	0	0	24
9	5	10	14	0	0	29
10	0	10	13	7	0	30

Reproduction at 50.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	6	8	0	0	0	14
2	0	8	9	10	0	27
3	0	5	12	0	0	17
4	8	11	0	17	0	36
5	4	8	9	0	0	21
6	6	8	13	0	0	27
7	3	9	11	0	0	23
8	5	7	0	14	0	26
9	2	8	13	0	0	23
10	2	9	9	0	0	20

Reproduction at 100.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	3	5	7	0	0	15
2	2	3	7	0	0	12
3	4	4	1	11	0	20
4	3	0	4	5	0	12
5	4	8	6	0	0	18
6	2	5	6	5	0	18
7	5	4	11	0	0	20
8	2	4	10	0	0	16
9	3	5	12	0	0	20
10	5	6	10	0	0	21

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Statistical Analyses

Client: Westinghouse Savannah River Company
Sample Identification: FHB-020
Test Date: 2/29/96

Test for Normality

Test Used: Shapiro Wilks	W=	0.948
	critical	0.93

The data are normal in distribution

Test for Homogeneity of Variance

Test Used: Bartlett's Test	B=	5.65
	critical	15.1

The data are homogeneous in variance

Test for Differences in Reproduction

Test Type Used: t Test

t Test

Test Concentration

	Control	6%	13%	25%	50%	100%
t Value		-0.10	-1.10	-0.80	-0.55	2.55
critical		2.33	2.33	2.33	2.33	2.33
mean	22.3	22.5	24.5	23.9	23.4	17.2

MSD= 4.65

NOEC 50% effluent concentration
LOEC 100% effluent concentration

The reduction in reproduction at 100% concentration was only marginally significant.

Effluent Conc. vs. Reproduction

Summary

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Water Chemistry

Client: Westinghouse Savannah River Company
 Sample Identification: FHB-020
 Test Date: 2/29/96

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	8.12	7.77	7.71	7.72	7.21	6.32
Day 1	7.98	7.82	7.68	7.55	7.13	6.55
Day 2	7.97	8.03	7.93	7.69	7.27	6.23
Day 3	7.98	8.18	7.77	7.72	7.09	6.75
Day 4	8.06	7.70	7.75	7.71	7.45	6.82
Day 5	8.05	7.85	7.75	7.51	7.17	6.09
Day 6	8.14	7.76	7.68	7.50	7.29	6.31

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.10	7.99	6.97	8.11	7.34	7.74
Day 2	8.27	8.25	8.19	8.15	7.97	8.66
Day 3	8.44	8.41	8.43	8.53	8.42	7.94
Day 4	8.09	8.24	8.37	8.17	8.08	7.51
Day 5	8.33	8.25	8.19	8.11	8.00	7.44
Day 6	8.30	8.02	8.10	8.07	7.97	7.40
Final	8.21	8.12	8.17	8.14	8.02	7.71

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	8.6	8.6	8.6	8.6	8.7	8.7
Day 1	8.6	8.6	8.6	8.7	8.8	8.8
Day 2	8.5	8.7	8.4	8.6	8.6	8.6
Day 3	8.6	8.4	8.4	8.5	8.6	8.8
Day 4	8.8	8.3	8.4	8.6	8.6	8.6
Day 5	8.9	8.5	8.5	8.6	8.4	7.6
Day 6	8.7	8.7	8.6	8.6	8.3	7.8

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.3	8.8	8.8	8.9	9.0	9.1
Day 2	8.2	8.4	8.6	8.5	8.4	8.6
Day 3	8.8	8.4	8.6	8.6	8.8	9.1
Day 4	8.6	8.4	8.6	8.8	8.9	8.8
Day 5	8.5	8.3	8.4	8.3	8.1	8.0
Day 6	8.6	8.5	8.5	8.2	8.2	8.1
Final	8.3	8.4	8.6	8.2	8.2	8.0

Dilution Water & Effluent Parameters

	Res Cl.	Alkaline	Hard.	Cond.	
	mg/L	mg/L	mg/L	µmhos	
Eff. Sample 1	<0.05	4.06	10	38.2	
Eff. Sample 2	<0.05	8.12	10	42.4	
Eff. Sample 3	<0.05	8.12	10	43	
Dilution Water		71.1	84	222	

Temperature

	Incubator °C
Initial	24.4
Day 1	24.3
Day 2	25.7
Day 3	25.1
Day 4	24.2
Day 5	25.7
Day 6	25.1
Final	25.3

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7 Day Chronic Definitive Survival and Reproduction Bioassay

Method: EPA/600/4-89/001

Test Organism: *Ceriodaphnia dubia*

Facility: Westinghouse Savannah River Company

Sample ID: FHB-021

Date: 4/11/96

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: WSRC
 Sample Identification: FHB-021
 Test Date: 4/11/96

Reproduction at 0.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	3	0	7	9	0	19
2	0	4	0	7	10	21
3	0	4	0	8	6	18
4	3	6	0	10	0	19
5	3	6	0	8	0	17
6	2	0	6	10	0	18
7	0	4	6	0	9	19
8	0	4	5	0	8	17
9	0	3	7	0	10	20
10	4	0	6	10	0	20

Reproduction at 6.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	3	0	7	12	22
2	0	4	4	0	11	19
3	2	1	0	8	6	17
4	0	5	7	0	9	21
5	3	0	2	10	4	19
6	0	3	0	7	9	19
7	0	0	1	8	4	13
8	0	0	7	8	2	17
9	0	0	0	6	0	6
10	3	3	0	8	7	21

Reproduction at 12.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	3	0	8	4	15
2	0	3	0	7	12	22
3	0	4	0	10	7	21
4	0	3	7	0	12	22
5	0	3	8	0	10	21
6	0	1	0	8	0	9
7	0	0	0	6	6	12
8	0	3	0	7	10	20
9	3	7	0	4	4	18
10	0	1	0	6	6	13

Reproduction at 25.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	2	0	0	5	3	10
2	0	3	4	0	10	17
3	0	2	6	0	12	20
4	0	4	6	0	10	20
5	1	4	0	0	10	15
6	0	0	0	4	12	16
7	0	3	0	4	10	17
8	0	0	0	3	6	9
9	0	0	0	5	12	17
10	0	0	4	6	4	14

Reproduction at 50.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	1	0	4	6	11
2	0	1	0	5	4	10
3	0	0	0	6	3	9
4	0	0	0	7	5	12
5	0	0	0	0	0	0
6	0	0	0	4	0	4
7	0	0	0	0	9	9
8	0	0	0	0	3	3
9	0	0	0	5	0	5
10	0	0	0	4	6	10

Reproduction at 100.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	0	0	0	3	2	5
2	0	4	0	6	0	10
3	0	1	0	0	4	5
4	0	3	0	4	4	11
5	0	0	0	3	4	7
6	0	0	0	5	3	8
7	0	0	0	0	0	0
8	0	3	0	3	0	6
9	0	0	0	2	1	3
10	0	0	0	3	4	7

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Statistical Analyses

Client: WSRC
 Sample Identification: FHB-021
 Test Date: 4/11/96

Test for Normality

Test Used: Shapiro Wilks W= 0.915
 critical 0.93

The data are not normal in distribution

Test for Homogeneity of Variance

Test Used: Bartlett's Test B= 13.63
 critical 15.1

The data are homogeneous in variance

Test for Differences in Reproduction

Test Type Used: Wilcoxon's Test

t Test	Test Concentration					
	Control	6%	12%	25%	50%	100%
t Value		0.83	0.89	1.96	6.83	7.48
critical		2.33	2.33	2.33	2.33	
mean	18.8	17.4	17.3	15.5	7.3	6.2
MSD=	3.92					

Wilcoxon's Test	Test Concentration				
	6%	12%	25%	50%	100%
Rank Sum		100	74	53	
critical		75	75	75	

NOEC= 12.5% effluent concentration
 LOEC= 25% effluent concentration

Effluent Conc. vs. Reproduction

Comments

The toxicity at 25% effluent concentration was marginal.

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Water Chemistry

Client: Westinghouse Savannah River Company
 Sample Identification: FHB-021
 Test Date: 4/11/96

pH (After Renewal)

	Test Concentration					
	Control	6%	12%	25%	50%	100%
Initial	8.28	7.48	7.01	6.93	6.87	6.75
Day 1	8.12	7.87	7.66	7.57	7.25	7.03
Day 2	7.95	no data	no data	no data	no data	no data
Day 3	8.03	7.97	7.96	7.79	7.57	7.26
Day 4	8.09	7.94	7.89	7.74	7.57	6.85
Day 5	8.07	7.82	7.80	7.53	6.95	6.51
Day 6	8.08	7.93	7.76	7.48	6.87	6.39

pH (Before Renewal)

	Test Concentration					
	Control	6%	12%	25%	50%	100%
Day 1	8.18	7.94	7.87	7.58	7.23	7.11
Day 2	8.14	no data	no data	no data	no data	no data
Day 3	8.20	7.95	7.95	7.82	7.64	7.15
Day 4	8.26	7.97	8.11	8.00	8.00	7.03
Day 5	8.33	8.08	8.03	7.86	7.65	6.94
Day 6	8.11	8.01	8.07	7.23	7.57	6.94
Final	8.07	8.14	8.21	7.98	7.73	7.14

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6%	12%	25%	50%	100%
Initial	8.7	8.6	8.5	8.6	8.6	8.7
Day 1	8.8	8.4	8.4	8.6	8.6	8.7
Day 2	8.7	no data	no data	no data	no data	no data
Day 3	8.6	8.6	8.6	8.5	8.6	8.8
Day 4	8.5	8.6	8.6	8.4	8.4	8.7
Day 5	8.7	8.7	8.6	8.6	8.4	8.6
Day 6	8.7	8.6	8.7	8.6	8.6	8.6

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6%	12%	25%	50%	100%
Day 1	8.6	8.4	8.4	8.8	8.8	9.0
Day 2	8.5	no data	no data	no data	no data	no data
Day 3	8.2	8.2	8.4	8.4	8.3	8.4
Day 4	8.6	8.3	8.3	8.4	8.4	8.6
Day 5	8.6	8.4	8.3	8.4	8.4	8.4
Day 6	8.5	8.4	8.3	8.4	8.4	8.3
Final	8.6	8.3	8.4	8.2	8.4	8.4

Dilution Water & Effluent Parameters

	Res Cl.	Alkalinity	Hard.	Cond.	
	mg/L	mg/L	mg/L	µmhos	
Eff. Sample 1	<0.05	no data	6	no data	
Eff. Sample 2			10		
Eff. Sample 3			10		
Dilution Water		69	86	178	

Temperature

Incubator °C	
Initial	24.5
Day 1	24.5
Day 2	25.3
Day 3	24.9
Day 4	25.5
Day 5	25.0
Day 6	26.0
Final	24.8

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

Method: EPA/600/4-89/001

Test Organism: *Ceriodaphnia dubia*

Facility: Westinghouse Savannah River Company
Sample ID: FHB-022

Date: 2/22/96

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST **Survival and Reproduction Results**

Client: Westinghouse Savannah River Company
Sample Identification: FHB-022
Test Date: 2/22/96

Reproduction at 0.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	6	8	0	14	28
2	4	0	4	11	0	19
3	4	7	0	8	0	19
4	4	6	0	0	14	24
5	2	4	7	10	0	23
6	4	0	0	8	10	22
7	4	0	8	10	0	22
8	3	6	2	10	0	21
9	0	5	8	0	9	22
10	0	3	10	0	13	26

Reproduction at 6.25% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	7	9	0	10	26
2	4	0	9	10	0	23
3	5	6	0	9	0	20
4	4	6	0	0	8	18
5	4	0	8	10	0	22
6	4	1	7	0	9	21
7	4	0	8	10	0	22
8	0	6	7	11	0	24
9	0	2	7	0	9	18
10	0	4	8	0	10	22

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

Reproduction at 25.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	1	8	10	0	19
2	4	0	8	0	11	23
3	4	6	0	8	0	18
4	6	4	0	0	11	21
5	0	4	7	0	10	21
6	4	0	9	0	0	13
7	5	0	9	11	0	25
8	0	4	10	9	0	23
9	0	6	7	10	0	23
10	0	2	8	0	12	22

Reproduction at 50.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	2	8	0	11	21
2	0	7	7	10	0	24
3	4	8	0	9	0	21
4	5	5	0	0	10	20
5	5	0	8	10	0	23
6	4	0	8	9	0	21
7	4	0	7	9	0	20
8	3	0	9	10	0	22
9	0	3	0	8	9	20
10	0	2	9	0	8	19

Reproduction at 100.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	4	6	0	10	20
2	4	0	0	12	9	25
3	3	6	0	8	0	17
4	4	6	0	0	9	19
5	4	1	8	11	0	24
6	3	0	7	13	0	23
7	4	0	8	10	0	22
8	3	4	4	8	0	19
9	0	3	9	0	10	22
10	0	4	8	0	11	23

Client: Westinghouse Savannah River Company
Sample Identification: FHB-022
Test Date: 2/22/96

The data are normal in distribution

The data are homogeneous in variance

The sample is not acutely or chronically toxic.

Summary

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Water Chemistry

Client: Westinghouse Savannah River Company
 Sample Identification: FHB-022
 Test Date: 2/22/96

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	8.04	7.58	7.87	7.84	7.88	7.82
Day 1	8.09	7.73	7.76	7.80	7.83	7.85
Day 2	8.00	7.66	7.82	7.91	7.86	7.99
Day 3	8.02	7.85	7.91	7.95	8.07	8.20
Day 4	8.03	7.69	7.94	7.95	7.98	8.14
Day 5	8.08	7.98	7.60	7.91	7.68	7.38
Day 6	8.11	7.70	7.82	7.89	7.93	8.09

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	7.93	8.14	8.27	8.27	8.18	7.97
Day 2	8.14	8.20	8.34	8.29	8.07	7.68
Day 3	8.26	8.14	8.14	8.16	8.08	7.79
Day 4	7.73	8.05	8.10	8.18	8.17	8.14
Day 5	8.07	7.24	7.98	7.79	7.95	8.12
Day 6	8.05	8.29	8.42	8.42	8.27	8.04
Final	8.20	8.20	8.16	8.19	8.14	8.00

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	8.6
Day 1	8.4	8.4	8.4	8.4	8.4	8.4
Day 2	8.6	8.6	8.6	8.4	8.4	8.6
Day 3	8.5	8.4	8.4	8.5	8.5	8.5
Day 4	8.7	8.2	8.2	8.3	8.3	8.4
Day 5	8.2	8.4	8.5	8.4	8.4	8.5
Day 6	8.9	8.3	8.3	8.4	8.5	8.5

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.3	8.7	8.7	8.7	8.7	8.7
Day 2	8.2	8.4	8.4	8.3	8.4	8.2
Day 3	8.5	8.3	8.4	8.4	8.4	8.4
Day 4	8.2	8.4	8.4	8.5	8.5	8.3
Day 5	8.4	8.0	8.1	8.2	8.1	8.2
Day 6	8.5	8.2	8.3	8.5	8.5	8.6
Final	8.6	8.6	8.7	8.7	8.8	8.8

Dilution Water & Effluent Parameters

	Res Cl.	Alkalinity	Hard.	Cond.	
	mg/L	mg/L	mg/L	µmhos	
Eff. Sample 1	<0.05	8.12	16	57.3	
Eff. Sample 2	<0.05	10.2	16	59.1	
Eff. Sample 3	<0.05	10.2	14	57.3	
Dilution Water		69	100	209	

Temperature

Incubator °C	
Initial	26.0
Day 1	25.8
Day 2	24.8
Day 3	24.1
Day 4	26.0
Day 5	24.0
Day 6	25.1
Final	24.4

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

Method: EPA/600/4-89/001

Test Organism: *Ceriodaphnia dubia*

Facility: Westinghouse Savannah River Company

Sample ID: FHB-023

Date: 2/22/96

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST **Survival and Reproduction Results**

Client: Westinghouse Savannah River Company
Sample Identification: FHB-023
Test Date: 2/22/96

Reproduction at 0.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	5	10	0	13	28
2	0	6	8	12	0	26
3	4	0	9	10	0	23
4	4	0	8	0	10	22
5	4	8	0	12	0	24
6	0	3	5	0	10	18
7	3	6	0	8	0	17
8	5	0	7	5	0	17
9	0	5	7	0	9	21
10	4	0	7	8	0	19

Reproduction at 6.25% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	4	6	0	12	22
2	0	5	8	11	0	24
3	6	0	8	10	0	24
4	0	5	7	10	0	22
5	4	7	0	0	9	20
6	0	5	7	L	L	L
7	4	7	0	0	11	22
8	3	7	0	0	9	19
9	0	5	9	10	0	24
10	3	0	5	0	10	18

Reproduction at 12.5% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	5	7	0	8	20
2	0	2	6	10	0	18
3	4	0	6	10	0	20
4	5	0	7	10	0	22
5	4	9	0	8	0	21
6	0	5	5	10	0	20
7	3	8	0	11	0	22
8	0	5	7	0	9	21
9	0	5	8	10	0	23
10	4	8	0	11	0	23

