**RESULTS OF ACUTE AND CHRONIC TOXICITY TESTS
CONDUCTED AT SRS NPDES OUTFALLS, JULY - OCTOBER
1991**

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**RESULTS OF ACUTE AND CHRONIC TOXICITY TESTS
CONDUCTED AT SRS NPDES OUTFALLS
JULY - OCTOBER 1991**

1. EXECUTIVE SUMMARY

Acute (48 hour LC50) and chronic (7-day reproductive impairment) toxicity tests were conducted on Ceriodaphnia dubia in water collected from 53 NPDES outfalls. All tests were conducted at the in-stream waste concentration. Only 12 of the 53 outfalls showed no evidence of toxicity. Twenty-eight of the outfalls were acutely toxic, often producing 100% mortality during the first day of exposure. Fourteen outfalls had no discharge at the time of sampling and could not be tested. Three outfalls were not tested because their toxicity has been adequately characterized in other investigations.

Elevated concentrations of total residual chlorine are suspected to be responsible for the observed toxicity of many NPDES outfalls, particularly the sanitary wastewater treatment plants. Chemical data from previous studies indicate that metals may also be present in toxic concentrations at many outfalls. Toxicity identification and reduction options are discussed. Effluent toxicants can be identified by means of Toxicity Identification Evaluations (TIE's) and waste characterization. Toxicity reduction options include waste minimization, effluent treatment, changes in the use of biocides, and combination and relocation of NPDES outfalls. Periodic toxicity testing at all NPDES outfalls is recommended.

It should be emphasized that the results of this toxicity screening investigation represent only a "snap-shot" view of the toxicity of an effluent during a 7-day test period and that additional testing needs to be performed prior to initiating more costly toxicity identification and reduction programs. Biological studies are also needed to determine if SRS effluents are adversely impacting the biota of receiving streams.

2. INTRODUCTION

In March 1984, the U.S. Environmental Protection Agency (EPA) released its policy for the "Development of Water-Quality-Based Permit Limitations for Toxic Pollutants" (EPA, 1984). This policy states that in addition to imposing limits on individual chemical constituents of effluents, a discharger may be required to demonstrate that the combination of chemicals in a complex effluent has no adverse effect on the organisms that inhabit the receiving stream. To this end, many states have added a toxicity

testing requirement to NPDES permits in order to monitor the effects of complex effluents on aquatic environments and to determine compliance with toxicity limits in National Pollutant Discharge Elimination System (NPDES) permits. Guidance in implementing this policy is provided to the states and regional EPA NPDES permit writers by EPA's "Technical Support Document for Water Quality-Based Toxics Control (EPA, 1985).

In anticipation of a toxicity testing requirement in the new SRS site-wide NPDES permit, a toxicity screening program was implemented in July 1991 to perform a pass-fail (control and in-stream dilution) toxicity test on each of the NPDES outfalls at the SRS. These tests were performed using the same test species (Ceriodaphnia dubia) that is required by the South Carolina Department of Health and Environmental Control (SCDHEC) for routine compliance testing. The test results will be used to pinpoint those outfalls that may be toxic to the test species, so that further testing can be done to confirm the toxicity of the outfalls, identify the toxic constituents in the outfalls, and eliminate toxicity at all SRS outfalls.

3. METHODS

Effluent samples were collected in accordance with U.S. EPA protocol. Methods used for toxicity testing deviated from the regulatory specifications set forth by the U.S. EPA (Weber et al., 1989) and SCDHEC, in that water samples that contained measurable concentrations of chlorine were split into two subsamples and one subsample was dechlorinated prior to performing a toxicity test on the sample. This approach was taken so that the toxic effects of effluent constituents other than chlorine could be detected even when toxic levels of chlorine were present in an effluent.

Details of the test conditions that must be maintained during the toxicity test, specific testing methodology and data analysis can be found in Weber et al.(1989). Toxicity testing was performed by Normandeau Associates, Inc., New Ellenton, SC, SCDHEC Certification Numbers 87075/91079.

Effluent grab samples were collected at each outfall three times during a seven day test period. For each test, 20 test organisms were exposed to a control water (containing no toxicants) and 20 organisms were exposed to effluent that was diluted with control water to approximate the in-stream dilution of the effluent in the receiving stream. The dilution factors used for the toxicity tests are presented in Table 1. In some instances, two or more effluents discharge to the same conveyance prior to reaching the receiving stream. The toxicity of these combined effluents

Table 1. DISCHARGE RATES OF NPDES OUTFALLS AND RECEIVING STREAMS AND IN-STREAM WASTE CONCENTRATIONS

Outfall	Outfall Discharge ^{a,b}	Receiving Stream ^c	7Q10 Stream Discharge ^{a,d}	In-Stream Waste Conc. ^e
A-001	0.619	Tim's Br.	0	100%
A-003	0.116	Tim's Br.	0	100%
A-005	0.184	Tim's Br.	0	100%
A-008	0.347	Tim's Br.	0	100%
A-011	0.011	Tim's Br.	0	100%
A-014	3.11	Tim's Br.	0	100%
A-015	0.124	Tim's Br.	0	100%
C-001	0.108	FMB trib.	0	100%
C-003	0.309	FMB trib.	0	100%
C-004	0.294	FMB trib.	0	100%
C-004A	0.015	FMB trib.	0	100%
D-001	85.144	BDC	0	100%
D-001A	0.19	BDC	0	100%
D-001B	-f	BDC	0	100%
D-001C	4.889	BDC	0	100%
D-006	0.248	SR swamp	0	100%
DW-001	0.073	Tink. Cr. trib.	0	100%
DW-002	0.046	Tink. Cr. trib.	0	100%
DW-003	0.012	UTR trib.	0	100%
DW-004	0.098	UTR trib.	0	100%
F-001	0.169	UTR trib.	0	100%
F-002	0.116	UTR trib.	0	100%
F-003	0.088	UTR trib.	0	100%
F-003A	0.011	UTR trib.	0	100%
F-005	0.139	UTR trib.	0	100%
F-008	1.21	FMB trib.	1.36	47%
F-008A	0.139	FMB trib.	1.36	9%
F-012	-f	FMB trib.	1.36	-
F-013	0.082	FMB trib.	1.36	6%
FS-001	0.02	UTR	107.9	0.02%
FS-002	0.06	UTR	107.9	0.05%
H-002	0.111	UTR trib.	0	100%
H-004	0.263	UTR trib.	0	100%
H-007	0.077	UTR trib.	0	100%
H-008	1.516	FMB	0	100%
H-008A	0.124	FMB	0	100%
H-012	1.300	FMB trib.	0.33	80%
H-012A	0.062	FMB trib.	0.33	16%
H-016	0.524	UTR	107.9	0.48%
H-017	-f	FMB trib.	0.33	-
H-018	-f	FMB trib.	0.33	-
K-001	0.062	IGB	0	100%
K-006	0.511	IGB	0	100%
K-008	0.944	IGB	0	100%
K-010	0.944	IGB	0	100%

Table 1 (cont.). DISCHARGE RATES OF NPDES OUTFALLS AND RECEIVING STREAMS AND IN-STREAM WASTE CONCENTRATIONS

Outfall	Outfall Discharge ^{a,b}	Receiving Stream ^c	7Q10 Stream Discharge ^{a,d}	In-Stream Waste Conc. ^e
K-011	3.23	IGB	0.2	94%
K-011A	0.014	IGB	0.2	7%
L-007	3.23	SC	2.15	60%
L-007A	0.009	SC	2.15	0.4%
L-008	1.27	SC	2.15	37%
L-010	0.009	SC	2.15	0.4%
M-004	0.144	Tim's Br.	0	100%
M-005	1.331	Tim's Br.	0	100%
P-005	0.217	MB trib.	0	100%
P-007	1.109	MB trib.	0	100%
P-013A	0.011	SC	0.17	6%
P-019	3.68	Par Pond	0	100%
S-002	0.046	FMB trib.	0	100%
S-008	0.046	PB trib.	0	100%
S-011	0.029	PB trib.	0	100%
S-014	0.003	FMB trib.	0	100%
T-001	0.046	UTR trib.	0	100%
T-005	0.003	UTR trib.	0	100%
T-007	0.008	UTR trib.	0	100%
X-004	0.077	SR	4346	0.002%
X-008	0.464	SR	4346	0.01%
X-011	0.005	SR	4346	0.0001%
X-013	0.068	SR	4346	0.0002%
X-014	0.09	SR	4346	0.002%
Y-001	0.002	MB	0	100%

^aDischarge reported as cubic feet per second (cfs)

^bOutfall discharges were estimated from information contained in Du Pont (1988)

^cAbbreviations of Stream Names:

BDC - Beaver Dam Creek

FMB - Four Mile Branch

IGB - Indian Grave Branch

MB - Meyer's Branch

PB - Pen Branch

SC - Steel Creek

SR - Savannah River

Tim's Br. - Tim's Branch

Tink. Cr. - Tinker Creek

UTR - Upper Three Runs Creek

trib. - tributary

^d7Q10 data was estimated from USGS stream discharge data (USGS, 1991)

^eIn-stream waste concentration - values listed are the percent effluent in the receiving stream after complete mixing with the 7Q10 stream discharge. The in-stream waste concentration did not include dilution from other outfalls that enter the same receiving stream.

^fIntermittent discharge

was not evaluated in this program, but it is possible that a reduction in effluent toxicity may result when effluents mix prior to entering a receiving stream. Therefore, some effluents that were identified as toxic in this investigation may not be toxic after they have mixed with other effluents prior to entering a receiving stream.

The test water was replaced daily and the test organisms were observed for mortality and the number of offspring produced. At the end of the 7-day test period, statistical comparisons were made between the mortality and reproductive rates of the organisms exposed to control water and those exposed to the in-stream waste concentration of the effluent. If the mortality rate of the organisms in the test group was statistically significantly higher than the rate in the control group, the effluent failed the acute toxicity test, indicating that the effluent was acutely toxic to the test organisms at the in-stream waste concentration. Similarly, if the reproductive rate of the organisms in a test group was statistically lower than the reproductive rate of the control group, the effluent failed the chronic toxicity test, indicating that the effluent may cause sublethal impacts to organisms in the receiving stream. However, in-stream biological surveys will need to be conducted to determine if effluents that failed the toxicity tests are actually having adverse effects on the organisms that live in the receiving streams.

Because chlorine is highly toxic to aquatic organisms at concentrations as low as 20 ug/l (parts per billion), effluents containing chlorine were divided into two subsamples and one subsample was dechlorinated using sodium thiosulfate. Toxicity tests were then performed on both the untreated and dechlorinated portions of the effluent. For those tests conducted on dechlorinated samples, the same amount of sodium thiosulfate was added to the control water as was needed to dechlorinate the effluent. For effluents that contained greater than 1 mg/l of chlorine, a toxicity test was performed only on the unchlorinated sample, since chlorine levels of this magnitude are known to cause immediate and complete mortality of the test organisms. In some instances, chlorine was not present in detectable levels in the first sample of effluent that was collected from an outfall, but detectable amounts of chlorine were present in one or both of the samples collected subsequently. In these instances, the subsequent effluent samples were chemically dechlorinated and the toxicity test was designated as a "dechlorinated" test. For effluents that had very high chlorine concentrations, the amount of sodium thiosulfate that was required to dechlorinate the sample sometimes appeared to produce a toxic effect in both the control and effluent samples. For these tests, it is not possible to determine if there were toxicants other than chlorine present in the effluent. In a few instances when

small amounts of chlorine were present, even small amounts of sodium thiosulfate appear to have adversely affected the test organisms, because the effluent subsample that was not dechlorinated passed a toxicity test, while the dechlorinated sample failed the test. Therefore, the results of the toxicity tests that were performed on dechlorinated effluent samples should be interpreted with caution, since the observed toxicity may be partially due to the dechlorinating agent.

4. RESULTS

The results of the toxicity tests conducted between July and October, 1991 are presented in Table 2. Of the 53 outfalls that were tested, only 12 showed no evidence of acute or chronic toxicity (Table 3). In addition, five outfalls that had low levels of total residual chlorine passed both the acute and chronic tests following dechlorination, indicating that chlorine was probably the only toxicant present in toxic concentrations. Of the remaining outfalls, eight outfalls were not acutely toxic, but failed the chronic test, and 28 outfalls were acutely toxic to the test organisms, often resulting in complete mortality to the test organisms in the first 24 hours of the test. Fourteen outfalls contained no discharge at the time of sampling and therefore could not be tested. In addition, three outfalls (H-016, M-004, M-005) were not tested, because the toxicity of the outfalls has been adequately characterized during other investigations. Outfall H-016 is not toxic at the in-stream waste concentration. Outfalls M-004 and M-005 are not toxic after mixing with other effluents prior to entering the receiving stream. Two outfalls that were tested (A-008 and P-005) have since been delisted as NPDES outfalls.

4.1 A Area Outfalls (A-001, A-003, A-005, A-008, A-011, A-014, and A-015)

The results of this study indicate that all of the A-Area outfalls were acutely toxic to the test species, even after dechlorination (Table 2). Outfall A-008 was recently delisted as an NPDES outfall, so its toxicity is no longer of concern. Previous toxicity investigations of outfalls A-001, A-003, A-005, A-011, A-014, and A-015 conducted in 1985 (Environmental and Chemical Sciences, 1986) and on A-003 and A-011 in 1990 (Chem-Nuclear, 1990) indicate that all of these outfalls showed some evidence of toxicity at the time of testing (Table 4). The similarity of the results of the 1991 toxicity tests to those tests conducted previously indicate persistent toxicity at all of the A-Area outfalls.

**TABLE 2. TOXICITY SCREENING OF SRS NPDES OUTFALLS,
JULY-OCTOBER, 1991**

Outfall	Acute Pass/Fail	% Mort.	Chronic Pass/Fail	Chlorine (mg/l)
A-001	Fail	100	NA	<0.02
A-003	Fail	100	NA	<0.02 - 0.04
A-005	Fail	100	NA	0.04 - 1.05
A-005-DeCl	Fail	100	NA	reduced to <0.02
A-008	Fail	100	NA	<0.02
A-011	Fail	100	NA	0.8
A-011-DeCl	Fail	100	NA	reduced to <0.02
A-014	Fail	55	NA	<0.02 to 0.05
A-014-DeCl	Fail	65	NA	reduced to <0.02
A-015	Fail	100	NA	9.0
A-015-DeCl	Fail	100	NA	reduced to <0.02
C-001	Pass	30	Pass	<0.02 to 0.03
C-001-DeCl	Fail	65	NA	0.02-0.04; red. to <0.02
C-003-DeCl	Fail	100	NA	2.0; reduced to <0.02
C-004	Pass	15	Fail	<0.02 to 0.04
C-004-DeCl	Fail	60	NA	0.03-0.06; red. to <0.02
C-004A-DeCl	Fail	100	NA	7.0; reduced to <0.02
D-001	Pass	5.3	Pass	<0.02 to 0.08
D-001-DeCl	Fail	95	NA	reduced to <0.02
D-001A	Fail	100	NA	0.03 to 7.5
D-001A-DeCl	Fail	100	NA	reduced to <0.02
D-001B	No flow			
D-001C-DeCl	Fail	52.6	Fail	reduced to <0.02
D-006-DeCl	Pass	5	Pass	reduced to <0.02
DW-001	No flow			
DW-002	No flow			
DW-003-DeCl	Fail	100	NA	reduced to <0.02
DW-004	No flow			
F-001-DeCl	Fail	80	NA	0.6-1.2; reduced to <0.02
F-002	Pass	5	Pass	,0.02
F-003-DeCl	Fail	100	NA	1.8; reduced to <0.02
F-003A	Fail	100	NA	<0.02
F-005-DeCl	Fail	100	NA	1.6; reduced to <0.02
F-008-DeCl	Pass	5	Pass	<0.02-0.04; red. to <0.02
F-008A	Pass	10	Pass	0.05-1.25; red. to <0.02
F-012	No flow			
F-013	No flow			
FS-001	No flow			
FS-002	No flow			
H-002	Fail	100	NA	0.04
H-002-DeCl	Fail	100	NA	reduced to <0.02
H-004	Fail	100	NA	<0.02
H-007	Pass	10	Pass	0.02 - 0.05
H-007-DeCl	Pass	5	Fail	reduced to <0.02
H-008-DeCl	Pass	20	Fail	reduced to <0.02
H-008A	Fail	100	NA	<0.02
H-012-DeCl	Pass	5	Fail	<0.02 to 0.05

**Table 2 (cont.) TOXICITY SCREENING OF SRS NPDES OUTFALLS,
JULY-OCTOBER, 1991**

Outfall	Acute Pass/Fail	% Mort.	Chronic Pass/Fail	Chlorine (mg/l)
H-012A	Fail	60	NA	0.03 - 0.35
H-012A-DeCl	Fail	45	NA	reduced to <0.02
H-015	No outfall			
H-016	Not tested.	Outfall toxicity has been characterized.		
H-017	No flow			
H-018	No flow			
K-001	Fail	100	NA	0.55
K-001-DeCl	Fail	100	NA	reduced to <0.02
K-006	Pass	15	Pass	<0.02 to 0.05
K-006-DeCl	Fail	100	NA	reduced to <0.02
K-008-DeCl	Fail	90	NA	reduced to <0.02
K-010	Fail	40	Fail	0.04 to 0.05
K-010-DeCl	Fail	89.5	NA	reduced to <0.02
K-011	Pass	0	Pass	<0.02
K-011A	Fail	100	NA	0.36 - 20
K-011A-DeCl	Fail	100	NA	reduced to <0.02
L-007	Pass	10	Pass	<0.02 - 0.05
L-007A-DeCl	Pass	0	Pass	reduced to <0.02
L-008	Fail	100	NA	<0.02 to 0.05
L-008-DeCl	Fail	100	NA	reduced to <0.02
L-010	Pass	5	Pass	<0.02
M-004	Not tested.	Outfall toxicity has been characterized.		
M-005	Not tested.	Outfall toxicity has been characterized.		
P-005	Pass	5	Fail	<0.02 to 0.07
P-005-DeCl	Pass	15	Fail	reduced to <0.02
P-007	Pass	5	Pass	<0.02 to 0.06
P-007-DeCl	Fail	85	NA	reduced to <0.02
P-013A-DeCl	Fail	100	NA	reduced to <0.02
P-019	Pass	20	Fail	0.05
P-019-DeCl	Fail	60	NA	reduced to <0.02
S-002	Pass	5	Pass	<0.02 to 0.04
S-002-DeCl	Pass	10	Pass	reduced to <0.02
S-008	No flow			
S-011-DeCl	Fail	100	NA	0.75; reduced to <0.02
S-014	No flow			
T-001	No flow			
T-005	Pass	5	Pass	0.04 - 0.18
T-005-DeCl	Pass	20	Pass	reduced to <0.02
T-007	Fail	100	NA	0.09 - 13
T-007-DeCl	Fail	100	NA	reduced to <0.02
X-004	Pass	10	Pass	<0.02
X-008	Pass	10	Fail	<0.02 to 0.08
X-008-DeCl	Pass	0	Pass	reduced to <0.02
X-011	Pass	10	Fail	<0.02
X-013	Pass	5	Fail	80 to 110
X-014-DeCl	Pass	0	Pass	reduced to <0.02
Y-001	No flow			

Table 3. SUMMARY OF TOXICITY RESULTS

No Toxicity	Chronic Toxicity	Acute Toxicity with Part. Mort.	Acute Toxicity 100% Mortality	No Flow/ Not Tested
C-001	C-004	A-014	A-001	D-001B
D-001	H-007-DeCl	A-014-DeCl	A-003	DW-001
D-006-DeCl	H-008-DeCl	C-001-DeCl	A-005	DW-002
F-002	H-012-DeCl	C-004-DeCl	A-005-DeCl	DW-004
F-008-DeCl	P-005	D-001-DeCl	A-008	F-012
F-008A	P-005-DeCl	D-001C-DeCl	A-011	F-013
H-007	P-019	F-001-DeCl	A-011-DeCl	FS-001
K-006	X-008	H-012A	A-015	FS-002
K-011	X-011	H-012A-DeCl	A-015-DeCl	H-016
L-007	X-013	K-008-DeCl	C-003-DeCl	H-017
L-007A-DeCl		K-010	C-004A-DeCl	H-018
L-010		K-010-DeCl	D-001A	M-004
P-007		P-007-DeCl	D-001A-DeCl	M-005
S-002		P-019-DeCl	DW-003-DeCl	S-008
S-002-DeCl			F-003-DeCl	S-014
T-005			F-003A	T-001
T-005-DeCl			F-005-DeCl	Y-001
X-004			H-002	
X-008-DeCl			H-002-DeCl	
X-014-DeCl			H-004	
			H-008A	
			K-001	
			K-001-DeCl	
			K-006-DeCl	
			K-011A	
			K-011A-DeCl	
			L-008	
			L-008-DeCl	
			P-013A-DeCl	
			S-011-DeCl	
			T-007	
			T-007-DeCl	

**TABLE 4. COMPARISON OF 1991 TOXICITY DATA WITH TOXICITY DATA
COLLECTED IN PREVIOUS INVESTIGATIONS**

Outfall	1991 Data		1985 Data ^a		1990 Data ^b	
	Acute Pass/Fail	Chronic Pass/Fail	Bluegill	Daphnid ^c	Ceriodaphnia Acute	Chronic
A-001	Fail	NA ^d	Part. mort. ^e	No effect		
A-003	Fail	NA	Part. mort.	100% mort. ^f	100% mort.	
A-005	Fail	NA	Part. mort.	Part. mort.		
A-005-DeCl	Fail	NA	-	-		
A-008	Fail	NA	-	-		
A-011	Fail	NA	part. mort.	Part. mort.	100% mort.	
A-011-DeCl	Fail	NA	-	-		
A-014	Fail	NA	100% mort.	100% mort.	see ^g	
A-014-DeCl	Fail	NA	-	-		
A-015	Fail	NA	-	-		
A-015-DeCl	Fail	NA	No mort.	Part. mort.		
C-001	Pass	Pass	No mort.	No effect		
C-001-DeCl	Fail	NA	-	-		
C-003	-	-	100% mort.	Rep. imp.		
C-003-DeCl	Fail	NA	-	-		
C-004	Pass	Fail	No mort.	Rep. imp.		
C-004-DeCl	Fail	NA	-	-		
C-004A-DeCl	Fail	NA	No mort.	Rep. imp.		
D-001	Pass	Pass	Part. mort.	No effect	Pass	Pass
D-001-DeCl	Fail	NA	-	-		
D-001A	Fail	NA	No mort.	100% mort.		
D-001A-DeCl	Fail	NA	-	-	Pass	Fail
D-001B	No flow	-	-	-		
D-001C	-	-	No mort.	Rep. imp.	Pass	Fail
D-001C-DeCl	Fail	Fail	-	-		
D-006	-	-	No mort.	Rep. imp.	Pass	Pass
D-006-DeCl	Pass	Pass	-	-		
DW-001	No flow	-	-	-	Part. mort.	
DW-002	No flow	-	No flow	No flow	Fail	Fail
DW-003-DeCl	Fail	NA	No mort.	100% mort.	Fail	Fail
DW-004	No flow	-	-	-		
F-001-DeCl	Fail	NA	No mort.	100% mort.		
F-002	Pass	Pass	Part. mort.	100% mort.		
F-003-DeCl	Fail	NA	-	-	100% mort.	
F-003A	Fail	NA	No mort.	100% mort.		
F-005-DeCl	Fail	NA	No mort.	Rep. imp.		
F-008	-	-	100% mort.	Rep. imp.	Part. mort.	
F-008-DeCl	Pass	Pass	-	-		
F-008A	Pass	Pass	-	-		
F-008A-DeCl	-	-	No mort.	Part. mort.	Pass	Pass
F-012	No flow	-	-	-		
F-013	No flow	-	-	-		
FS-001	No flow	-	-	-		
FS-002	No flow	-	-	-		
H-002	Fail	NA	100% mort.	-		

TABLE 4 (cont.) COMPARISON OF 1991 TOXICITY DATA WITH TOXICITY DATA COLLECTED IN PREVIOUS INVESTIGATIONS

Outfall	1991 Data		1985 Data ^a		1990 Data ^b	
	Acute Pass/Fail	Chronic Pass/Fail	Bluegill	Daphnid ^c	Ceriodaphnia Acute	Chronic
H-002-DeCl	Fail	NA	100% mort.	100% mort.		
H-004	Fail	NA	-	-		
H-004-DeCl	-	-	0% mort.	100% mort.		
H-007	Pass	Pass	-	-		
H-007-DeCl	Pass	Fail	-	-		
H-008	-	-	100% mort.	-		No effect
H-008-DeCl	Pass	Fail	No mort.	Part. mort.		
H-008A	Fail	NA	-	-		
H-012	-	-	No mort.	Rep. imp.		
H-012-DeCl	Pass	Fail	-	-		
H-012A	Fail	NA	-	-		
H-012A-DeCl	Fail	NA	-	-	Fail	Fail
H-016	Not tested ^h	-	-	-		No effect ¹
H-017	No flow	-	-	-		
H-018	No flow	-	-	-		
K-001	Fail	NA	-	-		
K-001-DeCl	Fail	NA	No mort.	Part. mort.		
K-006	Pass	Pass	No mort.	No effect		
K-006-DeCl	Fail	NA	-	-		
K-008	-	-	No mort.	No effect		
K-008-DeCl	Fail	NA	-	-		
K-010	Fail	Fail	No mort.	No effect		
K-010-DeCl	Fail	NA	-	-		
K-011	Pass	Pass	No mort.	100% mort.		
K-011A	Fail	NA	-	-		
K-011A-DeCl	Fail	NA	No mort.	Part. mort.		
L-007	Pass	Pass	-	-		
L-007A-DeCl	Pass	Pass	No mort.	Part. mort.		
L-008	Fail	NA	No mort.	No effect		
L-008-DeCl	Fail	NA	-	-		
L-010	Pass	Pass	-	-		
M-004	Not tested ^h	-	-	-		see g
M-005	Not tested ^h	-	-	-		see g
P-005	Pass	Fail	No mort.	Part. mort.		
P-005-DeCl	Pass	Fail	-	-		
P-007	Pass	Pass	No mort.	No effect		
P-007-DeCl	Fail	NA	-	-		
P-013A-DeCl	Fail	NA	-	-		
P-019	Pass	Fail	No mort.	Rep. imp.		
P-019-DeCl	Fail	NA	-	-		
S-002	Pass	Pass	No flow	No flow	Pass	Pass
S-002-DeCl	Pass	Pass	-	-		
S-008	No flow	-	-	-		
S-008-DeCl	-	-	-	No mort.		Rep. imp.
S-011-DeCl	Fail	NA	No mort.	Rep. imp.	Pass	Pass

TABLE 4 (cont.). COMPARISON OF 1991 TOXICITY DATA WITH TOXICITY DATA COLLECTED IN PREVIOUS INVESTIGATIONS

Outfall	1991 Data		1985 Data ^a		1990 Data ^b	
	Acute Pass/Fail	Chronic Pass/Fail	Bluegill	Daphnid ^c	Ceriodaphnia Acute	Chronic
S-014	No flow	-	No mort.	No effect		
T-001	No flow	-	-	-		
T-005	Pass	Pass	-	-		
T-005-DeCl	Pass	Pass	-	-		
T-007	Fail	NA	-	-	Pass	Pass
T-007-DeCl	Fail	NA	-	-	Pass	Pass
X-004	Pass	Pass	Part. mort.	100% mort.		
X-008	Pass	Fail	No mort.	-		
X-008-DeCl	Pass	Pass	-	100% mort.		
X-011	Pass	Fail	Part. mort.	100% mort.		
X-013	Pass	Fail	-	-		
X-013-DeCl					Pass	Pass
X-014-DeCl	Pass	Pass	-	-		
Y-001	No flow	-	No mort.	100% mort.		