Reproduction at 25.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	5	7	0	14	26
2	0	6	9	0	10	25
3	0	3	5	11	0	19
4	4	0	7	9	0	20
5	5	8	0	0	8	21
6	0	3	5	0	10	18
7	0	4	6	0	9	19
8	3	7	9	0	0	19
9	0	6	8	0	10	24
10	4	7	0	12	0	23

Reproduction at 50.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	1	5	0	10	16
2	0	5	7	0	12	24
3	0	4	8	10	0	22
4	0	2	5	0	12	19
5	4	8	0	11	0	23
6	0	4	6	0	8	18
7	5	0	7	11	0	23
8	5	7	0	0	10	22
9	0	4	7	0	12	23
10	0	3	7	10	0	20

Reproduction at 100.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	X	X	X	X	0
2	X	X	X	X	X	0
3	X	X	X	X	X	0
4	X	X	X	X	X	0
5	X	X	X	X	X	0
6	0	X	X	X	X	0
7	X	X	X	X	X	0
8	X	X	X	X	X	0
9	0	X	X	X	X	0
10	X	X	X	X	X	0

Client: Westinghouse Savannah River Company
Sample Identification: FHB-023
Test Date: 2/22/96

The data are normal in distribution

The data are homogeneous in variance

NOEC **50% effluent concentration**

LOEC **100% effluent concentration**

Summary

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Water Chemistry

Client: Westinghouse Savannah River Company
 Sample Identification: FHB-023
 Test Date: 2/22/96

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	8.04	7.81	7.46	7.42	7.39	6.03
Day 1	8.09	7.58	7.60	7.42	7.12	5.84
Day 2	8.00	7.70	7.69	7.51	7.06	6.07
Day 3	8.02	8.12	8.15	8.16	8.15	7.28
Day 4	8.03	7.77	7.77	7.71	7.65	
Day 5	8.08	7.89	7.74	7.47	7.11	
Day 6	8.11	7.82	7.85	7.83	7.64	

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	7.93	8.35	8.32	8.28	7.81	8.06
Day 2	8.14	8.30	8.21	8.40	7.91	8.10
Day 3	8.26	8.16	8.20	8.20	8.10	8.15
Day 4	7.73	8.18	8.20	8.15	8.16	7.97
Day 5	8.07	7.85	7.99	8.07	8.12	
Day 6	8.05	8.29	8.26	8.28	8.27	
Final	8.20	8.21	8.18	8.12	8.10	

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	8.6	8.8	8.8	8.6	8.6	8.6
Day 1	8.4	8.6	8.6	8.8	8.5	8.6
Day 2	8.6	8.8	8.7	8.6	8.4	8.6
Day 3	8.5	8.3	8.3	8.5	8.5	8.6
Day 4	8.7	8.4	8.4	8.4	8.2	
Day 5	8.2	8.0	8.2	8.4	8.4	
Day 6	8.9	8.2	8.2	8.2	8.5	

Dissolved Oxygen (Before Renewal)

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

Dilution Water & Effluent Parameters

	Res Cl.	Alkalinity	Hard.	Cond.	
	mg/L	mg/L	mg/L	µmhos	
Eff. Sample 1	.06	2.03	12	32.9	
Eff. Sample 2	<0.05	2.03	16	32.6	
Eff. Sample 3	<0.05	2.03	18	31.9	
Dilution Water		69	100	209	

Temperature

Incubator °C	
Initial	26.0
Day 1	25.8
Day 2	24.8
Day 3	24.1
Day 4	26.0
Day 5	24.0
Day 6	25.1
Final	24.4

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

Method: EPA/600/4-89/001

Test Organism: *Ceriodaphnia dubia*

Facility: Westinghouse Savannah River Company
Sample ID: HSP-064

Date: 2/29/96

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: Westinghouse Savannah River Company
 Sample Identification: HSP-064
 Test Date: 2/29/96 T5144

Reproduction at 0.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	6	10	14	0	30
2	0	0	4	4	9	17
3	0	5	8	0	13	26
4	5	0	9	6	5	25
5	4	0	9	3	4	20
6	5	9	0	10	0	24
7	4	4	6	0	7	21
8	0	5	7	6	3	21
9	5	0	10	10	0	25
10	0	3	11	9	0	23

Reproduction at 6.25% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	6	11	13	0	30
2	0	0	8	11	0	19
3	0	5	5	0	7	17
4	2	0	7	7	0	16
5	1	0	6	12	0	19
6	5	8	0	11	0	24
7	0	7	10	9	0	26
8	0	6	7	11	0	24
9	5	0	8	10	0	23
10	5	0	8	7	0	20

Reproduction at 12.5% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	6	8	14	0	28
2	0	0	2	11	10	23
3	0	5	7	4	0	16
4	3	0	8	12	0	23
5	0	0	9	0	9	18
6	4	0	7	8	0	19
7	4	0	8	11	0	23
8	0	6	9	0	7	22
9	0	6	5	5	0	16
10	4	0	8	0	4	16

Reproduction at 25.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	5	10	9	0	24
2	0	0	6	4	3	13
3	0	0	3	6	12	21
4	6	0	8	3	7	24
5	3	5	0	1	8	17
6	4	0	7	7	5	23
7	4	0	12	7	0	23
8	0	5	8	10	0	23
9	0	6	8	0	0	14
10	1	0	9	13	0	23

Reproduction at 50.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	4	9	11	0	24
2	0	0	4	9	0	13
3	0	5	0	0	0	5
4	0	8	7	0	0	15
5	1	0	2	11	0	14
6	5	5	0	3	4	17
7	3	0	6	11	0	20
8	0	4	7	0	8	19
9	0	0	10	11	0	21
10	4	0	8	8	0	20

Reproduction at 100.0% Concentration						
Rep.	Day 2/3	Day 4	Day 5	Day 6	Day 7	Total
1	0	4	6	10	0	20
2	0	0	4	6	12	22
3	0	4	L	L	L	L
4	0	0	6	7	9	22
5	4	0	6	8	0	18
6	3	0	5	11	0	19
7	0	4	8	9	0	21
8	0	2	3	0	11	16
9	0	5	8	9	0	22
10	0	6	9	9	0	24

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Statistical Analyses

Client: Westinghouse Savannah River Company
 Sample Identification: HSP-064
 Test Date: 2/29/96

Test for Normality

Test Used: Shapiro Wilks W= 0.948
 critical 0.93

The data are normal in distribution

Test for Homogeneity of Variance

Test Used: Bartlett's Test B= 4.31
 critical 15.1

The data are homogeneous in variance

Test for Differences in Reproduction

Test Type Used: t Test

t Test		Test Concentration					
	Control	6%	13%	25%	50%	100%	
t Value		0.76	1.53	1.47	3.49	1.46	
critical		2.33	2.33	2.33	2.33	2.33	
mean	23.2	21.8	20.4	20.5	16.8	20.4	
MSD=	4.27						

NOEC >100% effluent concentration

LOEC >100% effluent concentration

The sample is not acutely or chronically toxic
 Results at 50% concentration are considered anomalous.

Effluent Conc. vs. Reproduction

Summary

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Water Chemistry

Client: Westinghouse Savannah River Company
 Sample Identification: HSP-064
 Test Date: 2/29/96

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	8.12	7.69	7.83	7.71	7.48	6.15
Day 1	7.98	7.77	7.83	7.65	7.34	6.31
Day 2	7.97	8.10	8.00	7.87	7.45	6.52
Day 3	7.98	8.20	7.98	7.93	7.43	7.04
Day 4	8.06	8.07	7.85	7.77	7.33	6.12
Day 5	8.05	7.97	7.98	8.01	7.99	7.94
Day 6	8.14	8.16	8.11	8.04	7.91	7.25

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.10	8.16	8.24	8.28	8.31	8.49
Day 2	8.27	8.25	8.18	8.07	7.93	8.10
Day 3	8.44	8.46	8.50	8.53	8.44	8.24
Day 4	8.09	8.34	8.27	8.23	8.17	7.59
Day 5	8.33	8.20	8.17	8.16	8.03	7.58
Day 6	8.30	8.27	8.21	8.22	8.07	7.64
Final	8.21	8.28	8.24	8.16	8.16	7.57

Dissolved Oxygen (After Renewal)

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

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.3	8.2	8.0	8.3	8.4	8.2
Day 2	8.2	8.3	8.2	8.2	8.5	8.0
Day 3	8.8	8.6	8.6	8.8	8.9	9.0
Day 4	8.6	8.5	8.5	8.6	8.7	8.7
Day 5	8.5	8.2	8.2	8.2	8.1	8.1
Day 6	8.6	8.4	8.4	8.4	8.4	8.3
Final	8.3	8.4	8.4	8.5	8.5	8.6

Dilution Water & Effluent Parameters

	Res Cl.	Alkaline	Hard.	Cond.	
	mg/L	mg/L	mg/L	µmhos	
Eff. Sample 1	<0.05	4.06	10	32.1	
Eff. Sample 2	<0.05	6.09	10	33.7	
Eff. Sample 3	<0.05	6.09	16	30.8	
Dilution Water		71.1	84	222	

Temperature

	Incubator °C
Initial	24.4
Day 1	24.3
Day 2	25.7
Day 3	25.1
Day 4	24.2
Day 5	25.7
Day 6	25.1
Final	25.3

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

Method: EPA/600/4-89/001

Test Organism: *Ceriodaphnia dubia*

Facility: Westinghouse Savannah River Company

Sample ID: FMC-002H

Date: 2/22/96

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Survival and Reproduction Results

Client: Westinghouse Savannah River Company
 Sample Identification: FMC-002H
 Test Date: 2/22/96 T5101

Reproduction at 0.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	13	0	4	0	0	17
2	4	5	7	0	0	16
3	12	0	7	0	0	19
4	4	2	0	0	13	19
5	2	6	8	0	0	16
6	4	8	12	0	0	24
7	6	4	0	0	10	20
8	2	0	1	0	12	15
9	16	0	0	0	9	25
10	5	8	0	8	0	21

Reproduction at 6.25% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	12	0	1	0	12	25
2	4	10	1	0	14	29
3	13	0	7	0	0	20
4	0	1	0	8	9	18
5	4	7	6	0	0	17
6	2	6	7	0	0	15
7	0	2	3	0	10	15
8	0	0	0	9	11	20
9	15	0	0	0	10	25
10	4	9	0	8	0	21

Reproduction at 12.5% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	5	0	11	0	0	16
2	5	7	0	0	10	22
3	11	0	8	0	0	19
4	2	3	0	11	0	16
5	6	4	0	7	0	17
6	4	5	11	0	0	20
7	4	6	4	0	8	22
8	0	0	0	7	13	20
9	12	0	0	0	11	23
10	2	4	0	3	7	16

Reproduction at 25.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	9	0	6	12	0	27
2	4	6	2	0	9	21
3	8	0	9	0	0	17
4	0	0	0	8	10	18
5	2	6	0	12	0	20
6	6	6	9	0	0	21
7	3	8	5	0	0	16
8	0	0	5	7	11	23
9	3	7	2	0	9	21
10	4	9	6	2	0	21

Reproduction at 50.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	12	0	0	1	10	23
2	4	10	10	0	0	24
3	10	0	8	0	0	18
4	0	2	0	14	17	33
5	1	4	7	0	11	23
6	3	3	10	0	11	27
7	0	0	1	0	15	16
8	0	0	1	7	10	18
9	11	0	0	0	9	20
10	6	7	0	12	0	25

Reproduction at 100.0% Concentration						
Rep.	Day 3/4	Day 5	Day 6	Day 7	Day 8	Total
1	4	8	0	10	0	22
2	4	4	3	0	10	21
3	9	0	5	5	0	19
4	1	3	0	7	11	22
5	3	6	0	3	13	25
6	1	9	9	0	0	19
7	3	3	12	0	0	18
8	0	1	7	0	13	21
9	5	6	10	0	0	21
10	6	10	0	12	0	28

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION TEST

Statistical Analyses

Client: Westinghouse Savannah River Company
 Sample Identification: FMC-002H
 Test Date: 2/22/96

Test for Normality

Test Used: Shapiro Wilks W= 0.953
 critical 0.93

The data are normal in distribution

Test for Homogeneity of Variance

Test Used: Bartlett's Test B= 5.78
 critical 15.1

The data are homogeneous in variance

Test for Differences in Reproduction

Test Type Used: t Test

t Test		Test Concentration					
	Control	6%	13%	25%	50%	100%	
t Value		-0.78	0.06	-0.78	-2.11	-1.44	
critical		2.33	2.33	2.33	2.33		
mean	19.2	20.5	19.1	20.5	22.7	21.6	
MSD=		3.87					

NOEC >100% effluent concentration

LOEC >100% effluent concentration

The sample is not acutely or chronically toxic.

Effluent Conc. vs. Reproduction

Summary

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

Client: Westinghouse Savannah River Company
 Sample Identification: FMC-002H
 Test Date: 2/22/96

pH (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	8.04	7.86	7.24	7.80	7.35	7.37
Day 1	8.09	7.76	7.79	7.80	7.78	7.56
Day 2	8.00	7.81	7.69	7.86	7.90	7.39
Day 3	8.02	7.62	7.76	7.89	8.00	7.57
Day 4	8.03	7.91	7.99	8.01	7.22	7.64
Day 5	8.08	7.79	7.86	7.88	7.83	7.88
Day 6	8.11	8.05	8.06	8.05	8.02	7.54

pH (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	7.93	7.94	8.05	8.12	8.15	8.30
Day 2	8.14	7.86	8.01	8.19	8.26	8.41
Day 3	8.26	8.04	8.19	8.18	8.03	7.99
Day 4	7.73	8.16	8.14	8.11	8.00	7.49
Day 5	8.07	8.18	8.26	8.17	8.12	7.73
Day 6	8.05	8.23	8.17	8.19	8.07	7.48
Final	8.20					

Dissolved Oxygen (After Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Initial	8.6	8.8	8.8	8.8	8.6	8.6
Day 1	8.4	8.7	8.8	9.0	9.1	9.1
Day 2	8.6	8.8	8.6	8.8	9.0	8.6
Day 3	8.5	7.8	8.1	8.0	8.1	8.1
Day 4	8.7	8.1	8.1	8.2	8.2	8.2
Day 5	8.2	8.2	8.4	8.4	8.5	8.5
Day 6	8.9	8.4	8.4	8.4	8.4	8.3

Dissolved Oxygen (Before Renewal)

	Test Concentration					
	Control	6.25%	12.5%	25%	50%	100%
Day 1	8.3	8.4	8.6	8.6	8.8	8.8
Day 2	8.2	8.6	8.4	8.3	8.8	8.6
Day 3	8.5	7.0	8.2	8.1	8.2	8.1
Day 4	8.2	8.2	8.4	8.4	8.4	8.4
Day 5	8.4	8.2	8.3	8.4	8.4	8.4
Day 6	8.5	8.3	8.3	8.4	8.4	8.2
Final	8.6					

Dilution Water & Effluent Parameters

	Res Cl.	Alkaline	Hard.	Cond.	
	mg/L	mg/L	mg/L	µmhos	
Eff. Sample 1	0.06	10.2	12	56.9	
Eff. Sample 2	<.05	10.2	24	58.8	
Eff. Sample 3	<.05	8.12	14	57.2	
Dilution Water		68	82	196.3	

Temperature

Incubator °C	
Initial	26.0
Day 1	25.8
Day 2	24.0
Day 3	24.1
Day 4	26.0
Day 5	24.0
Day 6	25.1
Final	24.4

APPENDIX D

SEDIMENT TOXICITY RESULTS, AUGUST-SEPTEMBER 1995

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

EPA/600/R-94/024 Method 100.1

Test Organism: *Hyallela azteca*

Client: Westinghouse Savannah River Company
Sample Identification: WSRC BG 001

Test Start Date: 8-29-95

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 8-29-95
T4441	Sample Identification: WSRC BG 001	End Date: 9-8-95

Test System

EPA/600/R-94/024 Method 100.1

The test was set as a Pass/Fail test with a control treatment and one sample treatment. Each treatment replicate consisted of 100 g of sediment and 175 mL of dilution water. There were eight replicates for each treatment. Ten test organisms were placed in each replicate. Sediment from a local creek was used in the control treatment. Test organisms were fed with YCT food. The test was conducted at a temperature of 23°C with ambient laboratory light conditions. Test vessels were 500 mL plastic beakers placed in a constant temperature incubator room.