^aData from Environmental and Chemical Sciences (1986)

^bData from Chem-Nuclear (1990)

^cDaphnid - Testing was performed on either Daphnia magna (most acute tests) or Ceriodaphnia dubia (all chronic tests and some acute tests).

^dNA Not applicable. - Chronic test could not be performed, due to excessive or complete mortality of the test organisms.

^ePart. mort. (Partial mortality) - Exposure to the effluent was lethal to some, but not all, of the test organisms.

^f100% mort. (100% mortality) - Exposure to the effluent was lethal to all of the test organisms.

^gResults of numerous toxicity tests indicate this outfall is toxic at the point of discharge, but is not toxic after mixing with other effluents prior to reaching the receiving stream.

^hNot tested - Toxicity test was not performed, due to adequate characterization of outfall toxicity in previous investigations.

ⁱOutfall exhibits no toxicity at instream waste concentration

A series of toxicity tests conducted on the A-014 outfall in 1990 (Pickett, 1990) indicated chronic toxicity in 9 out of 10 tests at concentrations ranging from 25 to 40% effluent (as compared to an in-stream waste concentration of 86%). However, after flowing down the discharge ditch (0.75 miles) the combined discharges from A-011, A-014, and A-015 showed no evidence of chronic toxicity on any of the 10 sampling dates. Similarly, chronic toxicity tests conducted on water samples collected from the receiving stream (Tim's Branch) after all of the A-Area and M-Area outfalls had mixed indicated no chronic toxicity in the receiving stream.

4.2 B Area Outfalls (T-001, T-005, and T-007)

Of the three outfalls in B-Area, T-001 had no flow at the time of sampling and could not be tested, T-005 showed no evidence of toxicity either before or after dechlorination, and T-007 was acutely toxic, both before and after dechlorination (Table 2). However, toxicity tests performed in 1990 on both chlorinated and dechlorinated samples collected from T-007 showed no evidence of toxicity at that time (Table 4). Therefore, T-007 may be toxic on an intermittent basis.

4.3 C Area Outfalls (C-001, C-003, C-004, and C-004A)

Four outfalls were tested in C Area. Outfall C-001 showed no evidence of either acute or chronic toxicity during the present round of testing (Table 2) or during tests conducted in 1985 (Table 4). Outfall C-003 contained relatively high concentrations of total residual chlorine (up to 2 mg/l), and was acutely toxic after dechlorination (Table 2). The observed toxicity may be due to the dechlorination agent, or possibly to other toxicants present in the outfall. C-003 also showed evidence of toxicity during tests conducted in 1985 (Table 4). Prior to dechlorination, Outfall C-004 was not acutely toxic, but did cause reproductive impairment (Table 2). C-004 also caused reproductive impairment during a test conducted in 1985 (Table 4). Following dechlorination, C-004 was acutely toxic, probably as a result of the dechlorination agent. Outfall C-004A contained high concentrations of chlorine (up to 7 mg/l) and was acutely toxic following dechlorination (Table 2). During tests conducted in 1985, C-004A-DeCl resulted in reproductive impairment, but was not acutely toxic (Table 4). Therefore, the observed acute toxicity in 1991 may either be due to the dechlorination agent, or the toxicity of the effluent may have increased since 1985.

4.4 Central Shops Outfalls (S-002, S-008, S-011, and S-014)

Toxicity tests were performed on Outfalls S-002 and S-011 in Central Shops. Two more outfalls (S-008 and S-014) had no

flow at the time of sampling and could not be tested. Outfall S-008 was recently delisted as an NPDES outfall. Outfall S-002 contained measurable concentrations of chlorine, but passed both the acute and chronic tests, with and without dechlorination, showing no evidence of toxicity (Table 2). This outfall also showed no evidence of toxicity when tested in 1990 (Table 4). Outfall S-011 was acutely toxic to the test organisms following dechlorination (Table 2). After dechlorination, this outfall showed evidence of chronic toxicity, but not acute toxicity in 1985 and showed no evidence of toxicity after dechlorination during toxicity tests conducted in 1990 (Table 4), indicating that further testing is warranted to verify the present test results.

4.5 Railroad Yard Outfall (Y-001)

The one NPDES outfall from the railroad yard (Y-001) had no discharge at the time of sampling (Table 2) and therefore could not be tested. This outfall was recently delisted as an NPDES outfall.

4.6 D Area Outfalls (D-001, D-001A, D-001B, D-001C, and D-006)

Toxicity tests were conducted on four outfalls in D Area; one outfall (D-001B) had no discharge at the time of sampling (Table 2). Outfall D-001 passed both the acute and chronic tests, indicating no evidence of toxicity (Table 2). This outfall also showed no evidence of toxicity in 1990 (Table 4). Outfall D-006 had no total residual chlorine on the first two sampling dates and barely detectable concentrations of chlorine (0.05 mg/l) on the third sampling date. Because chlorine was detected, the effluent sample was dechlorinated. Outfall D-006 passed both the acute and chronic tests following dechlorination (Table 2); it is probable that this outfall would have passed both toxicity tests, even without dechlorination. D-006 also passed both acute and chronic tests in 1990 (Table 4). Outfalls D-001A and D-001C were acutely toxic before and after dechlorination (Table 2) and both exhibited chronic, but not acute toxicity when tested in 1990 (Table 4). However, since both of these outfalls flow into D-001, where they receive substantial dilution from the powerhouse cooling water, and because D-001 showed no evidence of toxicity, no in-stream toxicity would be expected in the receiving stream.

4.7 F Area (F-001, F-002, F-003, F-003A, F-005, F-008, F-008A, F-012, and F-013)

Toxicity tests were conducted on seven outfalls in F Area (Table 2). Two outfalls (F-012 and F-013) had no discharge at the time of sampling and could not be tested. Outfalls

F-002, F-008-DeCl, and F-008A passed both the acute and chronic toxicity tests (Table 2). Outfalls F-001-DeCl, F-003-DeCl, F-003A, and F-005-DeCl were acutely toxic to the test organisms (Table 2). These four outfalls also exhibited evidence of toxicity in tests conducted in 1985 and/or 1990 (Table 4), indicating persistent toxicity.

4.8 Flowing Streams Laboratory Outfalls (FS-001 and FS-002)

The two outfalls from the Savannah River Ecology Laboratory's Aquatic Ecology Laboratory (formerly SRL's Flowing Streams Laboratory) had no flow at the time of sampling; therefore no toxicity tests could be performed on these outfalls. Outfall FS-002 was recently delisted as an NPDES outfall.

4.9 H Area Outfalls (H-002, H-004, H-007, H-008, H-008A, H-012, H-012A, H-016, H-017, and H-018)

Toxicity tests were performed on seven outfalls in H Area. Two additional outfalls (H-017 and H-018) had no flow at the time of sampling (Table 2). H-016 was not tested because the toxicity of the outfall has been well characterized by toxicity tests that have been conducted on a quarterly basis since January 1989. The test results have consistently shown that H-016 is not toxic at the in-stream waste concentration (Specht, 1989; Chem-Nuclear, 1991). Outfall H-007 was the only H-Area outfall that passed both the chronic and acute toxicity tests (Table 2). Outfalls H-008-DeCl and H-012-DeCl both passed the acute test, but failed the chronic test (Table 2). Outfalls H-002, H-004, H-008A and H-012A were all acutely toxic to the test organisms (Table 2). Toxicity tests conducted on these four outfalls in 1985 and/or 1990 also indicate varying degrees of toxicity for each of these outfalls at the time of testing (Table 4).

4.10 K Area Outfalls (K-001, K-006, K-008, K-010, K-011, and K-011A)

Toxicity tests were conducted on each of the six NPDES outfalls in K Area. The K-006 and K-011 outfalls passed both the acute and chronic tests (Table 2). The remaining four outfalls (K-001, K-008, K-010, and K-011A) were all acutely toxic to the test organisms (Table 2). Of these four outfalls, K-008 and K-010 showed no evidence of toxicity during tests conducted in 1985, while K-001 and K-011A both caused reproductive impairment, even after dechlorination, during tests conducted in 1985 (Table 4).

4.11 L Area Outfalls (L-007, L-007A, L-008, and L-010)

Toxicity tests were conducted on effluent from each of the four outfalls in L Area. Outfalls L-007 and L-010 passed both the acute and chronic tests and Outfall L-007A showed no evidence of toxicity following dechlorination (Table 2). Outfall L-008 was acutely toxic to the test organisms, even after dechlorination. This outfall showed no evidence of toxicity during tests conducted in 1985 (Table 4), which indicates either that the source of toxicity is intermittent, or that the toxicity is the outfall has increased since 1985.

4.12 M Area Outfalls (M-004 and M-005)

Toxicity tests were not conducted on effluents from the two M-Area outfalls, because the toxicity of these outfalls has already been adequately characterized. Existing data from five toxicity tests conducted on outfall M-004 (Pickett, 1990) indicate that M-004 exhibited chronic toxicity at concentrations ranging from 1.4 to >8% of its in-stream waste concentration. Additional toxicity tests conducted in 1991 (Pickett, 1991) indicated no chronic toxicity at concentrations up to 2.2% effluent. The M-004 discharge flow rate is currently maintained at less than 2.2% effluent after mixing with outfalls A-011, A-014, A-015 prior to discharge into Tim's Branch. The M-005 outfall discharges groundwater that has been treated by the M-Area air stripper to remove volatile organics. Chronic toxicity tests conducted on M-005 in 1989 indicated chronic toxicity at 50% and 56% effluent (2 tests), as compared to its combined in-stream waste concentration of 37% effluent (Pickett, 1991).

4.13 P Area Outfalls (P-005, P-007, P-013A, and P-019)

Toxicity tests were conducted on four outfalls in P Area. Only P-007 passed both the acute and chronic tests (Table 2). Outfall P-019 passed the acute test, but caused reproductive impairment in the chronic test (Table 2). Reproductive impairment was also reported for this outfall during tests conducted in 1985 (Table 4). Outfall P-013A-DeCl was found to be acutely toxic to the test organisms (Table 2). Outfall P-005 was recently delisted as an NPDES outfall and is no longer of concern.

4.14 S Area Outfalls (DW-001, DW-002, DW-003, and DW-004)

Toxicity tests were conducted on only one outfall in S Area; the remaining three outfalls (DW-001, DW-002, and DW-004) had no discharge at the time of sampling (Table 2). Outfall DW-003 failed the acute test after dechlorination (Table 2). The results of toxicity tests conducted on DW-003 in 1985 and 1990 indicate consistent toxicity at this outfall (Table

4). Toxicity tests conducted on outfall DW-002 in 1990 when the outfall was discharging indicate acute toxicity for DW-002 (Table 4). Outfall DW-001 was recently delisted as an NPDES outfall.

4.15 TNX Outfalls (X-004, X-008, X-011, X-013, X-014)

Toxicity tests were conducted on five outfalls from TNX. Outfall X-004 passed both the acute and chronic tests, indicating no evidence of toxicity at this outfall (Table 2). Outfall X-014 had no total residual chlorine present on the first day of sample collection, so the test was initiated without dechlorination. However, slight amounts of chlorine were present in the samples collected subsequently (0.05 and 0.03 mg/l), so the water was dechlorinated, and the test results were treated as a "dechlorinated" test. However, the small amount of chlorine present in the effluent would not be expected to have any adverse effect after mixing with the Savannah River, where it is diluted by a factor of at least 50,000. Outfalls X-008, X-013, and X-011 all passed the acute tests but failed the chronic tests (Table 2), even with the high in-stream dilution afforded by the Savannah River. A closer examination of the results of the chronic toxicity tests reveals a slight, but statistically significant decrease in the number of young produced in the water containing effluent. However, it is highly unlikely that the decrease resulted from the small amount of effluent (0.0001% to 0.01%) that was added to the test samples. Rather, the difference is more likely due to random variability in the number of young produced in the controls and the treatments. The number of young produced in the controls for these three TNX outfalls ranged from 20.5 to 26.2, while the mean number of young in the treatments ranged from 19.9 to 23.6. However, Outfall X-013 had the highest levels of total residual chlorine (up to 110 mg/l) of the 53 outfalls that were sampled during this investigation. Steps should be taken immediately to regulate the amount of chlorine used at the wastewater treatment plant that discharges to X-013 and the outfall should be periodically tested to confirm that chlorine levels have been reduced to a reasonable level.

5. CONCLUSIONS

Several conclusions can be drawn from these data. First, routine operation of numerous facilities at the SRS produce effluents that are toxic to the test species and are very likely to be adversely impacting the ecosystems of the receiving streams. Most of the outfalls that were identified as producing toxic responses during this study were also found to be toxic in earlier investigations, which suggests persistent toxicity at these outfalls. Additional toxicity testing should be performed at these outfalls, and

if they are found to be toxic, changes in the operation of these facilities, by means of process changes, waste minimization, or effluent treatment may be required to reduce the concentrations of toxic effluent constituents to acceptable levels.

Chlorine is present in potentially lethal concentrations at many of the outfalls on site. Of the 54 outfalls tested during this study, only 10 contained no measurable concentrations of total residual chlorine. Chlorine is widely used because of its excellent disinfectant properties against bacteria. But the same properties that make chlorine an excellent bactericidal agent also make it highly toxic to aquatic organisms at extremely low concentrations. Toxic responses are reported in the literature for total residual chlorine at the present detection limit of 20 ug/l.

The SRS commonly uses chlorine as a disinfectant in potable water systems and sanitary wastewater treatment plants and also as a biocide in cooling systems. However, not only do all of the sanitary wastewater treatment plant effluents and most of the cooling system effluents contain potentially toxic levels of chlorine, but many of the other SRS outfalls contain measurable concentrations of chlorine, probably resulting from the presence of tap water in the effluents.

Many of the SRS sanitary wastewater treatment plants use excessive amounts of total residual chlorine for disinfection. While total residual chlorine levels of two or three mg/l are necessary to ensure that fecal coliform limits are not exceeded, during this study, total residual chlorine concentrations as high as 110 mg/l were recorded in effluents from the sanitary wastewater treatment plants (Table 2). In most instances, these excessive concentrations occur because at most of the sanitary wastewater treatment plants, chlorine is dripped into the wastewater at a constant rate that is sufficient to disinfect the effluent during periods of peak usage, but the dosage rate is independent of the actual rate of flow into the treatment facility. As a result when inflows to a treatment plant are low (i.e. during evenings and weekends), the chlorine concentrations in the effluent increase substantially. Concentrations of total residual chlorine could be greatly reduced at the sanitary wastewater treatment plants by the installation of chlorination systems that respond to changes in inflow rates. However, even with better control of the amount of chlorine used at sanitary wastewater treatment plants and cooling systems, dechlorination of the effluents from many facilities may be needed to eliminate potential in-stream impacts, unless the effluent receives substantial dilution by its receiving stream.

Chlorine is not the only toxicant present in SRS outfalls. Of the 52 outfalls tested, at least 12 were acutely toxic when toxic levels of chlorine were not present in the effluent. Although this study did not include analyses for other potential toxicants, the results of toxicity tests and chemical analyses performed in 1985 indicate that heavy metals may be present in toxic concentrations at a substantial number of SRS outfalls (Environmental and Chemical Sciences, 1986). Metals are commonly found as constituents in metal processing facilities (i.e. M Area), coal ash, and in many industrial chemicals, such as corrosion inhibitors, but it is also possible that toxic levels of some metals (zinc, copper, and lead) may be leaching from galvanized or copper pipe (with lead-soldered joints) used extensively in various plumbing applications at the SRS. The toxicity of most cationic metals is inversely related to water hardness. Because most well water and surface waters on the SRS are very soft, generally having a hardness of <20 mg/l (as CaCO₃), even very low concentrations of metals can be toxic to aquatic organisms. Further investigation is needed to identify the specific toxicants that are responsible for the toxicity observed at many of the outfalls that were identified to be toxic.

6. TOXICITY IDENTIFICATION/REDUCTION OPTIONS

Recent communication with SCDHEC indicates that the new sitewide NPDES permit will probably contain a toxicity testing requirement for pass/fail chronic toxicity tests at the in-stream waste concentration at 17 of the SRS outfalls (R. Weigel, Environmental Protection Department, personal communication). Based on the results of the toxicity tests conducted during this investigation, 12 of these 17 outfalls are likely to fail toxicity tests. If a substantial number of these 17 outfalls are identified as toxic during routine toxicity testing, it is likely that SCDHEC will require more rigorous toxicity testing at additional outfalls in the near future. Therefore it is in the best interest of the Savannah River Site to identify and eliminate the source(s) of toxicity at all NPDES outfalls in a timely manner. A number of strategies can be used to identify the sources of toxicity and to reduce or eliminate toxicity at NPDES outfalls.

6.1 Toxicity Identification Evaluations

Additional toxicity tests should be conducted on all outfalls that showed evidence of acute or chronic toxicity in the toxicity screening program. Where several outfalls enter a common conveyance prior to discharging to a receiving stream, toxicity tests should also be performed on the combined discharge to determine if the toxicity of

individual outfalls is reduced after mixing with other effluents.

For those outfalls that are confirmed to be toxic after additional testing, further investigations will be needed to identify the source(s) of toxicity. Toxicity Identification Evaluations (TIE's) should be initiated on all toxic outfalls, beginning with those outfalls that SCDHEC has indicated will have a toxicity testing requirement in the new sitewide NPDES permit and those outfalls that are acutely toxic. Following completion of TIE's on this group of outfalls, TIE's should also be initiated on outfalls that produced chronic toxicity.

The EPA protocol for conducting TIE's involves separation of an effluent into various fractions, based on the physical and/or chemical nature of toxicants. Effluent fractionation can be performed to separate an effluent sample into different fractions that contain volatile compounds (primarily volatile organics and chlorine), polar and nonpolar non-volatile organics, cationic metals, anionic metals, and ammonia. Toxicity tests are then performed on each of the effluent fractions to determine which class(es) of toxicants are responsible for most of the observed toxicity in an effluent sample. Further testing is done to identify the specific toxicant(s) within a given class of toxicants that is responsible for the observed toxicity, followed by confirmation testing in which the suspected toxicant is removed from an effluent sample and re-added by spiking to confirm that the observed toxicity is due to the suspected toxicant.

The EPA TIE procedures were developed primarily for wastewater treatment plants that may receive mixed wastes from a large number of sources. In this instance, a full TIE, involving complete effluent fractionation, is warranted because the wastewater treatment plant often has little information on the source or identity of a toxicant. Full TIE's are very time consuming and costly because toxicity tests must be performed in each fraction of the effluent. Because most NPDES effluents at the SRS have been characterized to some extent, full TIE's may not be needed at most toxic outfalls. Rather, an abbreviated TIE can be performed by focussing on the class or classes of toxicants that are believed to be the most likely source of the toxicity. For example, toxic organic compounds are not constituents of most SRS outfalls, while metals are found in many SRS effluents. If only the cationic metal portion of a TIE is performed and the results indicate that toxicity has been eliminated, then it is clear that cationic metals were responsible for the observed toxicity. Efforts can then be focussed immediately to identify the cationic metal(s) that are responsible for the observed toxicity and steps can be taken to reduce or eliminate the source of the metals. The

advantage of this approach is a significant savings of time and money. The disadvantages are that: 1) outfalls may contain classes of toxicants that were not believed to be present and therefore may be overlooked initially; and 2) toxicants within different classes that are not toxic by themselves may interact synergistically with one another to produce a toxic response.

6.2 Waste Characterization and Minimization

In order to ensure that NPDES outfalls do not release toxic quantities of chemicals, it is imperative that all of the waste streams that contribute to an NPDES outfall are identified and characterized with respect to the kinds and quantities of chemicals that are routinely or intermittently routed to an outfall. Waste characterization is needed not only to identify chemicals that are used for specific chemical processes, but also to identify miscellaneous off-the-shelf chemical compounds, such as janitorial supplies, that have the potential to cause toxicity. A waste characterization and minimization program for NPDES outfalls has been proposed by the Environmental Protection Department, but has not yet been implemented.

After a chemical inventory has been prepared, which lists the types and quantities of all chemicals routed to an NPDES outfall, the data can be evaluated to determine if the concentrations predicted to occur in a given outfall are likely to be toxic and whether synergistic interactions between effluent constituents would be expected to increase the predicted toxicity of an effluent. The chemical data and release schedules for chemicals that are used intermittently can also be used to pinpoint the source of toxicity in outfalls that are found to be toxic on an intermittent basis. Steps can then be taken to reduce the toxicity of an outfall, either by reducing the amount of a chemical that is used, replacing a toxic chemical with one that is less toxic, or in the instance of some chemicals that discharged intermittently, releasing the chemical over an extended period of time so that effluent concentrations remain below the threshold of toxicity.

Once the composition of an NPDES outfall has been characterized and demonstrated to be non-toxic, any significant changes in the composition of the effluent (i.e. use of a different chemical or a change in the waste streams to an outfall) should be reviewed from a toxicological standpoint and toxicity tests should be performed to document that the change has not increased the toxicity of the effluent.

6.3 Biocides

Chlorine is present in toxic amounts at more than half of the SRS NPDES outfalls that were tested. The amount of chlorine present in the outfalls from the sanitary wastewater treatment plants can be reduced, but not eliminated, by the installation of flow-dependent chlorination systems at all of the sanitary plants. Outfalls that do not mix with other outfalls prior to discharging to a receiving stream and outfalls that discharge to small headwater streams will probably require dechlorination via aeration or chemical treatment in order to meet in-stream limits for chlorine. Other alternatives include the use of alternative forms of disinfection (i.e. ultraviolet light) or consolidation and centralization of sanitary wastewater treatment at a few key locations at the SRS. Centralized waste treatment via the construction and operation of a few modern wastewater treatment plants that include dechlorination or alternate means of disinfection as part of the treatment process would significantly reduce the amount of chlorine released to SRS receiving streams and would also result in a significant reduction in the total number of NPDES outfalls at the SRS. The use of alternative biocides should also be considered for SRS cooling systems.

6.4 Effluent Treatment

The SRS currently has effluent treatment facilities in M Area, F/H Areas and TNX. It is possible that additional effluent treatment facilities will be needed in order to eliminate toxicity at some NPDES outfalls. In most instances, it is anticipated that effluent treatment would involve relatively simple treatment of effluents using existing technologies (i.e. precipitation of metals via pH adjustment or chemical chelation). However, even simple treatment strategies will require capital expenditures and will also increase operationing costs.

6.5 Combination and Relocation of NPDES Outfalls

There are presently 72 NPDES outfalls at the Savannah River site. Most areas have multiple outfalls, and in many instances outfalls are located in reasonable proximity to other outfalls. By combining several outfalls into one outfall, not only would the total number of NPDES outfalls at the SRS be substantially reduced, but in many instances, the outfalls would effectively dilute one another prior to mixing with the receiving stream, thus reducing the potential for toxicity. This approach would also be cost effective if effluent treatment were required, since it may be feasible to route effluents from several outfalls to one effluent treatment facility. Potential disadvantages of this strategy are possible synergistic interactions among

toxicants and increased difficulty in identifying the source of a toxicant if an outfall is found to be toxic.

6.6 Utilization of Larger Receiving Streams

In most instances, NPDES outfalls are currently routed to the nearest natural drainage. As a result, many outfalls discharge to headwater streams that have intermittent or very low discharge and afford little or no in-stream dilution of the effluent. If NPDES outfalls were piped to the main body of a receiving stream or to the Savannah River instead of to small tributaries, greater in-stream dilution of the effluents would result, and many outfalls that are presently toxic because of minimal dilution by the receiving stream would not be toxic at the resulting in-stream waste concentration.

6.7 Periodic Testing of all NPDES Outfalls

After toxicity identification evaluations have been conducted for all toxic outfalls and the sources of toxicity have been eliminated or reduced to acceptable levels, a program should be implemented to retest all NPDES outfalls on a periodic basis to document that the outfalls meet toxicity standards equivalent to those that would be imposed by SCDHEC if toxicity testing were required for regulatory compliance. This approach should ensure that SRS outfalls will be able to meet SCDHEC's toxicity standards for NPDES outfalls when toxicity testing is required for regulatory compliance and may minimize the number of outfalls for which mandatory toxicity testing will be required. In addition, biological surveys should be performed in all receiving streams to determine if effluents are causing measurable impacts to the biota of the receiving streams.