<div>Test Organisms</div> <div>Order: Amphipoda Species: <i>Hyallela azteca</i> Source: Aquatic Biosystems, CO Life Stage: 2-3 mm % Mortality During 48 Hr Prior to Test:: 0% Taxonomic Verification: RWK 8/28/95 Culturing: as received Observations: Cultures healthy Acclimation: None</div>	<div>Dilution Water</div> <div>Type: Surface Water Collection Date 8/28/95 Initial Final Alkalinity 46.9 40.8 mg/L Ammonia <0.1 0.2 mg/L Conductivity 142.6 186.1 umhos/cm Hardness 64 82 mg/L pH: 7.07 7.42 units Preparation Method: Grab sample Evidence of Water Quality: Good reproduction of Ceriodaphnia dubia cultures</div>
<div>Control Sediment</div> <div>Source: Resurrection Creek (Greer S C) Collection Date: 8-28-95 Preservation: kept at 0-4°C in plastic containers Date/Time Added to Test Chambers: 8-28-95 Observations: organic Collection Method: grab Disposal:</div>	<div>Test Sediment</div> <div>Source: WSRC BG 001 Collection Date 8/22/95 Homogenized?: yes Preservation: kept at 0-4°C in plastic containers Date/Time Added to Test Chambers: 8/28/95 Observations: organic Collection Method: grab Shipment: Overnight at 4°C</div>
<div>Food Preparation</div> <div>Source: Trout Chow (Glencoe Mills); Cerophyl (Sigma) Purchase Date: Preparation Date: 3/23/95 Preservation: kept at 0-4°C Preparation Method: Trout Chow aerated 7 days Cerophyl, yeast aerated overnight Feeding Rate: 1.5 mL / day / replicate Hold Time: 5 days</div>	<div>Test Chambers</div> <div>Type: Plastic 500 mL beakers Sediment Volume: 100 mL Sediment Depth 4 cm Overlying Water Volume: 175 mL Overlying Water Depth: 5 cm Aeration: none</div>

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 8-29-95
T4441	Sample Identification: WSRC BG 001	End Date: 9-8-95

WATER CHEMISTRY TEST METHODS

Temperature: SM 18th Ed. 2550	Alkalinity: SM 18th Ed. 2320
Dissolved Oxygen: SM 18th Ed. 4500-O	Hardness: SM 18th Ed. 2340
pH: SM 18th Ed. 4500-H+	Conductivity: SM 18th Ed. 2510

WATER CHEMISTRY TEST DATA - OVERLYING WATER

CONTROL TREATMENT					SAMPLE TREATMENT								
Test Day	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Test Day	Cond. umhos/cm	NH3 mg/L	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Alk. mg/L	Hard. mg/L
Start	23.3	7.07	7.8	91%	Start	73	0.597	23.0	6.31	6.8	79%	14.3	30.0
1	22.1		7.0	80%	1			22.0		6.2	71%		
2	21.9		6.0	67%	2			21.9		5.4	61%		
3	21.8		5.6	63%	3			22.0		5.4	62%		
4	22.0		5.3	61%	4			22.0		5.3	61%		
5	23.0		5.8	67%	5			22.6		5.0	57%		
6	22.5		5.5	63%	6			22.4		5.4	62%		
7	22.3		5.6	64%	7			22.1		5.6	64%		
8	22.0		5.3	61%	8			22.1		5.0	57%		
9	22.0		5.2	60%	9			22.0		5.1	59%		
10	22.1	7.42	4.7	54%	10	133		22.2	6.85	4.8	55%	46.9	56.0

SURVIVAL AND GROWTH RESULTS

CONTROL TREATMENT							SAMPLE TREATMENT						
	# Organisms				Mean Length (mm)	Mean Length (mm)		# Organisms				Mean Length (mm)	Mean Length (mm)
	Initial	Live at End	Dead at End	% Survival				Initial	Live at End	Dead at End	% Survival		
A	10	6	1	60%	2.4	2.40	A	10	7	0	70%	2.52	2.52
B	10	NA	NA	NA	NA	NA	B	10	9	0	90%	2.44	2.44
C	10	7	0	70%	2.18	2.18	C	10	6	0	60%	2.44	2.44
D	10	7	0	70%	2.18	2.18	D	10	5	0	50%	2.41	2.41
E	10	10	0	100%	2.17	2.17	E	10	10	0	100%	2.24	2.24
F	10	8	2	80%	2.12	2.12	F	10	6	0	60%	2.33	2.33
G	10	9	0	90%	2.13	2.13	G	10	8	0	80%	2.26	2.26
H	10	9	0	90%	2.2	2.15	H	10	8	0	80%	2.3	2.34
Mean	10.0			80%		2.19	Mean	10.0			74%		2.37

. 10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 8-29-95
T4441	Sample Identification: WSRC BG 001	End Date: 9-8-95

RESULTS

SURVIVAL DATA		GROWTH DATA	
Mean of Eight Replicates		Mean Length (mm)	
	Mean %		Mean
Control	80.0%	Control	2.19
Sample	73.8%	Sample	2.37

STATISTICAL ANALYSES

SURVIVAL DATA	GROWTH DATA
<p>Test for Normality: $W = 0.94$ Critical value: 0.84 Data are normal in distribution</p> <p>Test for Homogeneity of Variance: $F = N/A$ Critical value: 6.64</p> <p>Test for Differences in Survival: t Test $t = 0.65$ Critical value: 1.75 The sediment did not significantly reduce survival of the test organisms.</p>	<p>Test for Normality: $W = 0.94$ Critical value: 0.84 Data are normal in distribution</p> <p>Test for Homogeneity of Variance: $F = 1.02$ Critical value: 6.635 Data are homogeneous in variance</p> <p>Test for Differences in Growth: "t" Test $t = -3.67$ Critical value: 1.94 The sediment did not significantly reduce growth of the test organisms.</p>

COMMENTS

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Principal Analyst: Aimee Arnold	Signature: <i>Aimee Arnold</i>	Date: 10/13/95
Report Reviewed By: Robert W. Kelley, Ph.D.	Signature: <i>Robert W. Kelley</i>	Date: 10/13/95

CONCLUSIONS

The test sediment does not adversely affect the survival and growth of freshwater amphipods.

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

EPA/600/R-94/024 Method 100.1

Test Organism: *Hyallela azteca*

Client: Westinghouse Savannah River Company
Sample Identification: WSRC BG 002

Test Start Date: 9-30-95

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-30-95
T4442	Sample Identification: WSRC BG 002	End Date: 10-10-95

Test System

EPA/600/R-94/024 Method 100.1

The test was set as a Pass/Fail test with a control treatment and one sample treatment. Each treatment replicate consisted of 100 g of sediment and 175 mL of dilution water. There were eight replicates for each treatment. Ten test organisms were placed in each replicate. Sediment from a local river was used in the control treatment. Test organisms were fed with YCT food. The test was conducted at a temperature of 23°C with ambient laboratory light conditions. Test vessels were 500 mL plastic beakers placed in a constant temperature incubator room.

Test Organisms	
Order:	Amphipoda
Species:	<i>Hyallela azteca</i>
Source:	Aquatic Research Organisms, NH
Life Stage:	2-3 mm
% Mortality During 48 Hr Prior to Test::	0%
Taxonomic Verification:	RWK 9/29/95
Culturing:	as received
Observations:	Cultures healthy
Acclimation:	None

Dilution Water			
Type:	Surface Water		
Collection Date	9/29/95	Initial	Final
<i>Alkalinity</i>		16.2	16.2 mg/L
<i>Ammonia</i>		0.742	0.518 mg/L
<i>Conductivity</i>		51.9	46.4 umhos/cm
<i>Hardness</i>		16	16 mg/L
<i>pH:</i>		7.07	7.42 units
Preparation Method:	Grab sample		
Evidence of Water Quality:	Good reproduction of Ceriodaphnia dubia cultures		

Control Sediment	
Source:	South Tyger river @ Hwy. 14
Collection Date:	9-19-95
Preservation:	kept at 0-4°C in plastic containers
Date/Time Added to Test Chambers:	9-29-95
Observations:	silt
Collection Method:	grab
Disposal:	

Test Sediment	
Source:	WSRC BG 002
Collection Date	8/22/95
Homogenized?:	yes
Preservation:	kept at 0-4°C in plastic containers
Date/Time Added to Test Chambers:	9/29/95
Observations:	organic
Collection Method:	grab
Shipment:	Overnight at 4°C

Food Preparation	
Source:	Trout Chow (Glencoe Mills); Cerophyl (Sigma)
Purchase Date:	Preparation Date: 3/23/95
Preservation:	kept at 0-4°C
Preparation Method:	Trout Chow aerated 7 days Cerophyl, yeast aerated overnight
Feeding Rate:	1.5 mL / day / replicate
Hold Time:	5 days

Test Chambers	
Type:	Plastic 500 mL beakers
Sediment Volume:	100 mL
Sediment Depth	4 cm
Overlying Water Volume:	175 mL
Overlying Water Depth:	5 cm
Aeration:	none

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-30-95
T4442	Sample Identification: WSRC BG 002	End Date: 10-10-95

WATER CHEMISTRY TEST METHODS

Temperature: SM 18th Ed. 2550	Alkalinity: SM 18th Ed. 2320
Dissolved Oxygen: SM 18th Ed. 4500-O	Hardness: SM 18th Ed. 2340
pH: SM 18th Ed. 4500-H+	Conductivity: SM 18th Ed. 2510

WATER CHEMISTRY TEST DATA - OVERLYING WATER

CONTROL TREATMENT

Test Day	Temp. C	pH units	D.O. mg/L	D.O. % sat.
Start	22.5	6.67	7.0	80%
1	23.2		6.4	74%
2	22.6		6.8	78%
3	22.7		5.7	66%
4	22.9		5.5	63%
5	23.1		5.6	65%
6	22.2		5.6	64%
7	22.3		8.3	95%
8	23.5		5.4	63%
9	23.7		7.2	84%
10	22.0	6.38	6.2	71%

SAMPLE TREATMENT

Test Day	Cond. umhos/cm	NH3 mg/L	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Alk. mg/L	Hard. mg/L
Start	39.2	0.742	22.3	5.38	6.4	74%	4.1	50.0
1			23.4		5.2	60%		
2			22.2		7.0	80%		
3			22.5		6.5	75%		
4			22.9		6.2	71%		
5			23.0		5.9	69%		
6			22.2		6.0	69%		
7			22.1		6.1	70%		
8			23.5		6.4	74%		
9			23.1		6.8	79%		
10	26	0.725	22.1	5.76	6.5	75%	4.1	30.0

SURVIVAL AND GROWTH RESULTS

CONTROL TREATMENT

	# Organisms				Mean Length (mm)	Mean Length (mm)
	Initial	Live at End	Dead at End	% Survival		
A	10	8	0	80%	1.57	1.57
B	10	10	0	100%	1.58	1.58
C	10	8	0	80%	1.35	1.35
D	10	10	0	100%	1.56	1.56
E	10	9	0	90%	1.68	1.68
F	10	10	0	100%	1.58	1.58
G	10	10	0	100%	1.6	1.60
H	10	10	0	100%	1.6	1.60
Mean	10.0			94%		1.57

SAMPLE TREATMENT

	# Organisms				Mean Length (mm)	Mean Length (mm)
	Initial	Live at End	Dead at End	% Survival		
A	10	0	0	0%	NA	NA
B	10	0	0	0%	NA	NA
C	10	2	2	20%	1.64	1.64
D	10	0	0	0%	NA	NA
E	10	1	1	10%	1.73	1.73
F	10	0	2	0%	NA	NA
G	10	0	1	0%	NA	NA
H	10	0	0	0%	NA	NA
Mean	10.0			4%		1.69

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-30-95
T4442	Sample Identification: WSRC BG 002	End Date: 10-10-95

RESULTS

SURVIVAL DATA		GROWTH DATA	
Mean of Eight Replicates		Mean Length (mm)	
	Mean %		Mean
Control	93.8%	Control	1.57
Sample	3.8%	Sample	1.69

STATISTICAL ANALYSES

SURVIVAL DATA	GROWTH DATA
<p>Test for Normality: W= 0.90 Critical value: 0.84 Data are normal in distribution</p> <p>Test for Homogeneity of Variance: F= N/A Critical value: 6.64</p> <p>Test for Differences in Survival: t Test t= 14.03 Critical value: 1.75 The sediment significantly reduced survival of the test organisms.</p>	<p>Test for Normality: W= 0.71 Critical value: 0.84 Data are not normal in distribution</p> <p>Test for Homogeneity of Variance: F= 2.20 Critical value: 6.635 Data are homogeneous in variance</p> <p>Test for Differences in Growth: "t" Test t= -1.67 Critical value: 1.94 The sediment did not significantly reduce growth of the test organisms.</p>

COMMENTS

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Principal Analyst: Aimee Arnold	Signature: <i>Aimee Arnold</i>	Date: 10/13/95
Report Reviewed By: Robert W. Kelley, Ph.D.	Signature: <i>Robert W. Kelley</i>	Date: 10/13/95

CONCLUSIONS

The test sediment does adversely affect the survival but not the growth of freshwater amphipods.
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10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

EPA/600/R-94/024 Method 100.1

Test Organism: Hyallela azteca

Client: Westinghouse Savannah River Company
Sample Identification: WSRC BG003

Test Start Date: 8/29/95

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 8-29-95
T4443	Sample Identification: WSRC BG003	End Date: 9-8-95

Test System

EPA/600/R-94/024 Method 100.1

The test was set as a Pass/Fail test with a control treatment and one sample treatment. Each treatment replicate consisted of 100 g of sediment and 175 mL of dilution water. There were eight replicates for each treatment. Ten test organisms were placed in each replicate. Sediment from a local creek was used in the control treatment. Test organisms were fed with YCT food. The test was conducted at a temperature of 23°C with ambient laboratory light conditions. Test vessels were 500 mL plastic beakers placed in a constant temperature incubator room.

Test Organisms	Dilution Water
Order: Amphipoda	Type: Surface Water
Species: <i>Hyallela azteca</i>	Collection Date 8/28/95
Source: Aquatic Biosystems, CO	Initial Final
Life Stage: 2-3 mm	Alkalinity 46.9 40.8 mg/L
% Mortality During 48 Hr Prior to Test:: 0%	Ammonia <0.1 0.2 mg/L
Taxonomic Verification: RWK 8/28/95	Conductivity 142.6 186.1 umhos/cm
Culturing: as received	Hardness 64 82 mg/L
	pH: 7.07 7.42 units
Observations: Cultures healthy	Preparation Method:
Acclimation: None	Grab sample
	Evidence of Water Quality:
	Good reproduction of <i>Ceriodaphnia dubia</i> cultures

Control Sediment	Test Sediment
Source: Resurrection Creek (Greer S C)	Source: WSRC BG003
Collection Date: 8-28-95	Collection Date 8/22/95 Homogenized?: yes
Preservation: kept at 0-4°C in plastic containers	Preservation: kept at 0-4°C in plastic containers
Date/Time Added to Test Chambers: 8-28-95	Date/Time Added to Test Chambers: 8/28/95
Observations: organic	Observations: organic
Collection Method: grab	Collection Method: grab
Disposal:	Shipment: Overnight at 4°C

Food Preparation	Test Chambers
Source: Trout Chow (Glencoe Mills); Cerophyl (Sigma)	Type: Plastic 500 mL beakers
Purchase Date: Preparation Date: 3/23/95	Sediment Volume: 100 mL
Preservation: kept at 0-4°C	Sediment Depth 4 cm
Preparation Method: Trout Chow aerated 7 days	Overlying Water Volume: 175 mL
Cerophyl, yeast aerated overnight	Overlying Water Depth: 5 cm
Feeding Rate: 1.5 mL / day / replicate	Aeration: none
Hold Time: 5 days	

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 8-29-95
T4443	Sample Identification: WSRC BG003	End Date: 9-8-95

WATER CHEMISTRY TEST METHODS

Temperature: SM 18th Ed. 2550	Alkalinity: SM 18th Ed. 2320
Dissolved Oxygen: SM 18th Ed. 4500-O	Hardness: SM 18th Ed. 2340
pH: SM 18th Ed. 4500-H+	Conductivity: SM 18th Ed. 2510

WATER CHEMISTRY TEST DATA - OVERLYING WATER

CONTROL TREATMENT					SAMPLE TREATMENT								
Test Day	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Test Day	Cond. umhos/cm	NH3 mg/L	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Alk. mg/L	Hard. mg/L
Start	23.3	7.07	7.8	91%	Start	80.5	0.586	23.1	6.43	6.2	72%	16.3	28.0
1	22.1		7.0	80%	1			22.1		5.9	68%		
2	21.9		6.0	67%	2			22.0		5.6	64%		
3	21.8		5.6	63%	3			21.9		5.4	61%		
4	22.0		5.3	61%	4			22.1		5.6	64%		
5	23.0		5.8	67%	5			22.6		5.2	60%		
6	22.5		5.5	63%	6			22.3		5.2	60%		
7	22.3		5.6	64%	7			22.1		5.0	57%		
8	22.0		5.3	61%	8			22.1		5.2	60%		
9	22.0		5.2	60%	9			22.0		5.1	59%		
10	22.1	7.42	4.7	54%	10	134	<0.1	22.2	6.94	4.9	56%	42.8	54.0

SURVIVAL AND GROWTH RESULTS

CONTROL TREATMENT							SAMPLE TREATMENT						
	# Organisms				Mean Length (mm)	Mean Length (mm)		# Organisms				Mean Length (mm)	Mean Length (mm)
	Initial	Live at End	Dead at End	% Survival				Initial	Live at End	Dead at End	% Survival		
A	10	6	1	60%	2.4	2.40	A	10	8	0	80%	2.23	2.23
B	10	NA	NA	NA	NA	NA	B	10	8	1	80%	2.39	2.39
C	10	7	0	70%	2.18	2.18	C	10	8	2	80%	2.26	2.26
D	10	7	0	70%	2.18	2.18	D	10	6	0	60%	2.51	2.51
E	10	10	0	100%	2.17	2.17	E	10	7	0	70%	2.27	2.27
F	10	8	2	80%	2.12	2.12	F	10	6	0	60%	2.33	2.33
G	10	9	0	90%	2.13	2.13	G	10	6	0	60%	2.33	2.33
H	10	9	0	90%	2.2	2.15	H	10	5	0	50%	2.4	2.37
Mean	10.0			80%		2.19	Mean	10.0			68%		2.34

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 8-29-95
T4443	Sample Identification: WSRC BG003	End Date: 9-8-95

RESULTS

SURVIVAL DATA		GROWTH DATA	
Mean of Eight Replicates		Mean Length (mm)	
	Mean %		Mean
Control	80.0%	Control	2.19
Sample	67.5%	Sample	2.34

STATISTICAL ANALYSES

SURVIVAL DATA	GROWTH DATA
Test for Normality: $W = 0.95$ Critical value: 0.84 Data are normal in distribution	Test for Normality: $W = 0.84$ Critical value: 0.84 Data are normal in distribution
Test for Homogeneity of Variance: $F = N/A$ Critical value: 6.64	Test for Homogeneity of Variance: $F = 1.15$ Critical value: 6.635 Data are homogeneous in variance
Test for Differences in Survival: t Test $t = 1.92$ Critical value: 1.75 The sediment significantly reduced survival of the test organisms.	Test for Differences in Growth: t Test $t = -3.06$ Critical value: 1.94 The sediment did not significantly reduce growth of the test organisms.