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APPENDIX A

Locations of NPDES Outfalls

3/700 AREA

SCALE

LEGEND

STORM SEWER	STANDARD CATCH BASIN
OPEN DITCHES	SANITARY SEWER
PROCESS SEWER	
STANDARD C-1-C STRAIGHT HEADWELLS	
STANDARD C-1-C WING HEADWELLS	
STANDARD HEADWELLS	

8-0000000000

3/700 AREA

1:1000

STREET LIGHT	—
OPEN SPACE	—
PAVED DRIVE	—
STANDARD G-1-E STALLER BUILDING	—
STANDARD G-1-E TIRE BUILDING	—
STANDARD BUILDING	—
STANDARD GATED ROAD	—
CARTWAY DRIVE	—

IC-00000000

D-001

400-D AREA

1

STUDY SERIES
OF 800 MOTORS
PROCESS SERIES
STANDARD C-1C STALL/RT HEAD/FLY
STANDARD C-1C VMC HEAD/FLY
STANDARD C-1C VMC HEAD/FLY
STANDARD CATCH BASINS
STANDARD CATCH BASINS

400-D AREA

RESEARCH AND DEVELOPMENT

1. Title	Page
2. Author	
3. Date	
4. Revision	
5. Distribution	
6. Remarks	
7. Date	
8. Initials	
9. Signature	
10. Date

F- AREA

LEGEND

STORM SEWER _____
OPEN DITCHES _____
PROCESS SEWER _____
STANDARD C-1-C STRAIGHT HEADWELLS _____
STANDARD C-1-C WING HEADWELLS _____
STANDARD MANHOLES _____
STANDARD CATCH BASINS _____
SANITARY SEWER _____

SOME SAYS	
OF THE INTERESTS	
PROCESSES SOME	
STANDARD C-1-C STAINLESS STEEL	
STANDARD C-1-C WIRE MESHES	
STANDARD MACHINES	
STANDARD CATCH RINGS	
STANDARD LIVES

F- AREA

0 0000 10010
0000 01000
P00000 00000
ST00000 C-1-C ST00000 MAJ00000
ST00000 C-1-C VDC 00000000
ST00000 00000000
ST00000 CATCH 00000
SUMMIT 10700

F- AREA

LEGEND

1. ROOM	2. ROOM	3. ROOM	4. ROOM	5. ROOM	6. ROOM	7. ROOM	8. ROOM	9. ROOM	10. ROOM	11. ROOM	12. ROOM	13. ROOM	14. ROOM	15. ROOM	16. ROOM	17. ROOM	18. ROOM	19. ROOM	20. ROOM	21. ROOM	22. ROOM	23. ROOM	24. ROOM	25. ROOM	26. ROOM	27. ROOM	28. ROOM	29. ROOM	30. ROOM	31. ROOM	32. ROOM	33. ROOM	34. ROOM	35. ROOM	36. ROOM	37. ROOM	38. ROOM	39. ROOM	40. ROOM	41. ROOM	42. ROOM	43. ROOM	44. ROOM	45. ROOM	46. ROOM	47. ROOM	48. ROOM	49. ROOM	50. ROOM	51. ROOM	52. ROOM	53. ROOM	54. ROOM	55. ROOM	56. ROOM	57. ROOM	58. ROOM	59. ROOM	60. ROOM	61. ROOM	62. ROOM	63. ROOM	64. ROOM	65. ROOM	66. ROOM	67. ROOM	68. ROOM	69. ROOM	70. ROOM	71. ROOM	72. ROOM	73. ROOM	74. ROOM	75. ROOM	76. ROOM	77. ROOM	78. ROOM	79. ROOM	80. ROOM	81. ROOM	82. ROOM	83. ROOM	84. ROOM	85. ROOM	86. ROOM	87. ROOM	88. ROOM	89. ROOM	90. ROOM	91. ROOM	92. ROOM	93. ROOM	94. ROOM	95. ROOM	96. ROOM	97. ROOM	98. ROOM	99. ROOM	100. ROOM
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F- AREA

LEGEND

ROOM TYPE	_____
ROOM NUMBER	_____
ROOM NAME	_____
ROOM STATUS	_____
ROOM TYPE	_____
ROOM NUMBER	_____
ROOM NAME	_____
ROOM STATUS	_____
ROOM TYPE	_____
ROOM NUMBER	_____
ROOM NAME	_____
ROOM STATUS	_____

F - AREA

1

17000	SANTS
17001	SPR MITCHS
17002	FACCSB SAMS
17003	STABOBS G-I-C TITACOT REARWELLS
17004	STABOBS G-I-C WING REARWELLS
17005	STABOBS MINORS
17006	CATCH BALLS
17007	STABOBS

**FLOWING STREAMS
LABORATORY**

DATE	10/1/60
BY	J.M. HARRIS
PROJECT	Flowing Streams Laboratory
LOCATION	U.S. Army Medical Center
SCALE	1" = 100'
REVISIONS	1. Initial Design

H-002

H-AREA

LEGEND

- Storm Sewer ————
- Open Ditch ————
- Process Sewer ————
- Standard C-1-C Straight Headwells ————
- Standard C-1-C Wing Headwells ————
- Standard Manholes ————
- Standard Catch Basins ————
- Sanitary Sewers ————

H-007
H-AREA

LEGEND

- Storm Sewer
- Open Ditch
- Process Basin
- Standard C-15 C-15 Manhole
- Standard C-15 C-15 Manhole
- Standard Catch Basin
- Sanitary Sewer

1/4" = 100' - 1/4" = 100'

H-012A

H-AREA

LEGEND	
Storage Tank	Open Area
Perimeter	Perimeter
Standard C-1-C On Right Handside	Standard C-1-C On Left Handside
Standard C-1-C Along Roadside	Standard C-1-C Along Roadside
Standard Catch Basins	Standard Catch Basins
Standard Sewers	Standard Sewers

K AREA

1. NAME	_____
2. DATE	_____
3. DRAWN BY	_____
4. CHECKED BY	_____
5. APPROVED BY	_____
6. TITLE	_____
7. SCALE	_____
8. SHEET NO.	_____
9. TOTAL SHEETS	_____

K-008

K AREA

LEGEND	SYMBOL	DESCRIPTION
1	[Symbol]	EXISTING BUILDING
2	[Symbol]	PROPOSED BUILDING
3	[Symbol]	STREET LIGHT
4	[Symbol]	STREET LIGHT
5	[Symbol]	STREET LIGHT
6	[Symbol]	STREET LIGHT
7	[Symbol]	STREET LIGHT
8	[Symbol]	STREET LIGHT
9	[Symbol]	STREET LIGHT
10	[Symbol]	STREET LIGHT
11	[Symbol]	STREET LIGHT
12	[Symbol]	STREET LIGHT
13	[Symbol]	STREET LIGHT
14	[Symbol]	STREET LIGHT
15	[Symbol]	STREET LIGHT
16	[Symbol]	STREET LIGHT
17	[Symbol]	STREET LIGHT
18	[Symbol]	STREET LIGHT
19	[Symbol]	STREET LIGHT
20	[Symbol]	STREET LIGHT
21	[Symbol]	STREET LIGHT
22	[Symbol]	STREET LIGHT
23	[Symbol]	STREET LIGHT
24	[Symbol]	STREET LIGHT
25	[Symbol]	STREET LIGHT
26	[Symbol]	STREET LIGHT
27	[Symbol]	STREET LIGHT
28	[Symbol]	STREET LIGHT
29	[Symbol]	STREET LIGHT
30	[Symbol]	STREET LIGHT
31	[Symbol]	STREET LIGHT
32	[Symbol]	STREET LIGHT
33	[Symbol]	STREET LIGHT
34	[Symbol]	STREET LIGHT
35	[Symbol]	STREET LIGHT
36	[Symbol]	STREET LIGHT
37	[Symbol]	STREET LIGHT
38	[Symbol]	STREET LIGHT
39	[Symbol]	STREET LIGHT
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42	[Symbol]	STREET LIGHT
43	[Symbol]	STREET LIGHT
44	[Symbol]	STREET LIGHT
45	[Symbol]	STREET LIGHT
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56	[Symbol]	STREET LIGHT
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96	[Symbol]	STREET LIGHT
97	[Symbol]	STREET LIGHT
98	[Symbol]	STREET LIGHT
99	[Symbol]	STREET LIGHT
100	[Symbol]	STREET LIGHT

3/700 AREA

00445

LEGEND

STORM SEWER	—
OPEN DITCHES	—
PROCESS SEWER	—
STANDARD C-1-C STRAIGHT HEADWELLS	—
STANDARD C-1-C WING HEADWELLS	—
STANDARD MANHOLES	—
STANDARD CATCH BASINS	—
SANITARY SEWER	—

SC18900008989

M-005

3/700 AREA

2-216

1	TOOK 1000	_____
2	OF 10 1000	_____
3	PAVED 1000	_____
4	STANDARD C-1-C STRAIGHT ROADWELL	_____
5	STANDARD C-1-C WIDE ROADWELL	_____
6	STANDARD ROADWELL	_____
7	STANDARD CATCH BASIN	_____
8	WASTEWATER TOWER	_____

P-005

P AREA

STATION	10000
DATE	10/10/68
BY	W. J. L. L.
CHECKED BY	W. J. L. L.
DESIGNED BY	W. J. L. L.
CONSTRUCTED BY	W. J. L. L.
MAINTAINED BY	W. J. L. L.
REVISIONS	
NO.	1
DATE	10/10/68

P-019

P AREA

TYPE	STANDARD
DATE	10/1/68
BY	STANDARD
REVISION	1.0
REVISION	2.0
REVISION	3.0
REVISION	4.0
REVISION	5.0
REVISION	6.0
REVISION	7.0
REVISION	8.0
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REVISION	11.0
REVISION	12.0
REVISION	13.0
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REVISION	96.0
REVISION	97.0
REVISION	98.0
REVISION	99.0
REVISION	100.0

STORM SEWER	—
WATER MAIN	—
PROCESS WATER	—
STANDARD C-1 - STRAIGHT HEADWELLS	—
STANDARD C-1 - WING HEADWELLS	—
STANDARD MANHOLES	—
STANDARD RAIN BASINS	—
SANITARY TANKS	—

STORM SHEDS	STRAIGHT HEADWELLS
OPEN DITCHES	WING HEADWELLS
PROCESS SHEDS	STANDARD CATCH BASINS
STANDARD C-11	SANITARY STAIRS
STANDARD C-12	
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STANDARD C-99	
STANDARD C-100	

S-008

TC8 U - AREA

1:1,000

STORM SEWER	—
OPEN DITCHES	—
WATER MAIN	—
STANDARD C-1-C STRAIGHT HEADWELLS	—
STANDARD C-1-C WING HEADWELLS	—
STANDARD MANHOLES	—
STANDARD CATCH BASINS	—
SANITARY SEWER	—

SCHEMATIC

TC&U - AREA

LEGEND

STORM SEWER	STANDARD CATCH BASIN
OPEN DITCHES	SANITARY SEWER
PROCESS SEWERS	
STANDARD C-1-C STREET MANHOLE	
STANDARD C-1-C MANHOLE	
STANDARD MANHOLE	
STANDARD CATCH BASIN	
SANITARY SEWER	

SC-11111111111111111111

TC&U - AREA

LEADS

STUDY SHEET
COW DITCHES
PROCESS SHEET
STANDARD C-I-C STRAIGHT HEADWELLS
STANDARD C-I-C WIDE HEADWELLS
STANDARD MANHOLES
STANDARD CATCH BASINS
SANITARY SEWER

SC11000000-0000

CMX - TNX AREA

2-000

TOON DRESS	_____
WEDD WITCHES	_____
PROCESS TOWER	_____
STANDARD C.I. STANLEY HEADWALLS	_____
STANDARD C.I. WITH HEADWALLS	_____
STANDARD HEADWALLS	_____
STANDARD CATCH BOLTS	_____

WOLFGANG

Y-001

CLASSIFICATION YARD

STORM AREA	
CYR METECS	
PURCHS SUTER	
STANDARD C-1-C STANLEY HEADWILLS	
STANDARD C-1-C WDC HEADWILLS	
STANDARD HAMMOLES	
STANDARD CATCH RASUS	
SANTIAN LEVER	

CONCLUSIONS

APPENDIX B

Major Inputs to NPDES Outfalls

APPENDIX B. Major Inputs to NPDES Outfalls^a

<u>Outfall</u>	<u>Inputs</u>	<u>Receiving Stream</u>
A-001	Cooling water, steam condensate, lab drain waste, stormwater	Tim's Branch
A-003	Cooling water, steam condensate, cooling tower overflow, stormwater	Tim's Branch
A-005	Nonprocess cooling water, steam condensate, animal holding pen water, stormwater	Tim's Branch
A-008	Powerhouse wastewater, water tank overflow, well flush water, stormwater	Tim's Branch
A-011	Well flushing, fire station floor drains, stormwater	Tim's Branch
A-014	Noncontact cooling water, steam condensate, powerhouse wastewater, treated wastewater from M-004 and M-005, stormwater	Tim's Branch
A-015	Treated sanitary wastewater, treated photographic wastewater	Tim's Branch
C-001	Nonprocess cooling water, stormwater	Four Mile Branch tributary
C-003	Nonprocess cooling water, water plant wastewater, powerhouse wastewater, stormwater	Four Mile Branch tributary
C-004	Nonprocess cooling water, treated sanitary wastewater, 186 basin overflow	Four Mile Branch tributary
C-004A	Treated sanitary wastewater	Four Mile Branch tributary (via C-004)
D-001	Cooling water, treated sanitary wastewater raw river water, ash sluice water, stormwater	Beaver Dam Creek
D-001A	Treated sanitary wastewater	Beaver Dam Creek (via D-001)
D-001B	Overflow from coal pile runoff basin	Beaver Dam Creek (via D-001)

APPENDIX B (cont.) Major Inputs to NPDES Outfalls^a

Outfall	Inputs	Receiving Stream
D-001C	Overflow from coal ash disposal basin	Beaver Dam Creek (via D-001)
D-006	Cooling water, powerhouse drain water, stormwater	Savannah River swamp
DW-001	Cement truck washwater, icehouse cooling water, stormwater	Tinker Creek tributary
DW-002	Equipment wash pad wastewater, stormwater	Tinker Creek tributary
DW-003	Treated sanitary wastewater	Upper Three Runs tributary
DW-004	DWPF process wastewater, steam condensate, cooling tower blowdown, treated sanitary wastewater	Upper Three Runs tributary
F-001	Nonprocess cooling water, cooling tower blowdown, stormwater	Upper Three Runs tributary
F-002	Nonprocess cooling water, cooling tower blowdown, stormwater	Upper Three Runs tributary
F-003	Nonprocess cooling water, process water, steam condensate, treated sanitary wastewater, stormwater	Upper Three Runs tributary
F-003A	Treated sanitary wastewater	Upper Three Runs tributary (via F-003)
F-005	Nonprocess cooling water, steam condensate, stormwater	Upper Three Runs tributary
F-008	Cooling water, steam condensate, process wastewater, treated sanitary wastewater, stormwater	Four Mile Branch tributary
F-008A	Treated sanitary wastewater	Four Mile Branch tributary (via F-008)

APPENDIX B (cont.) Major Inputs to NPDES Outfalls^a

<u>Outfall</u>	<u>Inputs</u>	<u>Receiving Stream</u>
F-012	Overflow from stormwater retention basin	Four Mile Branch tributary (via F-008)
F-013	Overflow from cooling water retention basin	Four Mile Branch tributary (via F-008)
FS-001	Discharge from SREL greenhouse laboratory	Upper Three Runs
FS-002	Noncontact cooling water from SREL air conditioners, stormwater runoff	Upper Three Runs
H-002	Nonprocess cooling water, steam condensate, stormwater	Upper Three Runs tributary
H-004	Nonprocess cooling water, steam condensate, stormwater	Upper Three Runs tributary
H-007	Cooling water, cooling tower blowdown, water tank freeze protection runoff, stormwater	Upper Three Runs tributary
H-008	Cooling water, steam condensate, ash basin overflow, water tank overflow, stormwater	Four Mile Branch
H-008A	Ash basin overflow, stormwater	Four Mile Branch (via H-008)
H-012	Nonprocess cooling water, cooling tower and air compressor blowdown, treated sanitary wastewater, stormwater	Four Mile Branch tributary
H-012A	Treated sanitary wastewater	Four Mile Branch tributary (via H012)
H-016	Treated wastewater from F/H Effluent Treatment Facility	Upper Three Runs
H-017	Overflow from stormwater retention basin	Four Mile Branch tributary (via H-012)
H-018	Overflow from cooling water retention basin	Four Mile Branch tributary (via H-012)

APPENDIX B (cont.) Major Inputs to NPDES Outfalls^a

<u>Outfall</u>	<u>Inputs</u>	<u>Receiving Stream</u>
K-001	Nonprocess cooling water, stormwater	Indian Grave Branch
K-006	Powerhouse wastewater, ash basin overflow, stormwater	Indian Grave Branch
K-008	Nonprocess cooling water, stormwater	Indian Grave Branch
K-010	Nonprocess cooling water, reactor building drains, stormwater	Indian Grave Branch
K-011	Reactor cooling water, cooling water overflow, treated sanitary wastewater, reactor coolant and process sewer	Indian Grave Branch
K-011A	Treated sanitary wastewater	Indian Grave Branch (via K-011)
L-007	Reactor cooling water, treated sanitary wastewater, reactor coolant and process sewer, cooling water overflow	Steel Creek (via L Lake)
L-007A	Treated sanitary wastewater	Steel Creek (via L-007)
L-008	Reactor building drains, engine house wastewater, stormwater	Steel Creek (via L Lake)
L-010	Building floor drains, stormwater	Steel Creek (via L Lake)
M-004	M-Area Liquid Effluent Treatment Facility	Tim's Branch (via A-014)
M-005	M-Area air stripper	Tim's Branch (via A-014)
P-005	Ash basin overflow, powerhouse drains, service cooling water, stormwater	Meyers Branch tributary
P-007	Nonprocess cooling water, powerhouse wastewater, stormwater	Meyers Branch tributary
P-013A	Treated sanitary wastewater	Steel Creek

APPENDIX B (cont.) Major Inputs to NPDES Outfalls^a

Outfall	Inputs	Receiving Stream
P-019	Reactor cooling water, reactor building process sewer, engine house wastewater, cooling water overflow, stormwater	Par Pond
S-002	Nonprocess cooling water, steam cleaning pad and vehicle wash area wastewater, stormwater	Four Mile Branch tributary
S-008	Nonprocess cooling water from process heat exchanger facility	Pen Branch tributary
S-011	Treated sanitary wastewater, photographic wastes from construction x-ray processing	Pen Branch tributary
S-014	Air conditioner condensate, floor drain wastewater, stormwater	Four Mile Branch tributary
T-001	Wastewater from SREL artificial streams lab, stormwater	Upper Three Runs tributary
T-005	Neutralized laboratory wastewater, laboratory autoclave wastewater, stormwater	Upper Three Runs tributary
T-007	Treated sanitary wastewater	Upper Three Runs tributary
X-004	Nonprocess cooling water, steam condensate, stormwater	Savannah River
X-008	Nonprocess cooling water, cooling tower blowdown, domestic well overflow, treated sanitary wastewater, treated process water, stormwater	Savannah River
X-011	Noncontact cooling water, stormwater	Savannah River
X-013	Treated sanitary wastewater	Savannah River (via X-008)
X-014	Treated wastewater from TNX effluent treatment plant	Savannah River (via X-008)
Y-001	Office wastewater, wastewater from locomotive shop, stormwater	Meyers Branch

^aSource: Du Pont (1988).

APPENDIX C

Toxicity Test Reports

Comments: *TRC measured in laboratory. Test terminated after 24 hours
due to complete mortality in the effluent concentration.

Rep	Control		(100) % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

Pass/Fail Test Results% MortalityYoung/Female

Control:
 (100)% Effluent:
 Statistical Test:
 Pass/Fail:

0%
 100%
 FISHER's
 FAIL

NA
 NA
 NA
 NA

Comments: *TRC measured in laboratory. Test terminated after 24 hours
due to complete mortality in the effluent concentration.

NPDES Outfall: A-003

Rep	Control		(100) % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

Pass/Fail Test Results

% Mortality

Young/Female

Control:
 (100)% Effluent:
 Statistical Test:
 Pass/Fail:

0%
 100%
 FISHER'S
 FAIL

NA
 NA
 NA
 NA

Facility: Westinghouse Savannah River Company

NPDES Outfall: A-005

Laboratory: NORMANDEAU Cert. No.: 87075 Exp. Date: SPECIAL ISSUE

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.3 ° IWC: 100%

Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal

Started (date/time): 7-10-91/1515 Ended (date/time): 7-13-91

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (mS/cm)

20% MiliQ/Perrier 64.0 80.0 190

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk Hard Cond TRC # Renewals
(mg/L) (mg/L) (mS/cm) (ppm)

1	<u>7-10-91</u> / <u>1040 h</u>	<u>29.0</u>	<u>4.0</u>	<u>90.0</u>	<u>0.04</u> *	<u>2</u>
2	<u>7-12-91</u> / <u>h</u>	<u>15.0</u>	<u>4.0</u>	<u>80.0</u>	<u>1.05</u> *	<u>NA</u>
3	<u>NA</u> / <u>NA h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u> *	<u>NA</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.8	24.0	NA	NA	NA	NA	----
	Initial	7.65	7.67	6.88	NA	NA	NA	NA	----
DO	Final	----	7.68	7.34	7.19	NA	NA	NA	NA
	Initial	7.80	7.80	7.70	NA	NA	NA	NA	----
pH	Final	----	8.10	8.00	8.05	NA	NA	NA	NA

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.3	24.3	24.1	NA	NA	NA	NA	----
	Initial	7.49	8.05	7.22	NA	NA	NA	NA	----
DO	Final	----	7.92	7.20	7.34	NA	NA	NA	NA
	Initial	7.15	7.10	7.10	NA	NA	NA	NA	----
pH	Final	----	7.45	7.40	7.80	NA	NA	NA	NA

Comments: *TRC measured in laboratory. Test terminated on Day 3 due to
complete mortality in the effluent concentration.

NPDES Outfall: A-005

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

Pass/Fail Test Results

% Mortality

Young/Female

Control:
 (100)% Effluent:
 Statistical Test:
 Pass/Fail:

0%
 100%
 FISHER'S
 FAIL

NA
 NA
 NA
 NA

Facility: Westinghouse Savannah River Company

NPDES Outfall: A-005 DeCl

Laboratory: NORMANDEAU Cert. No.: 87075 Exp. Date: SPECIAL ISSUE

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.2 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal

Started (date/time): 7-10-91/1615 Ended (date/time): 7-14-91

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (mS/cm)

20% MiliQ/Perrier 64.0 80.0 190

Sample Type: [X] grab [] hr comp.

<u>Sample #</u>	<u>Date/Time Collected</u>	<u>Alk</u> (mg/L)	<u>Hard</u> (mg/L)	<u>Cond</u> (mS/cm)	<u>TRC</u> (ppm)	<u># Renewals</u>
-----------------	----------------------------	----------------------	-----------------------	------------------------	---------------------	-------------------

1	<u>07-10-91</u> / <u>1040 h</u>	<u>30.0</u>	<u>4.0</u>	<u>135</u>	<u>0.04*</u>	<u>2</u>
2	<u>07-12-91</u> / <u> h</u>	<u>15.0</u>	<u>4.0</u>	<u>950</u>	<u>1.05*</u>	<u>NA</u>
3	<u>NA</u> / <u>NA h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA *</u>	<u>NA</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.8	24.0	24.2	NA	NA	NA	----
	Initial	7.65	7.67	6.88	7.86	NA	NA	NA	----
DO	Final	-----	7.68	7.34	7.19	6.92	NA	NA	NA
	Initial	7.80	7.80	7.70	7.80	NA	NA	NA	----
pH	Final	-----	8.10	8.00	8.05	7.95	NA	NA	NA

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.5	24.6	24.2	24.7	NA	NA	NA	----
	Initial	7.75	8.02	6.82	7.37	NA	NA	NA	----
DO	Final	-----	7.70	7.05	7.29	6.72	NA	NA	NA
	Initial	6.90	7.20	7.30	7.35	NA	NA	NA	----
pH	Final	-----	7.30	7.40	7.75	7.25	NA	NA	NA

Comments: *TRC measured in laboratory. Test terminated on Day 4 due to
complete mortality in the effluent concentration. Sample was dechlori-
nated (TRC <0.02 ppm) with sodium thiosulfate prior to test initiation.

NPDES Outfall: A-005-DeCl

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	Mechanical Death	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	NA
(100)% Effluent:	100%	NA
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.040g/L

Sample 2: 1.05 g/L

Sample 3: NA

Facility: Westinghouse Savannah River Company

NPDES Outfall: A-008

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.1 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 08-27-91/1435 h Ended (date/time): 08-28-91 h

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (μmhos/cm)

20% MilliQ/Perrier 66.0 80.0 195

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk Hard Cond TRC # Renewals
(mg/L) (mg/L) (μmhos/cm) (ppm)

1	<u>08-27-91</u> / <u>h</u>	<u>NA</u>	<u>48.0</u>	<u>900</u>	<u><0.02*</u>	<u>NA</u>
2	<u>NA</u> / <u>NA h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA *</u>	<u>NA</u>
3	<u>NA</u> / <u>NA h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA *</u>	<u>NA</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.3	NA	NA	NA	NA	NA	NA	----
	Final	----	7.62	NA	NA	NA	NA	NA	NA
DO	Initial	7.61	NA	NA	NA	NA	NA	NA	----
	Final	----	7.62	NA	NA	NA	NA	NA	NA
pH	Initial	7.85	NA	NA	NA	NA	NA	NA	----
	Final	----	7.70	NA	NA	NA	NA	NA	NA

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	NA	NA	NA	NA	NA	NA	----
	Final	----	7.76	NA	NA	NA	NA	NA	NA
DO	Initial	7.94	NA	NA	NA	NA	NA	NA	----
	Final	----	7.76	NA	NA	NA	NA	NA	NA
pH	Initial	2.80	NA	NA	NA	NA	NA	NA	----
	Final	----	2.80	NA	NA	NA	NA	NA	NA

Comments: *TRC measured in laboratory. Test terminated on Day 1 due to complete mortality in the IWC.