COMMENTS

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Principal Analyst: Aimee Arnold	Signature: <i>Aimee Arnold</i>	Date: 10/13/95
Report Reviewed By: Robert W. Kelley, Ph.D.	Signature: <i>Robert W. Kelley</i>	Date: 10/13/95

CONCLUSIONS

The test sediment does adversely affect the survival but not the growth of freshwater amphipods.
--

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10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

EPA/600/R-94/024 Method 100.1

Test Organism: *Hyallela azteca*

Client: Westinghouse Savannah River Company
Sample Identification: WSRC FHB 006

Test Start Date: 9-30-95

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-30-95
T4451	Sample Identification: WSRC FHB 006	End Date: 10-10-95

Test System

EPA/600/R-94/024 Method 100.1

The test was set as a Pass/Fail test with a control treatment and one sample treatment. Each treatment replicate consisted of 100 g of sediment and 175 mL of dilution water. There were eight replicates for each treatment. Ten test organisms were placed in each replicate. Sediment from a local river was used in the control treatment. Test organisms were fed with YCT food. The test was conducted at a temperature of 23°C with ambient laboratory light conditions. Test vessels were 500 mL plastic beakers placed in a constant temperature incubator room.

Test Organisms	
Order:	Amphipoda
Species:	<i>Hyallela azteca</i>
Source:	Aquatic Research Organisms, NH
Life Stage:	2-3 mm
% Mortality During 48 Hr Prior to Test::	0%
Taxonomic Verification:	RWK 9/29/95
Culturing:	as received
Observations:	Cultures healthy
Acclimation:	None

Dilution Water			
Type:	Surface Water		
Collection Date	9/29/95	Initial	Final
Alkalinity		16.2	16.2 mg/L
Ammonia		0.742	0.518 mg/L
Conductivity		51.9	46.4 umhos/cm
Hardness		16	16 mg/L
pH:		7.07	7.42 units
Preparation Method:	Grab sample		
Evidence of Water Quality:	Good reproduction of <i>Ceriodaphnia dubia</i> cultures		

Control Sediment	
Source:	South Tyger river @ Hwy. 14
Collection Date:	9-19-95
Preservation:	kept at 0-4°C in plastic containers
Date/Time Added to Test Chambers:	9-29-95
Observations:	silt
Collection Method:	grab
Disposal:	

Test Sediment	
Source:	WSRC FHB 006
Collection Date	8/22/95
Homogenized?:	yes
Preservation:	kept at 0-4°C in plastic containers
Date/Time Added to Test Chambers:	9/29/95
Observations:	organic
Collection Method:	grab
Shipment:	Overnight at 4°C

Food Preparation	
Source:	Trout Chow (Glencoe Mills); Cerophyl (Sigma)
Purchase Date:	Preparation Date: 3/23/95
Preservation:	kept at 0-4°C
Preparation Method:	Trout Chow aerated 7 days Cerophyl, yeast aerated overnight
Feeding Rate:	1.5 mL / day / replicate
Hold Time:	5 days

Test Chambers	
Type:	Plastic 500 mL beakers
Sediment Volume:	100 mL
Sediment Depth	4 cm
Overlying Water Volume:	175 mL
Overlying Water Depth:	5 cm
Aeration:	none

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-30-95
T4451	Sample Identification: WSRC FHB 006	End Date: 10-10-95

WATER CHEMISTRY TEST METHODS

Temperature: SM 18th Ed. 2550	Alkalinity: SM 18th Ed. 2320
Dissolved Oxygen: SM 18th Ed. 4500-O	Hardness: SM 18th Ed. 2340
pH: SM 18th Ed. 4500-H+	Conductivity: SM 18th Ed. 2510

WATER CHEMISTRY TEST DATA - OVERLYING WATER

CONTROL TREATMENT

SAMPLE TREATMENT

Test Day	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Test Day	Cond. umhos/cm	NH3 mg/L	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Alk. mg/L	Hard. mg/L
Start	22.5	6.67	7.0	80%	Start	28	0.378	22.2	6.63	7.6	87%	4.1	46.0
1	23.2		6.4	74%	1			22.3		7.8	90%		
2	22.6		6.8	78%	2			23.0		6.4	74%		
3	22.7		5.7	66%	3			22.3		5.2	60%		
4	22.9		5.5	63%	4			22.9		6.2	71%		
5	23.1		5.6	65%	5			22.9		5.8	67%		
6	22.2		5.6	64%	6			22.1		6.7	77%		
7	22.3		8.3	95%	7			22.2		6.5	75%		
8	23.5		5.4	63%	8			23.3		6.7	78%		
9	23.7		7.2	84%	9			23.1		7.2	84%		
10	22.0	6.38	6.2	71%	10	23.9	0.641	22.1	6.08	6.7	77%	6.1	50.0

SURVIVAL AND GROWTH RESULTS

CONTROL TREATMENT

SAMPLE TREATMENT

	# Organisms				Mean Length (mm)	Mean Length (mm)		# Organisms				Mean Length (mm)	Mean Length (mm)
	Initial	Live at End	Dead at End	% Survival				Initial	Live at End	Dead at End	% Survival		
A	10	8	0	80%	1.57	1.57	A	10	0	0	0%	1.62	1.62
B	10	10	0	100%	1.58	1.58	B	10	1	1	10%	1.51	1.51
C	10	8	0	80%	1.35	1.35	C	10	0	1	0%	1.51	1.51
D	10	10	0	100%	1.56	1.56	D	10	1	0	10%	1.59	1.59
E	10	9	0	90%	1.68	1.68	E	10	0	1	0%	1.58	1.58
F	10	10	0	100%	1.58	1.58	F	10	0	1	0%	1.59	1.59
G	10	10	0	100%	1.6	1.60	G	10	0	0	0%	1.67	1.67
H	10	10	0	100%	1.6	1.60	H	10	0	5	0%	1.29	1.29
Mean	10.0			94%		1.57	Mean	10.0			3%		1.55

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-30-95
T4451	Sample Identification: WSRC FHB 006	End Date: 10-10-95

RESULTS

SURVIVAL DATA		GROWTH DATA	
Mean of Eight Replicates		Mean Length (mm)	
	Mean %		Mean
Control	93.8%	Control	1.57
Sample	2.5%	Sample	1.55

STATISTICAL ANALYSES

SURVIVAL DATA	GROWTH DATA
<p>Test for Normality: $W = 0.87$ Critical value: 0.84 Data are normal in distribution</p> <p>Test for Homogeneity of Variance: $F = N/A$ Critical value: 6.64</p> <p>Test for Differences in Survival: t Test $t = 15.62$ Critical value: 1.75 The sediment significantly reduced survival of the test organisms.</p>	<p>Test for Normality: $W = 0.81$ Critical value: 0.84 Data are not normal in distribution</p> <p>Test for Homogeneity of Variance: $F = 1.51$ Critical value: 6.635 Data are homogeneous in variance</p> <p>Test for Differences in Growth: t Test $t = 0.38$ Critical value: 1.94 The sediment did not significantly reduce growth of the test organisms.</p>

COMMENTS

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Principal Analyst: Aimee Arnold	Signature: <i>Aimee Arnold</i>	Date: 10/13/95
Report Reviewed By: Robert W. Kelley, Ph.D.	Signature: <i>Robert W. Kelley</i>	Date: 10/12/95

CONCLUSIONS

The test sediment does adversely affect the survival but not the growth of freshwater amphipods.

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

EPA/600/R-94/024 Method 100.1

Test Organism: *Hyalalella azteca*

Client: Westinghouse Savannah River Company
Sample Identification: WSRC FHB 012

Test Start Date: 9-19-95

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-19-95
T4503	Sample Identification: WSRC FHB 012	End Date: 9-29-95

Test System

EPA/600/R-94/024 Method 100.1

The test was set as a Pass/Fail test with a control treatment and one sample treatment. Each treatment replicate consisted of 100 g of sediment and 175 mL of dilution water. There were eight replicates for each treatment. Ten test organisms were placed in each replicate. Sediment from a local creek was used in the control treatment. Test organisms were fed with YCT food. The test was conducted at a temperature of 23°C with ambient laboratory light conditions. Test vessels were 500 mL plastic beakers placed in a constant temperature incubator room.

<div>Test Organisms</div> <div>Order: Amphipoda Species: <i>Hyalloa azteca</i> Source: Aquatic Biosystems, CO Life Stage: 2-3 mm % Mortality During 48 Hr Prior to Test:: 0% Taxonomic Verification: RWK 9/19/95 Culturing: as received Observations: Cultures healthy Acclimation: None</div>	<div>Dilution Water</div> <div>Type: Surface Water Collection Date 8/28/95 <table><tr><td></td><td>Initial</td><td>Final</td></tr><tr><td>Alkalinity</td><td>12.2</td><td>10.1 mg/L</td></tr><tr><td>Ammonia</td><td><0.1</td><td>0.2 mg/L</td></tr><tr><td>Conductivity</td><td>36.4</td><td>34.9 umhos/cm</td></tr><tr><td>Hardness</td><td>10</td><td>6 mg/L</td></tr><tr><td>pH:</td><td>7.38</td><td>6.14 units</td></tr></table> Preparation Method: Grab sample Evidence of Water Quality: Good reproduction of Ceriodaphnia dubia cultures</div>		Initial	Final	Alkalinity	12.2	10.1 mg/L	Ammonia	<0.1	0.2 mg/L	Conductivity	36.4	34.9 umhos/cm	Hardness	10	6 mg/L	pH:	7.38	6.14 units
	Initial	Final																	
Alkalinity	12.2	10.1 mg/L																	
Ammonia	<0.1	0.2 mg/L																	
Conductivity	36.4	34.9 umhos/cm																	
Hardness	10	6 mg/L																	
pH:	7.38	6.14 units																	
<div>Control Sediment</div> <div>Source: S. Tyger River at Hwy. 14 Collection Date: 9-19-95 Preservation: kept at 0-4°C in plastic containers Date/Time Added to Test Chambers: 9-19-95 Observations: organic Collection Method: grab Disposal:</div>	<div>Test Sediment</div> <div>Source: WSRC FHB 012 Collection Date 9/11/95 Homogenized?: yes Preservation: kept at 0-4°C in plastic containers Date/Time Added to Test Chambers: 9/18/95 Observations: organic Collection Method: grab Shipment: Overnight at 4°C</div>																		
<div>Food Preparation</div> <div>Source: Trout Chow (Glencoe Mills); Cerophyl (Sigma) Purchase Date: Preparation Date: 3/23/95 Preservation: kept at 0-4°C Preparation Method: Trout Chow aerated 7 days Cerophyl, yeast aerated overnight Feeding Rate: 1.5 mL / day / replicate Hold Time: 5 days</div>	<div>Test Chambers</div> <div>Type: Plastic 500 mL beakers Sediment Volume: 100 mL Sediment Depth 4 cm Overlying Water Volume: 175 mL Overlying Water Depth: 5 cm Aeration: none</div>																		

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-19-95
T4503	Sample Identification: WSRC FHB 012	End Date: 9-29-95

WATER CHEMISTRY TEST METHODS

Temperature: SM 18th Ed. 2550	Alkalinity: SM 18th Ed. 2320
Dissolved Oxygen: SM 18th Ed. 4500-O	Hardness: SM 18th Ed. 2340
pH: SM 18th Ed. 4500-H+	Conductivity: SM 18th Ed. 2510

WATER CHEMISTRY TEST DATA - OVERLYING WATER

CONTROL TREATMENT

SAMPLE TREATMENT

Test Day	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Test Day	Cond. umhos/cm	NH3 mg/L	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Alk. mg/L	Hard. mg/L
Start	22.8	7.38	7.8	90%	Start	30.4	0.675	22.2	6.31	8.4	97%	6.1	4.0
1	22.5		6.9	79%	1			22.4		8.4	97%		
2	22.7		6.6	76%	2			22.6		7.2	83%		
3	22.4		7.2	83%	3			22.5		7.4	85%		
4	22.1		8.1	93%	4			22.3		7.9	91%		
5	23.2		8.0	93%	5			23.2		7.6	88%		
6	22.2		6.8	78%	6			22.3		7.2	83%		
7	23.9		5.9	69%	7			23.9		6.4	74%		
8	22.0		6.4	74%	8			22.0		7.0	80%		
9	22.2		6.2	71%	9			22.4		7.2	83%		
10	22.1	6.14	6.2	71%	10	37	0.166	22.1	6.10	6.4	74%	12.9	8.0

SURVIVAL AND GROWTH RESULTS

CONTROL TREATMENT

SAMPLE TREATMENT

	# Organisms				Mean Length (mm)	Mean Length (mm)		# Organisms				Mean Length (mm)	Mean Length (mm)
	Initial	Live at End	Dead at End	% Survival				Initial	Live at End	Dead at End	% Survival		
A	10	9	0	90%	2.1	2.10	A	10	10	0	100%	2.32	2.32
B	10	10	0	100%	2.04	2.04	B	10	10	0	100%	2.17	2.17
C	10	9	0	90%	2.04	2.04	C	10	9	0	90%	2.22	2.22
D	10	10	0	100%	2.02	2.02	D	10	10	0	100%	2.3	2.30
E	10	9	0	90%	2.04	2.04	E	10	8	0	80%	2.23	2.23
F	10	10	0	100%	2	2.00	F	10	10	0	100%	1.96	1.96
G	10	10	0	100%	2.04	2.04	G	10	9	0	90%	1.82	1.82
H	10	10	0	100%	2.1	2.09	H	10	10	0	100%	2.0	1.98
Mean	10.0			96%		2.05	Mean	10.0			95%		2.13

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-19-95
T4503	Sample Identification: WSRC FHB 012	End Date: 9-29-95

RESULTS

SURVIVAL DATA		GROWTH DATA	
Mean of Eight Replicates		Mean Length (mm)	
	Mean %		Mean
Control	96.3%	Control	2.05
Sample	95.0%	Sample	2.13

STATISTICAL ANALYSES

SURVIVAL DATA	GROWTH DATA
<p>Test for Normality: W= 0.73 Critical value: 0.84 Data are not normal in distribution</p> <p>Test for Homogeneity of Variance: F= N/A Critical value: 6.64</p> <p>Test for Differences in Survival: Wilcoxon Test Sum= 66.50 Critical value: 49</p> <p>The sediment did not significantly reduce the survival of the test organisms.</p>	<p>Test for Normality: W= 0.94 Critical value: 0.84 Data are normal in distribution</p> <p>Test for Homogeneity of Variance: F= 29.79 Critical value: 6.635 Data are not homogeneous in variance</p> <p>Test for Differences in Growth: "t" Test t= -1.20 Critical value: 1.94</p> <p>The sediment did not significantly reduce growth of the test organisms.</p>

COMMENTS

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Principal Analyst: Aimee Arnold	Signature: <i>Aimee Arnold</i>	Date: 10/13/95
Report Reviewed By: Robert W. Kelley, Ph.D.	Signature: <i>Robert W. Kelley</i>	Date: 10/13/95

CONCLUSIONS

The test sediment does not adversely affect the survival but not the growth of freshwater amphipods.
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10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

EPA/600/R-94/024 Method 100.1

Test Organism: *Hyallela azteca*

Client: Westinghouse Savannah River Company
Sample Identification: WSRC FHB 013

Test Start Date: 9-19-95

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-19-95
T4504	Sample Identification: WSRC FHB 013	End Date: 9-29-95

Test System

EPA/600/R-94/024 Method 100.1

The test was set as a Pass/Fail test with a control treatment and one sample treatment. Each treatment replicate consisted of 100 g of sediment and 175 mL of dilution water. There were eight replicates for each treatment. Ten test organisms were placed in each replicate. Sediment from a local creek was used in the control treatment. Test organisms were fed with YCT food. The test was conducted at a temperature of 23°C with ambient laboratory light conditions. Test vessels were 500 mL plastic beakers placed in a constant temperature incubator room.

<div>Test Organisms</div> <div>Order: Amphipoda Species: <i>Hyallela azteca</i> Source: Aquatic Biosystems, CO Life Stage: 2-3 mm % Mortality During 48 Hr Prior to Test:: 0% Taxonomic Verification: RWK 9/19/95 Culturing: as received Observations: Cultures healthy Acclimation: None</div>	<div>Dilution Water</div> <div>Type: Surface Water Collection Date 8/28/95 Initial Final Alkalinity 12.2 10.1 mg/L Ammonia <0.1 0.2 mg/L Conductivity 36.4 34.9 umhos/cm Hardness 10 6 mg/L pH: 7.38 6.14 units Preparation Method: Grab sample Evidence of Water Quality: Good reproduction of <i>Ceriodaphnia dubia</i> cultures</div>
<div>Control Sediment</div> <div>Source: S. Tyger River at Hwy. 14 Collection Date: 9-19-95 Preservation: kept at 0-4°C in plastic containers Date/Time Added to Test Chambers: 9-19-95 Observations: organic Collection Method: grab Disposal:</div>	<div>Test Sediment</div> <div>Source: WSRC FHB 013 Collection Date 9/11/95 Homogenized?: yes Preservation: kept at 0-4°C in plastic containers Date/Time Added to Test Chambers: 9/18/95 Observations: organic Collection Method: grab Shipment: Overnight at 4°C</div>
<div>Food Preparation</div> <div>Source: Trout Chow (Glencoe Mills); Cerophyl (Sigma) Purchase Date: Preparation Date: 3/23/95 Preservation: kept at 0-4°C Preparation Method: Trout Chow aerated 7 days Cerophyl, yeast aerated overnight Feeding Rate: 1.5 mL / day / replicate Hold Time: 5 days</div>	<div>Test Chambers</div> <div>Type: Plastic 500 mL beakers Sediment Volume: 100 mL Sediment Depth 4 cm Overlying Water Volume: 175 mL Overlying Water Depth: 5 cm Aeration: none</div>

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-19-95
T4504	Sample Identification: WSRC FHB 013	End Date: 9-29-95

WATER CHEMISTRY TEST METHODS

Temperature: SM 18th Ed. 2550	Alkalinity: SM 18th Ed. 2320
Dissolved Oxygen: SM 18th Ed. 4500-O	Hardness: SM 18th Ed. 2340
pH: SM 18th Ed. 4500-H+	Conductivity: SM 18th Ed. 2510

WATER CHEMISTRY TEST DATA - OVERLYING WATER

CONTROL TREATMENT

SAMPLE TREATMENT

Test Day	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Test Day	Cond. umhos/cm	NH3 mg/L	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Alk. mg/L	Hard. mg/L
Start	22.8	7.38	7.8	90%	Start	36.4	0.949	22.3	5.94	7.0	80%	2.0	6.0
1	22.5		6.9	79%	1			22.4		8.2	94%		
2	22.7		6.6	76%	2			22.7		6.4	74%		
3	22.4		7.2	83%	3			22.5		6.8	78%		
4	22.1		8.1	93%	4			22.2		8.3	95%		
5	23.2		8.0	93%	5			23.3		8.1	94%		
6	22.2		6.8	78%	6			22.2		7.1	82%		
7	23.9		5.9	69%	7			23.9		5.7	66%		
8	22.0		6.4	74%	8			22.0		6.4	74%		
9	22.2		6.2	71%	9			22.4		7.3	84%		
10	22.1	6.14	6.2	71%	10	35	0.434	22.0	6.07	5.5	63%	6.1	4.0

SURVIVAL AND GROWTH RESULTS

CONTROL TREATMENT

SAMPLE TREATMENT

	# Organisms				Mean Length (mm)	Mean Length (mm)		# Organisms				Mean Length (mm)	Mean Length (mm)
	Initial	Live at End	Dead at End	% Survival				Initial	Live at End	Dead at End	% Survival		
A	10	9	0	90%	2.1	2.10	A	10	4	0	40%	1.94	1.94
B	10	10	0	100%	2.04	2.04	B *	10	6	0	60%	2.19	2.19
C	10	9	0	90%	2.04	2.04	C *	10	5	0	50%	2.11	2.11
D	10	10	0	100%	2.02	2.02	D	10	7	0	70%	2.06	2.06
E	10	9	0	90%	2.04	2.04	E	10	7	0	70%	2.15	2.15
F	10	10	0	100%	2	2.00	F	10	5	0	50%	2.02	2.02
G	10	10	0	100%	2.04	2.04	G	10	5	0	50%	2.11	2.11
H	10	10	0	100%	2.1	2.09	H	10	5	0	50%	2.2	2.19
Mean	10.0			96%		2.05	Mean	10.0			55%		2.10

* Predators observed in sample.

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-19-95
T4504	Sample Identification: WSRC FHB 013	End Date: 9-29-95

RESULTS

SURVIVAL DATA		GROWTH DATA	
Mean of Eight Replicates		Mean Length (mm)	
	Mean %		Mean
Control	96.3%	Control	2.05
Sample	55.0%	Sample	2.10

STATISTICAL ANALYSES

SURVIVAL DATA	GROWTH DATA
<p>Test for Normality: $W = 0.86$ Critical value: 0.84 Data are normal in distribution</p> <p>Test for Homogeneity of Variance: $F = \text{N/A}$ Critical value: 6.64</p> <p>Test for Differences in Survival: t Test $t = 9.31$ Critical value: 1.75 The sediment significantly reduced survival of the test organisms.</p>	<p>Test for Normality: $W = 0.94$ Critical value: 0.84 Data are normal in distribution</p> <p>Test for Homogeneity of Variance: $F = 6.73$ Critical value: 6.635 Data are not homogeneous in variance</p> <p>Test for Differences in Growth: "t" Test $t = -1.53$ Critical value: 1.94 The sediment did not significantly reduce growth of the test organisms.</p>

COMMENTS

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Principal Analyst: Aimee Arnold	Signature: <i>Aimee Arnold</i>	Date: 10/13/95
Report Reviewed By: Robert W. Kelley, Ph.D.	Signature: <i>Robert W. Kelley</i>	Date: 10/13/95

CONCLUSIONS

The test sediment does adversely affect the survival but not the growth of freshwater amphipods.

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P.O. Box 16414, Greenville, SC 29606 • 4 Craftsman Court, Greer, SC 29650

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

EPA/600/R-94/024 Method 100.1

Test Organism: Hyallela azteca

Client: Westinghouse Savannah River Company
Sample Identification: WSRC FHB014

Test Start Date: 8/29/95

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Corporation	Start Date: 8-29-95
T4444	Sample Identification: WSRC FHB014	End Date: 9-8-95

Test System

EPA/600/R-94/024 Method 100.1

The test was set as a Pass/Fail test with a control treatment and one sample treatment. Each treatment replicate consisted of 100 g of sediment and 175 mL of dilution water. There were eight replicates for each treatment. Ten test organisms were placed in each replicate. Sediment from a local creek was used in the control treatment. Test organisms were fed with YCT food. The test was conducted at a temperature of 23°C with ambient laboratory light conditions. Test vessels were 500 mL plastic beakers placed in a constant temperature incubator room.

<p style="text-align: center;">Test Organisms</p> <p>Order: Amphipoda Species: <i>Hyallela azteca</i> Source: Aquatic Biosystems, CO Life Stage: 2-3 mm % Mortality During 48 Hr Prior to Test:: 0% Taxonomic Verification: RWK 8/29/95 Culturing: as received</p> <p>Observations: Cultures healthy Acclimation: None</p>	<p style="text-align: center;">Dilution Water</p> <p>Type: Surface Water Collection Date 8/28/95</p> <table><tr><td></td><td>Initial</td><td>Final</td></tr><tr><td>Alkalinity</td><td>46.9</td><td>40.8 mg/L</td></tr><tr><td>Ammonia</td><td><0.1</td><td>0.2 mg/L</td></tr><tr><td>Conductivity</td><td>142.6</td><td>186.1 umhos/cm</td></tr><tr><td>Hardness</td><td>64</td><td>82 mg/L</td></tr><tr><td>pH:</td><td>7.07</td><td>7.42 units</td></tr></table> <p>Preparation Method: Grab sample</p> <p>Evidence of Water Quality: Good reproduction of <i>Ceriodaphnia dubia</i> cultures</p>		Initial	Final	Alkalinity	46.9	40.8 mg/L	Ammonia	<0.1	0.2 mg/L	Conductivity	142.6	186.1 umhos/cm	Hardness	64	82 mg/L	pH:	7.07	7.42 units
	Initial	Final																	
Alkalinity	46.9	40.8 mg/L																	
Ammonia	<0.1	0.2 mg/L																	
Conductivity	142.6	186.1 umhos/cm																	
Hardness	64	82 mg/L																	
pH:	7.07	7.42 units																	

<p style="text-align: center;">Control Sediment</p> <p>Source: Resurrection Creek (Greer S C) Collection Date: 8-28-95 Preservation: kept at 0-4°C in plastic containers Date/Time Added to Test Chambers: 8-28-95 Observations: organic Collection Method: grab Disposal:</p>	<p style="text-align: center;">Test Sediment</p> <p>Source: WSRC FHB014 Collection Date 8/22/95 Homogenized?: yes Preservation: kept at 0-4°C in plastic containers Date/Time Added to Test Chambers: 8/28/95 Observations: organic Collection Method: grab Shipment: Overnight at 4°C</p>
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<p style="text-align: center;">Food Preparation</p> <p>Source: Trout Chow (Glencoe Mills); Cerophyl (Sigma) Purchase Date: Preparation Date: 3/23/95 Preservation: kept at 0-4°C Preparation Method: Trout Chow aerated 7 days Cerophyl, yeast aerated overnight Feeding Rate: 1.5 mL / day / replicate Hold Time: 5 days</p>	<p style="text-align: center;">Test Chambers</p> <p>Type: Plastic 500 mL beakers Sediment Volume: 100 mL Sediment Depth 4 cm Overlying Water Volume: 175 mL Overlying Water Depth: 5 cm Aeration: none</p>
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10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Corporation	Start Date: 8-29-95
T4444	Sample Identification: WSRC FHB014	End Date: 9-8-95

WATER CHEMISTRY TEST METHODS

Temperature: SM 18th Ed. 2550	Alkalinity: SM 18th Ed. 2320
Dissolved Oxygen: SM 18th Ed. 4500-O	Hardness: SM 18th Ed. 2340
pH: SM 18th Ed. 4500-H+	Conductivity: SM 18th Ed. 2510

WATER CHEMISTRY TEST DATA - OVERLYING WATER

CONTROL TREATMENT					SAMPLE TREATMENT								
Test Day	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Test Day	Cond. umhos/cm	NH3 mg/L	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Alk mg/L	Hard mg/L
Start	23.3	7.07	7.8	91%	Start	91.7	0.16	22.8	6.26	6.2	71%	20.4	28.0
1	22.1		7.0	80%	1			22.0		5.0	57%		
2	21.9		6.0	67%	2			22.0		5.3	61%		
3	21.8		5.6	63%	3			21.9		5.0	56%		
4	22.0		5.3	61%	4			21.9		5.4	61%		
5	23.0		5.8	67%	5			22.5		4.7	54%		
6	22.5		5.5	63%	6			22.2		4.4	51%		
7	22.3		5.6	64%	7			22.1		5.3	61%		
8	22.0		5.3	61%	8			22.0		4.8	55%		
9	22.0		5.2	60%	9			22.0		4.7	54%		
10	22.1	7.42	4.7	54%	10	137	0.3	22.2	6.98	4.6	53%	51.0	56.0

SURVIVAL AND GROWTH RESULTS

CONTROL TREATMENT							SAMPLE TREATMENT						
	# Organisms				Mean Length (mm)	Mean Length (mm)		# Organisms				Mean Length (mm)	Mean Length (mm)
	Initial	Live at End	Dead at End	% Survival				Initial	Live at End	Dead at End	% Survival		
A	10	6	1	60%	2.4	2.40	A	10	6	3	60%	2.22	2.22
B	10	NA	NA	NA	NA	NA	B	10	8	0	80%	2.37	2.37
C	10	7	0	70%	2.18	2.18	C	10	10	0	100%	2.37	2.37
D	10	7	0	70%	2.18	2.18	D	10	9	0	90%	2.29	2.29
E	10	10	0	100%	2.17	2.17	E	10	8	0	80%	2.18	2.18
F	10	8	2	80%	2.12	2.12	F	10	8	1	80%	2.27	2.27
G	10	9	0	90%	2.13	2.13	G	10	8	0	80%	2.26	2.26
H	10	9	0	90%	2.2	2.15	H	10	9	0	90%	2.3	2.25
Mean	10.0			80%		2.19	Mean	10.0			83%		2.28

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Corporation	Start Date: 8-29-95
T4444	Sample Identification: WSRC FHB014	End Date: 9-8-95

RESULTS

SURVIVAL DATA		GROWTH DATA	
Mean of Eight Replicates		Mean Length (mm)	
	Mean %		Mean
Control	80.0%	Control	2.19
Sample	82.5%	Sample	2.28

STATISTICAL ANALYSES

SURVIVAL DATA	GROWTH DATA
Test for Normality: W= 0.93 Critical value: 0.84 Data are normal in distribution	Test for Normality: W= 0.85 Critical value: 0.84 Data are normal in distribution
Test for Homogeneity of Variance: F= N/A Critical value: 6.64	Test for Homogeneity of Variance: F= 2.05 Critical value: 6.635 Data are homogeneous in variance
Test for Differences in Survival: t Test t= -0.24 Critical value: 1.75 The sediment did not significantly reduce survival of the test organisms.	Test for Differences in Growth: "t" Test t= -2.05 Critical value: 1.94 The sediment did not significantly reduce growth of the test organisms.

COMMENTS

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Principal Analyst: Aimee Arnold	Signature: <i>Aimee Arnold</i>	Date: 10/11/95
Report Reviewed By: Robert W. Kelley, Ph.D.	Signature: <i>Robert W. Kelley</i>	Date: 10/11/95

CONCLUSIONS

The test sediment does not adversely affect the survival and growth of freshwater amphipods.
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10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

EPA/600/R-94/024 Method 100.1

Test Organism: *Hyallela azteca*

Client: Westinghouse Savannah River Company
Sample Identification: WSRC FHB 018

Test Start Date: 9-19-95

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-19-95
T4505	Sample Identification: WSRC FHB 018	End Date: 9-29-95

Test System

EPA/600/R-94/024 Method 100.1

The test was set as a Pass/Fail test with a control treatment and one sample treatment. Each treatment replicate consisted of 100 g of sediment and 175 mL of dilution water. There were eight replicates for each treatment. Ten test organisms were placed in each replicate. Sediment from a local creek was used in the control treatment. Test organisms were fed with YCT food. The test was conducted at a temperature of 23°C with ambient laboratory light conditions. Test vessels were 500 mL plastic beakers placed in a constant temperature incubator room.