NPDES Outfall: A-008

Rep	Control		(100) % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	NA
(100)% Effluent:	100%	NA
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: NA

Sample 3: NA

Facility: Westinghouse Savannah River Company

NPDES Outfall: A-011

Laboratory: NORMANDEAU Cert. No.: 87075 Exp. Date: SPECIAL ISSUE

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.1 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal

Started (date/time): 7-12-91/1700 Ended (date/time): 7-13-91

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (mS/cm)

20% MiliQ/Perrier 64.0 79.0 180

Sample Type: [X] grab [] hr comp.

<u>Sample #</u>	<u>Date/Time Collected</u>	<u>Alk</u> (mg/L)	<u>Hard</u> (mg/L)	<u>Cond</u> (mS/cm)	<u>TRC</u> (ppm)	<u># Renewals</u>
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1	<u>07-12-91</u> /	<u>NA h</u>	<u>11.0</u>	<u>6.0</u>	<u>65.0</u>	<u>0.8 *</u>	<u>NA</u>
2	<u>NA</u> /	<u>NA h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA *</u>	<u>NA</u>
3	<u>NA</u> /	<u>NA h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA *</u>	<u>NA</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	NA	NA	NA	NA	NA	NA	----
	Initial	6.88	NA	NA	NA	NA	NA	NA	----
DO	Final	----	7.19	NA	NA	NA	NA	NA	NA
	Initial	7.70	NA	NA	NA	NA	NA	NA	----
pH	Final	----	8.05	NA	NA	NA	NA	NA	NA

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	NA	NA	NA	NA	NA	NA	----
	Initial	6.33	NA	NA	NA	NA	NA	NA	----
DO	Final	----	7.72	NA	NA	NA	NA	NA	NA
	Initial	7.10	NA	NA	NA	NA	NA	NA	----
pH	Final	----	7.50	NA	NA	NA	NA	NA	NA

Comments: *TRC measured in laboratory. Test terminated after 24 hours
due to complete mortality in the effluent concentration.

NPDES Outfall: A-011

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

Pass/Fail Test Results

% Mortality

Young/Female

Control:
 (100)% Effluent:
 Statistical Test:
 Pass/Fail:

0%
 100%
 FISHER'S
 FAIL

NA
 NA
 NA
 NA

Comments: *TRC measured in laboratory. Test terminated on Day 4 due to complete mortality in the effluent concentrations. Sample was dechlorinated (TRC <0.02 ppm) with sodium thiosulfate prior to test initiation.

NPDES Outfall: A-011-Dec1

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	D	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	D	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>10%</u>	<u>NA</u>
(100)% Effluent:	<u>100%</u>	<u>NA</u>
Statistical Test:	<u>FISHER'S</u>	<u>NA</u>
Pass/Fail:	<u>FAIL</u>	<u>NA</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.80g/L

Sample 2: 0.90g/L

Sample 3: NA

NPDES Outfall: A-014

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia **Temp.Range:** 24.0-25.7°C **IWC:** 100%

Test Type: ☐ hr acute; ☒ d chronic; ☐ static ☒ daily-renewal

Started (date/time): 08-27-91/1510 h Ended (date/time): 09-03-91/1500 h

<u>Dilution Water Source</u>	<u>Alk</u> (mg/L)	<u>Hard</u> (mg/L)	<u>Conductivity</u> (μmhos/cm)
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20% MilliQ/Perrier	<u>66.0</u>	<u>80.0</u>	<u>195</u>
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Sample Type: ☒ grab ☐ hr comp.

<u>Sample #</u>	<u>Date/Time Collected</u>	<u>Alk</u> (mg/L)	<u>Hard</u> (mg/L)	<u>Cond</u> (μmhos/cm)	<u>TRC</u> (ppm)	<u># Renewals</u>
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1	<u>08-27-91</u> / <u>h</u>	<u>50.0</u>	<u>8.0</u>	<u>245</u>	<u>0.05*</u>	<u>2</u>
2	<u>08-28-91</u> / <u>1005 h</u>	<u>37.0</u>	<u>10.0</u>	<u>205</u>	<u><0.02*</u>	<u>3</u>
3	<u>08-30-91</u> / <u>1115 h</u>	<u>10.0</u>	<u>13.0</u>	<u>65.0</u>	<u><0.02*</u>	<u>2</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.3	25.0	24.9	25.3	24.1	24.3	25.7	----
	DO								
	Initial	7.61	7.48	7.89	7.27	7.54	7.66	7.32	----
	Final	----	7.62	8.08	7.27	7.43	7.55	7.29	7.55
pH	Initial	7.85	7.70	8.00	8.10	8.05	8.10	8.05	----
	Final	----	7.70	8.20	8.00	8.15	8.15	8.15	8.10

(100) * Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.4	24.5	24.0	24.0	25.5	24.4	24.4	----
	DO								
	Initial	7.57	8.09	8.37	8.09	7.78	7.74	7.92	----
	Final	----	7.90	8.07	7.31	7.29	7.43	7.38	7.47
pH	Initial	7.35	7.15	7.65	7.60	7.65	7.10	7.20	----
	Final	----	7.40	7.85	7.80	7.85	7.80	7.30	7.40

Comments: *TRC measured in laboratory

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	NA	L	NA
2	L	NA	D	NA
3	L	NA	L	NA
4	L	NA	L	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	L	NA
10	L	NA	D	NA
11	L	NA	L	NA
12	L	NA	D	NA
13	L	NA	L	NA
14	L	NA	L	NA
15	L	NA	L	NA
16	L	NA	L	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	NA
(100)% Effluent:	55%	NA
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: NA

Sample 3: NA

Facility: Westinghouse Savannah River Company

NPDES Outfall: A-014 DeCl

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.7 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal

Started (date/time): 08-27-91/1540 h Ended (date/time): 09-03-91/1520 h

Dilution Water Source Alk*(mg/L) Hard*(mg/L) Conductivity*(μmhos/cm)

20% MilliQ/Perrier 64.0 77.0 230

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk* (mg/L) Hard* (mg/L) Cond* (μmhos/cm) TRC (ppm) # Renewals

1 08-27-91 / h 28.0 10.0 355 0.05** 1

2 08-28-91 / 1005 h 37.0 10.0 205 <0.02** 1

3 08-30-91 / 1115 h 10.0 13.0 65.0 <0.02** 1

*Readings reflect the addition of sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.0	24.4	24.9	25.3	24.1	24.3	25.7	----
	Final	----	7.64	8.20	7.27	7.43	7.55	7.29	7.55
DO	Initial	7.75	8.32	7.89	7.27	7.54	7.66	7.32	----
	Final	----	7.64	8.20	7.27	7.43	7.55	7.29	7.55
pH	Initial	7.75	7.45	8.00	8.10	8.05	8.10	8.05	----
	Final	----	7.70	8.10	8.00	8.15	8.15	8.15	8.10

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.6	24.0	24.1	25.5	24.4	24.4	----
	Final	----	7.97	8.15	7.31	7.29	7.43	7.38	7.47
DO	Initial	8.17	7.55	8.37	8.05	7.78	7.74	7.92	----
	Final	----	7.97	8.15	7.31	7.29	7.43	7.38	7.47
pH	Initial	7.25	7.40	7.65	7.65	7.65	7.10	7.20	----
	Final	----	7.55	7.80	7.80	7.85	7.80	7.30	7.40

Comments: **TRC measured in laboratory. Sodium thiosulfate was added to the control and diluent (TRC reduced <0.02ppm) prior to testing and chemistry readings.

NPDES Outfall: A-014-Dec1

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	NA	D	NA
2	D	NA	D	NA
3	L	NA	L	NA
4	L	NA	L	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	L	NA
12	L	NA	L	NA
13	L	NA	L	NA
14	L	NA	L	NA
15	D	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	L	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>10%</u>	<u>NA</u>
(100)% Effluent:	<u>65%</u>	<u>NA</u>
Statistical Test:	<u>FISHER'S</u>	<u>NA</u>
Pass/Fail:	<u>FAIL</u>	<u>NA</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.050 g/L

Sample 2: Not necessary

Sample 3: Not necessary

Comments: *TRC measured in laboratory. Test terminated after 24 hours
due to complete mortality in the effluent concentratiton.

NPDES Outfall: A-015

Rep	Control		(100) % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

Pass/Fail Test Results

% Mortality

Young/Female

Control: 0%

(100)% Effluent: 100%

Statistical Test: FISHER'S

Pass/Fail: FAIL

NA

NA

NA

NA

Comments: *TRC measured in laboratory. Test terminated on Day 3 due to complete mortality in the effluent concentration. Sample was dechlorinated (TRC < 0.02 ppm) via aeration and sodium thiosulfate prior to testing. *measurements not recorded due to laboratory error.

NPDES Outfall: A-015-DeCl

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>0%</u>	<u>NA</u>
(100)% Effluent:	<u>100%</u>	<u>NA</u>
Statistical Test:	<u>FISHER'S</u>	<u>NA</u>
Pass/Fail:	<u>FAIL</u>	<u>NA</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 1.20g/L

Sample 2: NA

Sample 3: NA

Facility: Westinghouse Savannah River Company

NPDES Outfall: C-001

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.9 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 08-27-91/1445 h Ended (date/time): 09-03-91/1450 h

Dilution Water Source Alk*(mg/L) Hard*(mg/L) Conductivity*(μmhos/cm)

20% MilliQ/Perrier 66.0 80.0 195

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk* Hard* Cond* TRC # Renewals
(mg/L) (mg/L) (μmhos/cm) (ppm)

1	<u>08-27-91</u> / <u> </u> h	<u>14.0</u>	<u>27.0</u>	<u>75.0</u>	<u><0.02**</u>	<u>2</u>
2	<u>08-28-91</u> / <u>0950 h</u>	<u>14.0</u>	<u>24.0</u>	<u>85.0</u>	<u><0.02**</u>	<u>3</u>
3	<u>08-30-91</u> / <u>1030 h</u>	<u>18.0 *</u>	<u>16.0 *</u>	<u>750 *</u>	<u>0.03**</u>	<u>2</u>

*Readings reflect addition of sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.3	25.0	24.9	25.3	24.1	24.5	24.6	----
	Final	----	7.62	8.08	7.27	7.43	7.55	7.44	7.45
DO	Initial	7.61	7.48	7.89	7.27	7.54	7.92	8.59	----
	Final	----	7.62	8.08	7.27	7.43	7.55	7.44	7.45
pH	Initial	7.85	7.70	8.00	8.10	8.05	7.90	7.95	----
	Final	----	7.70	8.20	8.00	8.15	8.15	8.15	8.20

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.6	24.6	24.1	24.1	25.9	24.3	24.5	----
	Final	----	7.55	8.07	7.16	7.09	7.35	7.42	7.36
DO	Initial	7.10	7.74	8.04	7.91	7.45	7.61	8.08	----
	Final	----	7.55	8.07	7.16	7.09	7.35	7.42	7.36
pH	Initial	6.65	6.60	6.90	6.75	7.10	7.30	7.45	----
	Final	----	7.10	7.30	7.30	7.40	7.40	7.60	6.10

Comments: **TRC measured in laboratory. Sodium thiosulfate was added to
to Sample #3 prior to testing and chemistry readings. (TRC reduced to
<0.02ppm.)

NPDES Outfall: C-001

Rep	Control		(100) % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	26	L	12
2	L	27	L	26
3	L	2	L	33
4	L	17	D	30
5	L	13	D	17
6	L	12	D	14
7	D	13	L	10
8	D	8	L	13
9	L	15	L	17
10	L	19	L	11
11	L	16	D	13
12	L	7	L	16
13	L	14	MECHANICAL DEATH	NA
14	L	14	L	7
15	L	24	L	10
16	L	26	D	5
17	L	14	D	4
18	D	13	L	25
19	L	16	L	23
20	L	14	L	6

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>15%</u>	<u>15.5</u>
(100)% Effluent:	<u>30%</u>	<u>15.4</u>
Statistical Test:	<u>FISHER'S</u>	<u>T-TEST</u>
Pass/Fail:	<u>PASS</u>	<u>PASS</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: Not necessary

Sample 2: Not necessary

Sample 3: 0.030 g/L

Laboratory: NORMANDEAU Cert. No.: 87075 Exp. Date: SPECIAL ISSUE

Started (date/time): 7-16-91/1545 h Ended (date/time): 7-23-91/1645 h

20% MiliQ/Perrier	<u>59.0</u>	<u>81.0</u>	<u>200</u>
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Sample Type: ☒ grab ☐ hr comp.