<div>Test Organisms</div> <div>Order: Amphipoda Species: <i>Hyallela azteca</i> Source: Aquatic Biosystems, CO Life Stage: 2-3 mm % Mortality During 48 Hr Prior to Test:: 0% Taxonomic Verification: RWK 9/19/95 Culturing: as received Observations: Cultures healthy Acclimation: None</div>	<div>Dilution Water</div> <div>Type: Surface Water Collection Date 8/28/95 Initial Final Alkalinity 12.2 10.1 mg/L Ammonia <0.1 0.2 mg/L Conductivity 36.4 34.9 umhos/cm Hardness 10 6 mg/L pH: 7.38 6.14 units Preparation Method: Grab sample Evidence of Water Quality: Good reproduction of Ceriodaphnia dubia cultures</div>
<div>Control Sediment</div> <div>Source: S. Tyger River at Hwy. 14 Collection Date: 9-19-95 Preservation: kept at 0-4°C in plastic containers Date/Time Added to Test Chambers: 9-19-95 Observations: silt Collection Method: grab Disposal:</div>	<div>Test Sediment</div> <div>Source: WSRC FHB 018 Collection Date 9/11/95 Homogenized?: yes Preservation: kept at 0-4°C in plastic containers Date/Time Added to Test Chambers: 9/18/95 Observations: organic Collection Method: grab Shipment: Overnight at 4°C</div>
<div>Food Preparation</div> <div>Source: Trout Chow (Glencoe Mills); Cerophyl (Sigma) Purchase Date: Preparation Date: 3/23/95 Preservation: kept at 0-4°C Preparation Method: Trout Chow aerated 7 days Cerophyl, yeast aerated overnight Feeding Rate: 1.5 mL / day / replicate Hold Time: 5 days</div>	<div>Test Chambers</div> <div>Type: Plastic 500 mL beakers Sediment Volume: 100 mL Sediment Depth 4 cm Overlying Water Volume: 175 mL Overlying Water Depth: 5 cm Aeration: none</div>

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-19-95
T4505	Sample Identification: WSRC FHB 018	End Date: 9-29-95

WATER CHEMISTRY TEST METHODS

Temperature: SM 18th Ed. 2550	Alkalinity: SM 18th Ed. 2320
Dissolved Oxygen: SM 18th Ed. 4500-O	Hardness: SM 18th Ed. 2340
pH: SM 18th Ed. 4500-H+	Conductivity: SM 18th Ed. 2510

WATER CHEMISTRY TEST DATA - OVERLYING WATER

CONTROL TREATMENT					SAMPLE TREATMENT								
Test Day	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Test Day	Cond. umhos/cm	NH3 mg/L	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Alk. mg/L	Hard. mg/L
Start	22.8	7.38	7.8	90%	Start	28.2	0.882	22.3	6.18	6.3	72%	8.1	6.0
1	22.5		6.9	79%	1			22.4		7.7	89%		
2	22.7		6.6	76%	2			22.7		6.8	78%		
3	22.4		7.2	83%	3			22.4		7.2	83%		
4	22.1		8.1	93%	4			22.3		8.4	97%		
5	23.2		8.0	93%	5			23.3		7.4	86%		
6	22.2		6.8	78%	6			22.1		6.6	76%		
7	23.9		5.9	69%	7			23.9		6.4	74%		
8	22.0		6.4	74%	8			22.0		6.6	76%		
9	22.2		6.2	71%	9			22.3		6.4	74%		
10	22.1	6.14	6.2	71%	10	35	0.322	22.1	6.10	5.9	68%	10.1	6.0

SURVIVAL AND GROWTH RESULTS

CONTROL TREATMENT							SAMPLE TREATMENT						
	# Organisms				Mean Length (mm)	Mean Length (mm)		# Organisms				Mean Length (mm)	Mean Length (mm)
	Initial	Live at End	Dead at End	% Survival				Initial	Live at End	Dead at End	% Survival		
A	10	9	0	90%	2.1	2.10	A	10	5	0	50%	2.45	2.45
B	10	10	0	100%	2.04	2.04	B	10	8	0	80%	2.1	2.10
C	10	9	0	90%	2.04	2.04	C	10	6	0	60%	2.01	2.01
D	10	10	0	100%	2.02	2.02	D	10	3	0	30%	2.37	2.37
E	10	9	0	90%	2.04	2.04	E	10	7	0	70%	2.21	2.21
F	10	10	0	100%	2	2.00	F	10	4	0	40%	2.42	2.42
G	10	10	0	100%	2.04	2.04	G	10	5	0	50%	2.49	2.49
H	10	10	0	100%	2.1	2.09	H	10	2	0	20%	2.5	2.47
Mean	10.0			96%		2.05	Mean	10.0			50%		2.32

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-19-95
T4505	Sample Identification: WSRC FHB 018	End Date: 9-29-95

RESULTS

SURVIVAL DATA		GROWTH DATA	
Mean of Eight Replicates		Mean Length (mm)	
	Mean %		Mean
Control	96.3%	Control	2.05
Sample	50.0%	Sample	2.32

STATISTICAL ANALYSES

SURVIVAL DATA	GROWTH DATA
<p>Test for Normality: $W = 0.94$ Critical value: 0.84 Data are normal in distribution</p> <p>Test for Homogeneity of Variance: $F = \text{N/A}$ Critical value: 6.64</p> <p>Test for Differences in Survival: t Test $t = 7.07$ Critical value: 1.75 The sediment significantly reduced survival of the test organisms.</p>	<p>Test for Normality: $W = 0.92$ Critical value: 0.84 Data are normal in distribution</p> <p>Test for Homogeneity of Variance: $F = 30.46$ Critical value: 6.635 Data are not homogeneous in variance</p> <p>Test for Differences in Growth: t Test $t = -4.06$ Critical value: 1.94 The sediment did not significantly reduce growth of the test organisms.</p>

COMMENTS

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Principal Analyst: Aimee Arnold	Signature: <i>Aimee Arnold</i>	Date: 6/13/95
Report Reviewed By: Robert W. Kelley, Ph.D.	Signature: <i>Robert W. Kelley</i>	Date: 10/13/95

CONCLUSIONS

The test sediment does adversely affect the survival but not the growth of freshwater amphipods.

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

EPA/600/R-94/024 Method 100.1

Test Organism: Hyallela azteca

Client: Westinghouse Savannah River Company
Sample Identification: WSRC FHB020

Test Start Date: 8/29/95

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 8-29-95
T4445	Sample Identification: WSRC FHB020	End Date: 9-8-95

Test System

EPA/600/R-94/024 Method 100.1

The test was set as a Pass/Fail test with a control treatment and one sample treatment. Each treatment replicate consisted of 100 g of sediment and 175 mL of dilution water. There were eight replicates for each treatment. Ten test organisms were placed in each replicate. Sediment from a local creek was used in the control treatment. Test organisms were fed with YCT food. The test was conducted at a temperature of 23°C with ambient laboratory light conditions. Test vessels were 500 mL plastic beakers placed in a constant temperature incubator room.

<div>Test Organisms</div> <div>Order: Amphipoda Species: <i>Hyalloa azteca</i> Source: Aquatic Biosystems, CO Life Stage: 2-3 mm % Mortality During 48 Hr Prior to Test:: 0% Taxonomic Verification: RWK 8/28/95 Culturing: as received Observations: Cultures healthy Acclimation: None</div>	<div>Dilution Water</div> <div>Type: Surface Water Collection Date 8/28/95 Initial Final Alkalinity 46.9 40.8 mg/L Ammonia <0.1 0.2 mg/L Conductivity 142.6 186.1 umhos/cm Hardness 64 82 mg/L pH: 7.07 7.42 units Preparation Method: Grab sample Evidence of Water Quality: Good reproduction of <i>Ceriodaphnia dubia</i> cultures</div>
<div>Control Sediment</div> <div>Source: Resurrection Creek (Greer S C) Collection Date: 8-28-95 Preservation: kept at 0-4°C in plastic containers Date/Time Added to Test Chambers: 8-28-95 Observations: organic Collection Method: petite ponar grab Disposal:</div>	<div>Test Sediment</div> <div>Source: WSRC FHB020 Collection Date 8/22/95 Homogenized?: yes Preservation: kept at 0-4°C in plastic containers Date/Time Added to Test Chambers: 8/28/95 Observations: organic Collection Method: petite ponar grab Shipment: Overnight at 4°C</div>
<div>Food Preparation</div> <div>Source: Trout Chow (Glencoe Mills); Cerophyl (Sigma) Purchase Date: Preparation Date: 3/23/95 Preservation: kept at 0-4°C Preparation Method: Trout Chow aerated 7 days Cerophyl, yeast aerated overnight Feeding Rate: 1.5 mL / day / replicate Hold Time: 5 days</div>	<div>Test Chambers</div> <div>Type: Plastic 500 mL beakers Sediment Volume: 100 mL Sediment Depth 4 cm Overlying Water Volume: 175 mL Overlying Water Depth: 5 cm Aeration: none</div>

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Corporation	Start Date: 8-29-95
T4445	Sample Identification: WSRC FHB020	End Date: 9-8-95

WATER CHEMISTRY TEST METHODS

Temperature: SM 18th Ed. 2550	Alkalinity: SM 18th Ed. 2320
Dissolved Oxygen: SM 18th Ed. 4500-O	Hardness: SM 18th Ed. 2340
pH: SM 18th Ed. 4500-H+	Conductivity: SM 18th Ed. 2510

WATER CHEMISTRY TEST DATA - OVERLYING WATER

CONTROL TREATMENT

SAMPLE TREATMENT

Test Day	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Test Day	Cond. umhos/cm	NH3 mg/L	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Alk. mg/L	Hard. mg/L
Start	23.3	7.07	7.8	91%	Start	90	0.83	22.9	6.15	6.6	76%	22.4	38.0
1	22.1		7.0	80%	1			22.1		5.8	67%		
2	21.9		6.0	67%	2			22.0		5.2	60%		
3	21.8		5.6	63%	3			21.9		5.3	60%		
4	22.0		5.3	61%	4			22.0		5.2	60%		
5	23.0		5.8	67%	5			22.8		5.2	60%		
6	22.5		5.5	63%	6			22.4		5.7	66%		
7	22.3		5.6	64%	7			22.1		5.6	64%		
8	22.0		5.3	61%	8			22.0		5.4	62%		
9	22.0		5.2	60%	9			21.9		5.3	60%		
10	22.1	7.42	4.7	54%	10	104	0.19	22.1	6.86	4.8	55%	30.6	38.0

SURVIVAL AND GROWTH RESULTS

CONTROL TREATMENT

SAMPLE TREATMENT

	# Organisms				Mean Length (mm)	Mean Length (mm)		# Organisms				Mean Length (mm)	Mean Length (mm)
	Initial	Live at End	Dead at End	% Survival				Initial	Live at End	Dead at End	% Survival		
A	10	6	1	60%	2.4	2.40	A	10	7	2	70%	2.15	2.15
B	10	NA	NA	NA	NA	NA	B	10	8	1	80%	2.18	2.18
C	10	7	0	70%	2.18	2.18	C	10	7	0	70%	2.21	2.21
D	10	7	0	70%	2.18	2.18	D	10	9	1	90%	2.22	2.22
E	10	10	0	100%	2.17	2.17	E	10	9	1	90%	2.25	2.25
F	10	8	2	80%	2.12	2.12	F	10	7	0	70%	2.24	2.24
G	10	9	0	90%	2.13	2.13	G	10	8	0	80%	2.15	2.15
H	10	9	0	90%	2.2	2.15	H	10	10	0	100%	2.1	2.11
Mean	10.0			80%		2.19	Mean	10.0			81%		2.19

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 8-29-95
T4445	Sample Identification: WSRC FHB020	End Date: 9-8-95

RESULTS

SURVIVAL DATA		GROWTH DATA	
Mean of Eight Replicates		Mean Length (mm)	
	Mean %		Mean
Control	80.0%	Control	2.19
Sample	81.3%	Sample	2.19

STATISTICAL ANALYSES

SURVIVAL DATA	GROWTH DATA
<p>Test for Normality: $W = 0.89$ Critical value: 0.84 Data are normal in distribution</p> <p>Test for Homogeneity of Variance: $F = N/A$ Critical value: 6.64</p> <p>Test for Differences in Survival: t Test $t = -0.09$ Critical value: 1.75 The sediment did not significantly reduce survival of the test organisms.</p>	<p>Test for Normality: $W = 0.83$ Critical value: 0.84 Data are not normal in distribution</p> <p>Test for Homogeneity of Variance: $F = 3.74$ Critical value: 6.635 Data are homogeneous in variance</p> <p>Test for Differences in Growth: "t" Test $t = 0.03$ Critical value: 1.94 The sediment did not significantly reduce growth of the test organisms.</p>

COMMENTS

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Principal Analyst: Aimee Arnold	Signature: <i>Aimee Arnold</i>	Date: 10/11/95
Report Reviewed By: Robert W. Kelley, Ph.D.	Signature: <i>Robert W. Kelley</i>	Date: 10/11/95

CONCLUSIONS

The test sediment does not adversely affect the survival and the growth of freshwater amphipods.
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10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

EPA/600/R-94/024 Method 100.1

Test Organism: *Hyallela azteca*

Client: Westinghouse Savannah River Company
Sample Identification: WSRC FHB 021

Test Start Date: 9-19-95

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-19-95
T4506	Sample Identification: WSRC FHB 021	End Date: 9-29-95

Test System

EPA/600/R-94/024 Method 100.1

The test was set as a Pass/Fail test with a control treatment and one sample treatment. Each treatment replicate consisted of 100 g of sediment and 175 mL of dilution water. There were eight replicates for each treatment. Ten test organisms were placed in each replicate. Sediment from a local creek was used in the control treatment. Test organisms were fed with YCT food. The test was conducted at a temperature of 23°C with ambient laboratory light conditions. Test vessels were 500 mL plastic beakers placed in a constant temperature incubator room.

<p style="text-align: center;">Test Organisms</p> <p>Order: Amphipoda Species: <i>Hyallela azteca</i> Source: Aquatic Biosystems, CO Life Stage: 2-3 mm % Mortality During 48 Hr Prior to Test:: 0% Taxonomic Verification: RWK 9/19/95 Culturing: as received</p> <p>Observations: Cultures healthy Acclimation: None</p>	<p style="text-align: center;">Dilution Water</p> <p>Type: Surface Water Collection Date 8/28/95</p> <table><tr><th></th><th>Initial</th><th>Final</th></tr><tr><td><i>Alkalinity</i></td><td>12.2</td><td>10.1 mg/L</td></tr><tr><td><i>Ammonia</i></td><td><0.1</td><td>0.2 mg/L</td></tr><tr><td><i>Conductivity</i></td><td>36.4</td><td>34.9 umhos/cm</td></tr><tr><td><i>Hardness</i></td><td>10</td><td>6 mg/L</td></tr><tr><td><i>pH:</i></td><td>7.38</td><td>6.14 units</td></tr></table> <p>Preparation Method: Grab sample</p> <p>Evidence of Water Quality: Good reproduction of <i>Ceriodaphnia dubia</i> cultures</p>		Initial	Final	<i>Alkalinity</i>	12.2	10.1 mg/L	<i>Ammonia</i>	<0.1	0.2 mg/L	<i>Conductivity</i>	36.4	34.9 umhos/cm	<i>Hardness</i>	10	6 mg/L	<i>pH:</i>	7.38	6.14 units
	Initial	Final																	
<i>Alkalinity</i>	12.2	10.1 mg/L																	
<i>Ammonia</i>	<0.1	0.2 mg/L																	
<i>Conductivity</i>	36.4	34.9 umhos/cm																	
<i>Hardness</i>	10	6 mg/L																	
<i>pH:</i>	7.38	6.14 units																	

<p style="text-align: center;">Control Sediment</p> <p>Source: S. Tyger River at Hwy. 14 Collection Date: 9-19-95 Preservation: kept at 0-4°C in plastic containers Date/Time Added to Test Chambers: 9-19-95 Observations: silt Collection Method: grab Disposal:</p>	<p style="text-align: center;">Test Sediment</p> <p>Source: WSRC FHB 021 Collection Date 9/11/95 Homogenized?: yes Preservation: kept at 0-4°C in plastic containers Date/Time Added to Test Chambers: 9/18/95 Observations: organic Collection Method: grab Shipment: Overnight at 4°C</p>
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<p style="text-align: center;">Food Preparation</p> <p>Source: Trout Chow (Glencoe Mills); Cerophyl (Sigma) Purchase Date: Preparation Date: 3/23/95 Preservation: kept at 0-4°C Preparation Method: Trout Chow aerated 7 days Cerophyl, yeast aerated overnight Feeding Rate: 1.5 mL / day / replicate Hold Time: 5 days</p>	<p style="text-align: center;">Test Chambers</p> <p>Type: Plastic 500 mL beakers Sediment Volume: 100 mL Sediment Depth 4 cm Overlying Water Volume: 175 mL Overlying Water Depth: 5 cm Aeration: none</p>
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10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-19-95
T4506	Sample Identification: WSRC FHB 021	End Date: 9-29-95

WATER CHEMISTRY TEST METHODS

Temperature: SM 18th Ed. 2550	Alkalinity: SM 18th Ed. 2320
Dissolved Oxygen: SM 18th Ed. 4500-O	Hardness: SM 18th Ed. 2340
pH: SM 18th Ed. 4500-H+	Conductivity: SM 18th Ed. 2510

WATER CHEMISTRY TEST DATA - OVERLYING WATER

CONTROL TREATMENT					SAMPLE TREATMENT								
Test Day	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Test Day	Cond. umhos/cm	NH3 mg/L	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Alk. mg/L	Hard. mg/L
Start	22.8	7.38	7.8	90%	Start	32.4	0.586	22.4	6.16	5.8	67%	6.1	4.0
1	22.5		6.9	79%	1			22.5		7.0	80%		
2	22.7		6.6	76%	2			22.7		7.2	83%		
3	22.4		7.2	83%	3			22.5		7.6	87%		
4	22.1		8.1	93%	4			22.3		8.2	94%		
5	23.2		8.0	93%	5			23.4		7.8	91%		
6	22.2		6.8	78%	6			22.1		8.0	92%		
7	23.9		5.9	69%	7			23.9		6.1	71%		
8	22.0		6.4	74%	8			22.0		7.6	87%		
9	22.2		6.2	71%	9			22.3		7.0	80%		
10	22.1	6.14	6.2	71%	10	32	0.216	22.1	5.92	6.0	69%	8.1	6.0

SURVIVAL AND GROWTH RESULTS

CONTROL TREATMENT							SAMPLE TREATMENT						
	# Organisms				Mean Length (mm)	Mean Length (mm)		# Organisms				Mean Length (mm)	Mean Length (mm)
	Initial	Live at End	Dead at End	% Survival				Initial	Live at End	Dead at End	% Survival		
A	10	9	0	90%	2.1	2.10	A	10	9	0	90%	2.25	2.25
B	10	10	0	100%	2.04	2.04	B	10	7	0	70%	2.15	2.15
C	10	9	0	90%	2.04	2.04	C	10	7	0	70%	2.01	2.01
D	10	10	0	100%	2.02	2.02	D	10	NA	NA	NA	NA	NA
E	10	9	0	90%	2.04	2.04	E	10	6	0	60%	2.01	2.01
F	10	10	0	100%	2	2.00	F	10	8	0	80%	1.75	1.75
G	10	10	0	100%	2.04	2.04	G	10	6	0	60%	2.01	2.01
H	10	10	0	100%	2.1	2.09	H	10	8	0	80%	2.1	2.12
Mean	10.0			96%		2.05	Mean	10.0			73%		2.04

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-19-95
T4506	Sample Identification: WSRC FHB 021	End Date: 9-29-95

RESULTS

SURVIVAL DATA		GROWTH DATA	
Mean of Eight Replicates		Mean Length (mm)	
	Mean %		Mean
Control	96.3%	Control	2.05
Sample	72.9%	Sample	2.04

STATISTICAL ANALYSES

SURVIVAL DATA	GROWTH DATA
<p>Test for Normality: $W = 0.87$ Critical value: 0.84 Data are normal in distribution</p> <p>Test for Homogeneity of Variance: $F = \text{N/A}$ Critical value: 6.64</p> <p>Test for Differences in Survival: t Test $t = 5.50$ Critical value: 1.75 The sediment significantly reduced survival of the test organisms.</p>	<p>Test for Normality: $W = 0.83$ Critical value: 0.84 Data are not normal in distribution</p> <p>Test for Homogeneity of Variance: $F = 22.37$ Critical value: 6.635 Data are not homogeneous in variance</p> <p>Test for Differences in Growth: t Test $t = 0.06$ Critical value: 1.94 The sediment did not significantly reduce growth of the test organisms.</p>

COMMENTS

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Principal Analyst: Aimee Arnold	Signature: <i>Aimee Arnold</i>	Date: 10/13/95
Report Reviewed By: Robert W. Kelley, Ph.D.	Signature: <i>Robert W. Kelley</i>	Date: 10/13/95

CONCLUSIONS

The test sediment does adversely affect the survival but not the growth of freshwater amphipods.
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10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

EPA/600/R-94/024 Method 100.1

Test Organism: *Hyallela azteca*

Client: Westinghouse Savannah River Company
Sample Identification: WSRC FHB 022

Test Start Date: 9-30-95

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-30-95
T4450	Sample Identification: WSRC FHB 022	End Date: 10-10-95

Test System

EPA/600/R-94/024 Method 100.1

The test was set as a Pass/Fail test with a control treatment and one sample treatment. Each treatment replicate consisted of 100 g of sediment and 175 mL of dilution water. There were eight replicates for each treatment. Ten test organisms were placed in each replicate. Sediment from a local river was used in the control treatment. Test organisms were fed with YCT food. The test was conducted at a temperature of 23°C with ambient laboratory light conditions. Test vessels were 500 mL plastic beakers placed in a constant temperature incubator room.

<div>Test Organisms</div> <div>Order: Amphipoda</div> <div>Species: <i>Hyalloa azteca</i></div> <div>Source: Aquatic Research Organisms, NH</div> <div>Life Stage: 2-3 mm</div> <div>% Mortality During 48 Hr Prior to Test:: 0%</div> <div>Taxonomic Verification: RWK 9/29/95</div> <div>Culturing: as received</div> <div>Observations: Cultures healthy</div> <div>Acclimation: None</div>	<div>Dilution Water</div> <div>Type: Surface Water</div> <div>Collection Date 9/29/95</div> <div><table><tr><td></td><td>Initial</td><td>Final</td><td></td></tr><tr><td>Alkalinity</td><td>16.2</td><td>16.2</td><td>mg/L</td></tr><tr><td>Ammonia</td><td>0.742</td><td>0.518</td><td>mg/L</td></tr><tr><td>Conductivity</td><td>51.9</td><td>46.4</td><td>umhos/cm</td></tr><tr><td>Hardness</td><td>16</td><td>16</td><td>mg/L</td></tr><tr><td>pH:</td><td>7.07</td><td>7.42</td><td>units</td></tr></table></div> <div>Preparation Method: Grab sample</div> <div>Evidence of Water Quality: Good reproduction of <i>Ceriodaphnia dubia</i> cultures</div>		Initial	Final		Alkalinity	16.2	16.2	mg/L	Ammonia	0.742	0.518	mg/L	Conductivity	51.9	46.4	umhos/cm	Hardness	16	16	mg/L	pH:	7.07	7.42	units
	Initial	Final																							
Alkalinity	16.2	16.2	mg/L																						
Ammonia	0.742	0.518	mg/L																						
Conductivity	51.9	46.4	umhos/cm																						
Hardness	16	16	mg/L																						
pH:	7.07	7.42	units																						
<div>Control Sediment</div> <div>Source: South Tyger river @ Hwy. 14</div> <div>Collection Date: 9-19-95</div> <div>Preservation: kept at 0-4°C in plastic containers</div> <div>Date/Time Added to Test Chambers: 9-29-95</div> <div>Observations: silt</div> <div>Collection Method: grab</div> <div>Disposal:</div>	<div>Test Sediment</div> <div>Source: WSRC FHB 022</div> <div>Collection Date 8/22/95</div> <div>Homogenized?: yes</div> <div>Preservation: kept at 0-4°C in plastic containers</div> <div>Date/Time Added to Test Chambers: 9/29/95</div> <div>Observations: organic</div> <div>Collection Method: grab</div> <div>Shipment: Overnight at 4°C</div>																								
<div>Food Preparation</div> <div>Source: Trout Chow (Glencoe Mills); Cerophyl (Sigma)</div> <div>Purchase Date: Preparation Date: 3/23/95</div> <div>Preservation: kept at 0-4°C</div> <div>Preparation Method: Trout Chow aerated 7 days Cerophyl, yeast aerated overnight</div> <div>Feeding Rate: 1.5 mL / day / replicate</div> <div>Hold Time: 5 days</div>	<div>Test Chambers</div> <div>Type: Plastic 500 mL beakers</div> <div>Sediment Volume: 100 mL</div> <div>Sediment Depth 4 cm</div> <div>Overlying Water Volume: 175 mL</div> <div>Overlying Water Depth: 5 cm</div> <div>Aeration: none</div>																								

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-30-95
T4450	Sample Identification: WSRC FHB 022	End Date: 10-10-95

WATER CHEMISTRY TEST METHODS

Temperature: SM 18th Ed. 2550	Alkalinity: SM 18th Ed. 2320
Dissolved Oxygen: SM 18th Ed. 4500-O	Hardness: SM 18th Ed. 2340
pH: SM 18th Ed. 4500-H+	Conductivity: SM 18th Ed. 2510

WATER CHEMISTRY TEST DATA - OVERLYING WATER

CONTROL TREATMENT					SAMPLE TREATMENT								
Test Day	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Test Day	Cond. umhos/cm	NH3 mg/L	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Alk. mg/L	Hard. mg/L
Start	22.5	6.67	7.0	80%	Start	81.6	1.89	22.2	6.20	5.9	68%	6.1	46.0
1	23.2		6.4	74%	1			22.7		5.2	60%		
2	22.6		6.8	78%	2			22.2		7.2	83%		
3	22.7		5.7	66%	3			22.3		5.2	60%		
4	22.9		5.5	63%	4			22.8		5.0	57%		
5	23.1		5.6	65%	5			22.9		5.4	62%		
6	22.2		5.6	64%	6			22.2		6.1	70%		
7	22.3		8.3	95%	7			22.2		6.1	70%		
8	23.5		5.4	63%	8			23.0		5.8	67%		
9	23.7		7.2	84%	9			23.1		6.0	70%		
10	22.0	6.38	6.2	71%	10	49.3	0.871	22.1	5.15	5.8	67%	14.2	40.0

SURVIVAL AND GROWTH RESULTS

CONTROL TREATMENT							SAMPLE TREATMENT						
	# Organisms				Mean Length (mm)	Mean Length (mm)		# Organisms				Mean Length (mm)	Mean Length (mm)
	Initial	Live at End	Dead at End	% Survival				Initial	Live at End	Dead at End	% Survival		
A	10	8	0	80%	1.57	1.57	A	10	0	0	0%	NA	NA
B	10	10	0	100%	1.58	1.58	B	10	1	1	10%	1.93	1.93
C	10	8	0	80%	1.35	1.35	C	10	0	1	0%	NA	NA
D	10	10	0	100%	1.56	1.56	D	10	1	0	10%	1.72	1.72
E	10	9	0	90%	1.68	1.68	E	10	0	1	0%	NA	NA
F	10	10	0	100%	1.58	1.58	F	10	0	1	0%	NA	NA
G	10	10	0	100%	1.6	1.60	G	10	0	0	0%	NA	NA
H	10	10	0	100%	1.6	1.60	H	10	0	5	0%	NA	NA
Mean	10.0			94%		1.57	Mean	10.0			3%		1.83

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-30-95
T4450	Sample Identification: WSRC FHB 022	End Date: 10-10-95

RESULTS

SURVIVAL DATA		GROWTH DATA	
Mean of Eight Replicates		Mean Length (mm)	
	Mean %		Mean
Control	93.8%	Control	1.57
Sample	2.5%	Sample	1.83

STATISTICAL ANALYSES

SURVIVAL DATA	GROWTH DATA
<p>Test for Normality: $W = 0.87$ Critical value: 0.84 Data are normal in distribution</p> <p>Test for Homogeneity of Variance: $F = \text{N/A}$ Critical value: 6.64</p> <p>Test for Differences in Survival: t Test $t = 15.62$ Critical value: 1.75 The sediment significantly reduced survival of the test organisms.</p>	<p>Test for Normality: $W = 0.78$ Critical value: 0.84 Data are not normal in distribution</p> <p>Test for Homogeneity of Variance: $F = 2.47$ Critical value: 6.635 Data are homogeneous in variance</p> <p>Test for Differences in Growth: t Test $t = -3.20$ Critical value: 1.94 The sediment did not significantly reduce growth of the test organisms.</p>

COMMENTS

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Principal Analyst: Aimee Arnold	Signature: <i>Aimee Arnold</i>	Date: 10/13/95
Report Reviewed By: Robert W. Kelley, Ph.D.	Signature: <i>RLW & [unclear]</i>	Date: 10/13/95

CONCLUSIONS

The test sediment does adversely affect the survival but not the growth of freshwater amphipods.
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10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

EPA/600/R-94/024 Method 100.1

Test Organism: *Hyallela azteca*

Client: Westinghouse Savannah River Company
Sample Identification: WSRC FHB 023

Test Start Date: 9-30-95

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-30-95
T4452	Sample Identification: WSRC FHB 023	End Date: 10-10-95

Test System

EPA/600/R-94/024 Method 100.1

The test was set as a Pass/Fail test with a control treatment and one sample treatment. Each treatment replicate consisted of 100 g of sediment and 175 mL of dilution water. There were eight replicates for each treatment. Ten test organisms were placed in each replicate. Sediment from a local river was used in the control treatment. Test organisms were fed with YCT food. The test was conducted at a temperature of 23°C with ambient laboratory light conditions. Test vessels were 500 mL plastic beakers placed in a constant temperature incubator room.

<p style="text-align: center;">Test Organisms</p> <p>Order: Amphipoda Species: <i>Hyallela azteca</i> Source: Aquatic Research Organisms, NH Life Stage: 2-3 mm % Mortality During 48 Hr Prior to Test:: 0% Taxonomic Verification: RWK 9/29/95 Culturing: as received</p> <p>Observations: Cultures healthy Acclimation: None</p>	<p style="text-align: center;">Dilution Water</p> <p>Type: Surface Water Collection Date 9/29/95</p> <table><tr><th></th><th>Initial</th><th>Final</th><th></th></tr><tr><td><i>Alkalinity</i></td><td>16.2</td><td>16.2</td><td>mg/L</td></tr><tr><td><i>Ammonia</i></td><td>0.742</td><td>0.518</td><td>mg/L</td></tr><tr><td><i>Conductivity</i></td><td>51.9</td><td>46.4</td><td>umhos/cm</td></tr><tr><td><i>Hardness</i></td><td>16</td><td>16</td><td>mg/L</td></tr><tr><td><i>pH:</i></td><td>7.07</td><td>7.42</td><td>units</td></tr></table> <p>Preparation Method: Grab sample</p> <p>Evidence of Water Quality: Good reproduction of Ceriodaphnia dubia cultures</p>		Initial	Final		<i>Alkalinity</i>	16.2	16.2	mg/L	<i>Ammonia</i>	0.742	0.518	mg/L	<i>Conductivity</i>	51.9	46.4	umhos/cm	<i>Hardness</i>	16	16	mg/L	<i>pH:</i>	7.07	7.42	units
	Initial	Final																							
<i>Alkalinity</i>	16.2	16.2	mg/L																						
<i>Ammonia</i>	0.742	0.518	mg/L																						
<i>Conductivity</i>	51.9	46.4	umhos/cm																						
<i>Hardness</i>	16	16	mg/L																						
<i>pH:</i>	7.07	7.42	units																						

<p style="text-align: center;">Control Sediment</p> <p>Source: South Tyger river @ Hwy. 14 Collection Date: 9-19-95 Preservation: kept at 0-4°C in plastic containers Date/Time Added to Test Chambers: 9-29-95 Observations: silt Collection Method: grab Disposal:</p>	<p style="text-align: center;">Test Sediment</p> <p>Source: WSRC FHB 023 Collection Date 8/22/95 Homogenized?: yes Preservation: kept at 0-4°C in plastic containers Date/Time Added to Test Chambers: 9/29/95 Observations: organic Collection Method: grab Shipment: Overnight at 4°C</p>
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<p style="text-align: center;">Food Preparation</p> <p>Source: Trout Chow (Glencoe Mills); Cerophyl (Sigma) Purchase Date: Preparation Date: 3/23/95 Preservation: kept at 0-4°C Preparation Method: Trout Chow aerated 7 days Cerophyl, yeast aerated overnight Feeding Rate: 1.5 mL / day / replicate Hold Time: 5 days</p>	<p style="text-align: center;">Test Chambers</p> <p>Type: Plastic 500 mL beakers Sediment Volume: 100 mL Sediment Depth 4 cm Overlying Water Volume: 175 mL Overlying Water Depth: 5 cm Aeration: none</p>
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10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-30-95
T4452	Sample Identification: WSRC FHB 023	End Date: 10-10-95

WATER CHEMISTRY TEST METHODS

Temperature: SM 18th Ed. 2550	Alkalinity: SM 18th Ed. 2320
Dissolved Oxygen: SM 18th Ed. 4500-O	Hardness: SM 18th Ed. 2340
pH: SM 18th Ed. 4500-H+	Conductivity: SM 18th Ed. 2510

WATER CHEMISTRY TEST DATA - OVERLYING WATER

CONTROL TREATMENT

Test Day	Temp. C	pH units	D.O. mg/L	D.O. % sat.
Start	22.5	6.67	7.0	80%
1	23.2		6.4	74%
2	22.6		6.8	78%
3	22.7		5.7	66%
4	22.9		5.5	63%
5	23.1		5.6	65%
6	22.2		5.6	64%
7	22.3		8.3	95%
8	23.5		5.4	63%
9	23.7		7.2	84%
10	22.0	6.38	6.2	71%

SAMPLE TREATMENT

Test Day	Cond. umhos/cm	NH3 mg/L	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Alk. mg/L	Hard. mg/L
Start	25.5	0.518	22.2	6.72	7.3	84%	2.0	26.0
1			23.3		5.6	65%		
2			22.2		7.2	83%		
3			22.4		6.1	70%		
4			22.8		6.0	69%		
5			23.0		6.1	71%		
6			22.1		6.2	71%		
7			22.1		6.2	71%		
8			23.4		6.4	74%		
9			23.4		6.9	80%		
10	23.6	0.653	22.1	6.23	6.8	78%	4.1	32.0

SURVIVAL AND GROWTH RESULTS

CONTROL TREATMENT

	# Organisms				Mean Length (mm)	Mean Length (mm)
	Initial	Live at End	Dead at End	% Survival		
A	10	8	0	80%	1.57	1.57
B	10	10	0	100%	1.58	1.58
C	10	8	0	80%	1.35	1.35
D	10	10	0	100%	1.56	1.56
E	10	9	0	90%	1.68	1.68
F	10	10	0	100%	1.58	1.58
G	10	10	0	100%	1.6	1.60
H	10	10	0	100%	1.6	1.60
Mean	10.0			94%		1.57

SAMPLE TREATMENT

	# Organisms				Mean Length (mm)	Mean Length (mm)
	Initial	Live at End	Dead at End	% Survival		
A	10	2	0	20%	1.51	1.51
B	10	0	0	0%	NA	NA
C	10	1	0	10%	1.29	1.29
D	10	5	0	50%	1.56	1.56
E	10	1	0	10%	1.29	1.29
F	10	1	1	10%	1.55	1.55
G	10	3	1	30%	1.22	1.22
H	10	3	0	30%	1.58	1.58
Mean	10.0			20%		1.43

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-30-95
T4452	Sample Identification: WSRC FHB 023	End Date: 10-10-95

RESULTS

SURVIVAL DATA		GROWTH DATA	
Mean of Eight Replicates		Mean Length (mm)	
	Mean %		Mean
Control	93.8%	Control	1.57
Sample	20.0%	Sample	1.43

STATISTICAL ANALYSES

SURVIVAL DATA	GROWTH DATA
<p>Test for Normality: W= 0.91 Critical value: 0.84 Data are normal in distribution</p> <p>Test for Homogeneity of Variance: F= N/A Critical value: 6.64</p> <p>Test for Differences in Survival: t Test t= 9.15 Critical value: 1.75 The sediment significantly reduced survival of the test organisms.</p>	<p>Test for Normality: W= 0.90 Critical value: 0.84 Data are normal in distribution</p> <p>Test for Homogeneity of Variance: F= 2.68 Critical value: 6.635 Data are homogeneous in variance</p> <p>Test for Differences in Growth: "t" Test t= 2.09 Critical value: 1.94 The sediment significantly reduced growth of the test organisms.</p>

COMMENTS

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Principal Analyst: Aimee Arnold	Signature: <i>Aimee Arnold</i>	Date: 10/13/95
Report Reviewed By: Robert W. Kelley, Ph.D.	Signature: <i>Robert W. Kelley</i>	Date: 10/13/95

CONCLUSIONS

The test sediment does adversely affect the survival and the growth of freshwater amphipods.
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10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

EPA/600/R-94/024 Method 100.1

Test Organism: *Hyallela azteca*

Client: Westinghouse Savannah River Company
Sample Identification: WSRC HSP 064

Test Start Date: 9-30-95

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-30-95
T4449	Sample Identification: WSRC HSP 064	End Date: 10-10-95

Test System

EPA/600/R-94/024 Method 100.1

The test was set as a Pass/Fail test with a control treatment and one sample treatment. Each treatment replicate consisted of 100 g of sediment and 175 mL of dilution water. There were eight replicates for each treatment. Ten test organisms were placed in each replicate. Sediment from a local river was used in the control treatment. Test organisms were fed with YCT food. The test was conducted at a temperature of 23°C with ambient laboratory light conditions. Test vessels were 500 mL plastic beakers placed in a constant temperature incubator room.

Test Organisms	
Order:	Amphipoda
Species:	<i>Hyallela azteca</i>
Source:	Aquatic Research Organisms, NH
Life Stage:	2-3 mm
% Mortality During 48 Hr Prior to Test::	0%
Taxonomic Verification:	RWK 9/29/95
Culturing:	as received
Observations:	Cultures healthy
Acclimation:	None

Dilution Water		
Type:	Surface Water	
Collection Date	9/29/95	
	Initial	Final
<i>Alkalinity</i>	16.2	16.2 mg/L
<i>Ammonia</i>	0.742	0.518 mg/L
<i>Conductivity</i>	51.9	46.4 umhos/cm
<i>Hardness</i>	16	16 mg/L
<i>pH:</i>	7.07	7.42 units
Preparation Method:	Grab sample	
Evidence of Water Quality:	Good reproduction of Ceriodaphnia dubia cultures	

Control Sediment	
Source:	South Tyger river @ Hwy. 14
Collection Date:	9-19-95
Preservation:	kept at 0-4°C in plastic containers
Date/Time Added to Test Chambers:	9-29-95
Observations:	silt
Collection Method:	grab
Disposal:	

Test Sediment	
Source:	WSRC HSP 064
Collection Date	8/22/95
	Homogenized?: yes
Preservation:	kept at 0-4°C in plastic containers
Date/Time Added to Test Chambers:	9/29/95
Observations:	organic
Collection Method:	grab
Shipment:	Overnight at 4°C

Food Preparation	
Source:	Trout Chow (Glencoe Mills); Cerophyl (Sigma)
Purchase Date:	Preparation Date: 3/23/95
Preservation:	kept at 0-4°C
Preparation Method:	Trout Chow aerated 7 days Cerophyl, yeast aerated overnight
Feeding Rate:	1.5 mL / day / replicate
Hold Time:	5 days

Test Chambers	
Type:	Plastic 500 mL beakers
Sediment Volume:	100 mL
Sediment Depth	4 cm
Overlying Water Volume:	175 mL
Overlying Water Depth:	5 cm
Aeration:	none

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-30-95
T4449	Sample Identification: WSRC HSP 064	End Date: 10-10-95

WATER CHEMISTRY TEST METHODS

Temperature: SM 18th Ed. 2550	Alkalinity: SM 18th Ed. 2320
Dissolved Oxygen: SM 18th Ed. 4500-O	Hardness: SM 18th Ed. 2340
pH: SM 18th Ed. 4500-H+	Conductivity: SM 18th Ed. 2510

WATER CHEMISTRY TEST DATA - OVERLYING WATER

CONTROL TREATMENT					SAMPLE TREATMENT								
Test Day	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Test Day	Cond. umhos/cm	NH3 mg/L	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Alk. mg/L	Hard. mg/L
Start	22.5	6.67	7.0	80%	Start	37.5	0.21	22.2	6.49	7.8	90%	4.1	42.0
1	23.2		6.4	74%	1			23.0		4.2	49%		
2	22.6		6.8	78%	2			22.2		5.9	68%		
3	22.7		5.7	66%	3			22.4		6.3	72%		
4	22.9		5.5	63%	4			22.8		6.0	69%		
5	23.1		5.6	65%	5			22.9		6.0	69%		
6	22.2		5.6	64%	6			22.1		6.2	71%		
7	22.3		8.3	95%	7			22.2		6.3	72%		
8	23.5		5.4	63%	8			23.4		6.2	72%		
9	23.7		7.2	84%	9			23.1		6.5	76%		
10	22.0	6.38	6.2	71%	10	36	1.7	22.0	6.01	6.8	78%	8.1	50.0

SURVIVAL AND GROWTH RESULTS

CONTROL TREATMENT							SAMPLE TREATMENT						
	# Organisms				Mean Length (mm)	Mean Length (mm)		# Organisms				Mean Length (mm)	Mean Length (mm)
	Initial	Live at End	Dead at End	% Survival				Initial	Live at End	Dead at End	% Survival		
A	10	8	0	80%	1.57	1.57	A	10	6	0	60%	1.67	1.67
B	10	10	0	100%	1.58	1.58	B	10	8	0	80%	1.53	1.53
C	10	8	0	80%	1.35	1.35	C	10	6	0	60%	1.41	1.41
D	10	10	0	100%	1.56	1.56	D	10	5	0	50%	1.59	1.59
E	10	9	0	90%	1.68	1.68	E	10	NA	NA	NA	NA	NA
F	10	10	0	100%	1.58	1.58	F	10	6	0	60%	1.54	1.54
G	10	10	0	100%	1.6	1.60	G	10	8	0	80%	1.49	1.49
H	10	10	0	100%	1.6	1.60	H	10	9	0	90%	1.5	1.54
Mean	10.0			94%		1.57	Mean	10.0			69%		1.54

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-30-95
T4449	Sample Identification: WSRC HSP 064	End Date: 10-10-95

RESULTS

SURVIVAL DATA		GROWTH DATA	
Mean of Eight Replicates		Mean Length (mm)	
	Mean %		Mean
Control	93.8%	Control	1.57
Sample	68.6%	Sample	1.54

STATISTICAL ANALYSES

SURVIVAL DATA	GROWTH DATA
<p>Test for Normality: $W = 0.89$ Critical value: 0.84 Data are normal in distribution</p> <p>Test for Homogeneity of Variance: $F = \text{N/A}$ Critical value: 6.64</p> <p>Test for Differences in Survival: t Test $t = 4.20$ Critical value: 1.75 The sediment significantly reduced survival of the test organisms.</p>	<p>Test for Normality: $W = 0.87$ Critical value: 0.84 Data are normal in distribution</p> <p>Test for Homogeneity of Variance: $F = 1.38$ Critical value: 6.635 Data are homogeneous in variance</p> <p>Test for Differences in Growth: "t" Test $t = 0.58$ Critical value: 1.94 The sediment did not significantly reduce growth of the test organisms.</p>

COMMENTS

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Principal Analyst: Aimee Arnold	Signature: <i>Aimee Arnold</i>	Date: 10/13/95
Report Reviewed By: Robert W. Kelley, Ph.D.	Signature: <i>Robert W. Kelley</i>	Date: 10/13/95

CONCLUSIONS

The test sediment does adversely affect the survival but not the growth of freshwater amphipods.
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10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

EPA/600/R-94/024 Method 100.1

Test Organism: *Hyallela azteca*

Client: Westinghouse Savannah River Company
Sample Identification: WSRC FMC 002H

Test Start Date: 9-30-95

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-30-95
T4453	Sample Identification: WSRC FMC 002H	End Date: 10-10-95

Test System

EPA/600/R-94/024 Method 100.1

The test was set as a Pass/Fail test with a control treatment and one sample treatment. Each treatment replicate consisted of 100 g of sediment and 175 mL of dilution water. There were eight replicates for each treatment. Ten test organisms were placed in each replicate. Sediment from a local river was used in the control treatment. Test organisms were fed with YCT food. The test was conducted at a temperature of 23°C with ambient laboratory light conditions. Test vessels were 500 mL plastic beakers placed in a constant temperature incubator room.

<p style="text-align: center;">Test Organisms</p> <p>Order: Amphipoda Species: <i>Hyallela azteca</i> Source: Aquatic Research Organisms, NH Life Stage: 2-3 mm % Mortality During 48 Hr Prior to Test:: 0% Taxonomic Verification: RWK 9/29/95 Culturing: as received</p> <p>Observations: Cultures healthy Acclimation: None</p>	<p style="text-align: center;">Dilution Water</p> <p>Type: Surface Water Collection Date 9/29/95</p> <table><tr><th></th><th>Initial</th><th>Final</th><th></th></tr><tr><td><i>Alkalinity</i></td><td>16.2</td><td>16.2</td><td>mg/L</td></tr><tr><td><i>Ammonia</i></td><td>0.742</td><td>0.518</td><td>mg/L</td></tr><tr><td><i>Conductivity</i></td><td>51.9</td><td>46.4</td><td>umhos/cm</td></tr><tr><td><i>Hardness</i></td><td>16</td><td>16</td><td>mg/L</td></tr><tr><td><i>pH:</i></td><td>7.07</td><td>7.42</td><td>units</td></tr></table> <p>Preparation Method: Grab sample</p> <p>Evidence of Water Quality: Good reproduction of <i>Ceriodaphnia dubia</i> cultures</p>		Initial	Final		<i>Alkalinity</i>	16.2	16.2	mg/L	<i>Ammonia</i>	0.742	0.518	mg/L	<i>Conductivity</i>	51.9	46.4	umhos/cm	<i>Hardness</i>	16	16	mg/L	<i>pH:</i>	7.07	7.42	units
	Initial	Final																							
<i>Alkalinity</i>	16.2	16.2	mg/L																						
<i>Ammonia</i>	0.742	0.518	mg/L																						
<i>Conductivity</i>	51.9	46.4	umhos/cm																						
<i>Hardness</i>	16	16	mg/L																						
<i>pH:</i>	7.07	7.42	units																						

<p style="text-align: center;">Control Sediment</p> <p>Source: South Tyger river @ Hwy. 14 Collection Date: 9-19-95 Preservation: kept at 0-4°C in plastic containers Date/Time Added to Test Chambers: 9-29-95 Observations: silt Collection Method: grab Disposal:</p>	<p style="text-align: center;">Test Sediment</p> <p>Source: WSRC FMC 002H Collection Date 8/22/95 Homogenized?: yes Preservation: kept at 0-4°C in plastic containers Date/Time Added to Test Chambers: 9/29/95 Observations: organic Collection Method: grab Shipment: Overnight at 4°C</p>
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<p style="text-align: center;">Food Preparation</p> <p>Source: Trout Chow (Glencoe Mills); Cerophyl (Sigma) Purchase Date: Preparation Date: 3/23/95 Preservation: kept at 0-4°C Preparation Method: Trout Chow aerated 7 days Cerophyl, yeast aerated overnight Feeding Rate: 1.5 mL / day / replicate Hold Time: 5 days</p>	<p style="text-align: center;">Test Chambers</p> <p>Type: Plastic 500 mL beakers Sediment Volume: 100 mL Sediment Depth 4 cm Overlying Water Volume: 175 mL Overlying Water Depth: 5 cm Aeration: starting at Day 3</p>
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10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-30-95
T4453	Sample Identification: WSRC FMC 002H	End Date: 10-10-95

WATER CHEMISTRY TEST METHODS

Temperature: SM 18th Ed. 2550	Alkalinity: SM 18th Ed. 2320
Dissolved Oxygen: SM 18th Ed. 4500-O	Hardness: SM 18th Ed. 2340
pH: SM 18th Ed. 4500-H+	Conductivity: SM 18th Ed. 2510

WATER CHEMISTRY TEST DATA - OVERLYING WATER

CONTROL TREATMENT

SAMPLE TREATMENT

Test Day	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Test Day	Cond. umhos/cm	NH3 mg/L	Temp. C	pH units	D.O. mg/L	D.O. % sat.	Alk. mg/L	Hard. mg/L
Start	22.5	6.67	7.0	80%	Start	44.3	1.11	22.3	6.25	4.4	51%	10.1	40.0
1	23.2		6.4	74%	1			23.0		4.2	49%		
2	22.6		6.8	78%	2			22.2		5.9	68%		
3	22.7		5.7	66%	3			22.4		4.1	47%		
4	22.9		5.5	63%	4			22.9		8.0	92%		
5	23.1		5.6	65%	5			22.0		8.5	98%		
6	22.2		5.6	64%	6			22.0		8.2	94%		
7	22.3		8.3	95%	7			22.0		6.0	69%		
8	23.5		5.4	63%	8			22.8		8.2	94%		
9	23.7		7.2	84%	9			22.4		7.9	91%		
10	22.0	6.38	6.2	71%	10	32.4	3.04	22.0	5.77	7.7	89%	4.1	28.0

SURVIVAL AND GROWTH RESULTS

CONTROL TREATMENT

SAMPLE TREATMENT

	# Organisms				Mean Length (mm)	Mean Length (mm)		# Organisms				Mean Length (mm)	Mean Length (mm)
	Initial	Live at End	Dead at End	% Survival				Initial	Live at End	Dead at End	% Survival		
A	10	8	0	80%	1.57	1.57	A	10	0	0	0%	NA	NA
B	10	10	0	100%	1.58	1.58	B	10	0	0	0%	NA	NA
C	10	8	0	80%	1.35	1.35	C	10	0	0	0%	NA	NA
D	10	10	0	100%	1.56	1.56	D	10	0	0	0%	NA	NA
E	10	9	0	90%	1.68	1.68	E	10	0	0	0%	NA	NA
F	10	10	0	100%	1.58	1.58	F	10	0	0	0%	NA	NA
G	10	10	0	100%	1.6	1.60	G	10	0	0	0%	NA	NA
H	10	10	0	100%	1.6	1.60	H	10	0	0	0%	NA	NA
Mean	10.0			94%		1.57	Mean	10.0			0%		NA

10 DAY AMPHIPOD SEDIMENT TOXICITY TEST

Lab ID#	Client: Westinghouse Savannah River Company	Start Date: 9-30-95
T4453	Sample Identification: WSRC FMC 002H	End Date: 10-10-95

RESULTS

SURVIVAL DATA		GROWTH DATA	
Mean of Eight Replicates		Mean Length (mm)	
	Mean %		Mean
Control	93.8%	Control	1.57
Sample	0.0%	Sample	NA

STATISTICAL ANALYSES

SURVIVAL DATA	GROWTH DATA
<p>Test for Normality: $W = 0.80$ Critical value: 0.84 Data are not normal in distribution</p> <p>Test for Homogeneity of Variance: $F = N/A$ Critical value: 6.64</p> <p>Test for Differences in Survival: Wilcoxon Test Sum = Critical value: 82 The sediment significantly reduced survival of the test organisms.</p>	<p>Test for Normality: $W = N/A$ Critical value: 0.84</p> <p>Test for Homogeneity of Variance: $F = N/A$ Critical value: 6.635</p> <p>Test for Differences in Growth: "t" Test $t = N/A$ Critical value: 1.94 Test organism growth effects cannot be determined</p>

COMMENTS

All test organisms exposed to the test sediment died during the test.

Principal Analyst: Aimee Arnold	Signature: <i>Aimee Arnold</i>	Date: 10/13/95
Report Reviewed By: Robert W. Kelley, Ph.D.	Signature: <i>Robert W. Kelley</i>	Date: 10/13/95

CONCLUSIONS

The test sediment does adversely affect the survival and the growth of freshwater amphipods.