1	<u>07-15-91</u>	<u>/ 1330 h</u>	<u>4.0</u>	<u>16.0</u>	<u>100</u>	<u>0.04*</u>	<u>2</u>
2	<u>07-17-91</u>	<u>/ h</u>	<u>5.0</u>	<u>14.0</u>	<u>70</u>	<u>0.02*</u>	<u>3</u>
3	<u>07-19-91</u>	<u>/ h</u>	<u>4.0</u>	<u>14.0</u>	<u>80</u>	<u>0.02*</u>	<u>2</u>

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.3	24.2	24.2	24.4	24.3	25.3	----
	DO								
	Initial	8.68	7.73	7.31	7.87	7.17	7.33	8.09	----
	Final	----	7.37	7.25	7.29	7.71	7.57	7.62	8.04
pH	Initial	7.50	7.70	7.80	7.60	7.80	7.90	7.40	----
	Final	----	8.00	8.15	7.85	8.10	8.10	7.80	7.90

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.1	24.5	24.0	24.4	24.1	24.9	----
	DO								
	Initial	8.65	7.45	7.16	7.84	7.32	7.10	7.98	----
	Final	----	7.63	7.11	7.29	7.10	7.57	7.10	7.62
pH	Initial	6.50	7.20	6.75	6.50	6.20	6.80	6.50	----
	Final	----	7.30	7.40	7.05	7.50	6.90	4.00	4.10

Comments: *TRC measured in laboratory. Sodium thiosulfate was added to the control and effluent (TRC reduced to <0.02 ppm) prior to testing.

NPDES Outfall: C-001-Dec1

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	6	D	0
2	L	7	D	12
3	L	6	L	18
4	L	5	L	18
5	L	8	D	10
6	MECHANICAL DEATH	NA	D	0
7	L	6	D	13
8	L	4	L	6
9	L	12	D	9
10	L	13	D	14
11	L	5	L	15
12	L	5	L	25
13	L	7	D	12
14	L	6	D	2
15	L	8	D	0
16	L	5	D	0
17	L	9	D	10
18	L	6	D	0
19	L	9	L	15
20	L	0	L	12

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	6.68
(100)% Effluent:	65%	9.55
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample: 1 0.050g/L

Sample: 2 0.032g/L

Sample: 3 0.024g/L

Facility: Westinghouse Savannah River Company

NPDES Outfall: C-003 DeCl

Laboratory: NORMANDEAU Cert. No.: 87075 Exp. Date: SPECIAL ISSUE

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-24.2 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal

Started (date/time): 7-16-91/1510 Ended (date/time): 7-18-91

Dilution Water Source Alk* (mg/L) Hard* (mg/L) Conductivity* (mS/cm)

20% MiliQ/Perrier 60.0 84.0 600

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk* (mg/L) Hard* (mg/L) Cond* (mS/cm) TRC (ppm) # Renewals

1	<u>07-15-91 / 1300 h</u>	<u>4.0</u>	<u>24.0</u>	<u>1400</u>	<u>1.90**</u>	<u>NA</u>
2	<u>NA / NA h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>
3	<u>NA / NA h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>

*Chemistry readings reflect addition of sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.2	24.4	NA	NA	NA	NA	NA	----
	Final	----	7.48	7.32	NA	NA	NA	NA	NA
DO	Initial	8.68	7.52	NA	NA	NA	NA	NA	----
	Final	----	7.48	7.32	NA	NA	NA	NA	NA
pH	Initial	7.50	7.70	NA	NA	NA	NA	NA	----
	Final	----	8.10	8.10	NA	NA	NA	NA	NA

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.4	NA	NA	NA	NA	NA	----
	Final	----	7.57	7.71	NA	NA	NA	NA	NA
DO	Initial	8.74	7.39	NA	NA	NA	NA	NA	----
	Final	----	7.57	7.71	NA	NA	NA	NA	NA
pH	Initial	6.80	7.00	NA	NA	NA	NA	NA	----
	Final	----	7.60	7.60	NA	NA	NA	NA	NA

Comments: **TRC measured in laboratory. Test terminated after 24 hours due to complete mortality in the effluent concentration. TRC was reduced via aeration and sodium thiosulfate added to control and effluent (TRC reduced to < 0.02 ppm) prior to testing.

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>0%</u>	<u>NA</u>
(100)% Effluent:	<u>100%</u>	<u>NA</u>
Statistical Test:	<u>FISHER'S</u>	<u>NA</u>
Pass/Fail:	<u>FAIL</u>	<u>NA</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 1.90g/L

Sample 2: NA

Sample 3: NA

Facility: Westinghouse Savannah River Company

NPDES Outfall: C-004

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.1-25.7 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 08-27-91/1410 h Ended (date/time): 09-03-91/1440 h

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (µmhos/cm)

20% MilliQ/Perrier 66.0 80.0 195

Sample Type: [X] grab [] hr comp.

Sample #	Date/Time Collected	Alk (mg/L)	Hard (mg/L)	Cond (µmhos/cm)	TRC (ppm)	# Renewals
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1	<u>08-27-91</u> / <u> </u> h	<u>14.0</u>	<u>17.0</u>	<u>65.0</u>	<u>0.03*</u>	<u>2</u>
2	<u>08-28-91</u> / <u>0935h</u>	<u>14.0</u>	<u>20.0</u>	<u>70.0</u>	<u><0.02*</u>	<u>3</u>
3	<u>08-30-91</u> / <u>1055h</u>	<u>15.0</u>	<u>15.0</u>	<u>70.0</u>	<u>0.04*</u>	<u>2</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.3	25.0	24.9	25.3	24.1	24.3	25.7	----
	Initial	7.61	7.48	7.89	7.27	7.54	7.66	7.32	----
DO	Final	----	7.62	8.08	7.27	7.43	7.55	7.29	7.55
	Initial	7.85	7.70	8.00	8.10	8.05	8.10	8.05	----
pH	Final	----	7.70	8.20	8.00	8.15	8.15	8.15	8.10

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.6	24.7	24.1	24.2	24.1	24.7	24.6	----
	Initial	7.44	8.34	8.30	7.94	8.44	7.88	8.20	----
DO	Final	----	7.90	7.92	7.33	7.29	7.43	7.34	7.41
	Initial	7.10	6.90	7.10	7.10	7.00	7.00	7.20	----
pH	Final	----	7.25	7.35	7.40	7.50	7.50	7.45	7.40

Comments: *TRC measured in laboratory

Rep	Control		(100) % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	32	L	30
2	L	20	L	30
3	L	34	L	23
4	L	26	L	21
5	L	31	L	32
6	L	31	D	6
7	L	26	L	21
8	L	29	D	19
9	L	22	L	28
10	L	28	L	23
11	MECHANICAL DEATH	NA	D	7
12	L	23	L	20
13	L	32	L	45
14	L	30	L	22
15	L	23	L	20
16	D	4	L	7
17	L	30	L	31
18	L	29	L	2
19	L	28	L	21
20	L	34	L	11

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	5.3%	27.1
(100)% Effluent:	15%	20.9
Statistical Test:	FISHER'S	T-TEST
Pass/Fail:	PASS	FAIL

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: NA

Sample 3: NA

NPDES Outfall: C-004 DeClLaboratory: NORMANDEAU

Cert. No.: 91079 Exp. Date: 02-01-93

Exp. Date: 02-01-93

Test Type: [] nr acute; [7] d chronic; _____ static X daily-renewal

Started (date/time): 08-27-91/1545 h Ended (date/time): 09-03-91/1530 h

Alk* (mg/L)

Hard* (mg/L)Conductivity* ($\mu\text{mhos/cm}$)

64.0

82.0

245

[] hr comp.

Alk*
(mg/L)

Hard*
(mg/L)

Cond*
($\mu\text{mhos/cm}$)

TRC
(ppm)

Renewals

1 08-27-91 / h 16.0 14.0 235 0.03** 2

2	08-28-91 / 0935 h	14.0	20.0	70.0	<0.02**	3
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3	<u>08-30-91</u>	<u>/ 1055 h</u>	<u>18.0</u>	<u>14.0</u>	<u>700</u>	<u>0.04**</u>	<u>2</u>
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*Readings reflect addition of sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.5	24.8	24.9	25.3	24.1	24.0	25.3	----
	DO								
	Initial	7.79	8.37	7.89	7.27	7.54	8.01	8.13	----
	Final	----	7.90	8.15	7.27	7.43	7.55	7.47	7.44
pH	Initial	7.80	7.50	8.00	8.10	8.05	7.75	7.95	----
	Final	----	7.80	8.05	8.00	8.15	8.15	8.15	8.10

(100) * Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.2	24.7	24.1	24.4	24.1	24.7	24.5	----
	DO	Initial	8.12	7.77	8.30	8.00	8.44	7.57	7.73
	Final	----	7.60	7.93	7.33	7.29	7.43	7.25	7.16
pH	Initial	7.00	7.25	7.10	7.10	7.00	7.40	7.45	----
	Final	----	7.25	7.65	7.40	7.50	7.50	7.55	6.10

Comments: **TRC measured in laboratory. Sodium thiosulfate was added to the control and effluent (TRC reduced to <0.02ppm) prior to testing and chemistry readings.

NPDES Outfall: C-004-DeCl

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	10	L	9
2	L	17	D	9
3	L	6	D	12
4	L	8	D	11
5	D	5	D	13
6	D	10	D	12
7	D	16	L	9
8	D	13	L	10
9	L	15	L	17
10	L	15	D	2
11	D	5	D	12
12	D	8	L	13
13	D	9	L	10
14	L	9	MECHANICAL DEATH	NA
15	L	5	D	7
16	L	13	D	10
17	L	16	D	6
18	D	14	D	2
19	L	16	D	11
20	L	11	D	12

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	40%	11.0
(100)% Effluent:	68.4%	9.8
Statistical Test:	FISHER'S	T-TEST
Pass/Fail:	PASS	PASS

Mortality was not significantly ($p=0.05$) different when compared using Fisher's exact test.

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.030 g/L

Sample 2: Not Necessary

Sample 3: 0.040 g/L

Facility: Westinghouse Savannah River Company

NPDES Outfall: C-004A DeCl

Laboratory: NORMANDEAU Cert. No.: 87075 Exp. Date: SPECIAL ISSUE

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-26.0 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal

Started (date/time): 7-16-91/1500 Ended (date/time): 7-18-91

Dilution Water Source Alk * (mg/L) Hard * (mg/L) Conductivity * (mS/cm)

20% MiliQ/Perrier 60.0 80.0 2600

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk * (mg/L) Hard * (mg/L) Cond * (mS/cm) TRC (ppm) # Renewals

1	<u>07-15-91 / 1340 h</u>	<u>109</u>	<u>36.0</u>	<u>3150</u>	<u>7.0</u> **	<u>NA</u>
2	<u>NA / NA h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>
3	<u>NA / NA h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>

*Chemistry readings reflect addition of sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	26.0	24.4	NA	NA	NA	NA	NA	----
	Final	----	7.63	7.29	NA	NA	NA	NA	NA
DO	Initial	8.33	7.53	NA	NA	NA	NA	NA	----
	Final	----	7.63	7.29	NA	NA	NA	NA	NA
pH	Initial	7.60	7.70	NA	NA	NA	NA	NA	----
	Final	----	8.00	8.00	NA	NA	NA	NA	NA

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.1	24.0	NA	NA	NA	NA	NA	----
	Final	----	7.48	7.22	NA	NA	NA	NA	NA
DO	Initial	8.68	7.42	NA	NA	NA	NA	NA	----
	Final	----	7.48	7.22	NA	NA	NA	NA	NA
pH	Initial	8.20	8.30	NA	NA	NA	NA	NA	----
	Final	----	8.70	8.78	NA	NA	NA	NA	NA

Comments: **TRC measured in laboratory. Test terminated on Day 2 due to complete mortality in the effluent concentration, and partial control mortality. TRC was reduced via aeration and sodiumthiosulfate added to control and effluent (TRC reduced to <0.02ppm) prior to testing.

NPDES Outfall: C-004A-DeCl

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	D	NA	D	NA
2	L	NA	D	NA
3	D	NA	D	NA
4	D	NA	D	NA
5	D	NA	D	NA
6	D	NA	D	NA
7	D	NA	D	NA
8	D	NA	D	NA
9	D	NA	D	NA
10	D	NA	D	NA
11	L	NA	D	NA
12	D	NA	D	NA
13	D	NA	D	NA
14	D	NA	D	NA
15	D	NA	D	NA
16	D	NA	D	NA
17	D	NA	D	NA
18	D	NA	D	NA
19	L	NA	D	NA
20	D	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	85%	NA
(100)% Effluent:	100%	NA
Statistical Test:	NA	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 3.50g/L

Sample 2: NA

Sample 3: NA

Comments: *TRC measured in laboratory

NPDES Outfall: D-001

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	29	L	22
2	L	10	L	21
3	L	26	L	28
4	L	24	L	22
5	L	25	L	24
6	L	27	D	23
7	L	15	L	25
8	L	28	L	29
9	L	30	L	22
10	L	23	L	24
11	L	20	L	16
12	L	24	L	21
13	L	19	L	20
14	L	28	L	26
15	L	23	L	24
16	L	25	MECHANICAL DEATH	NA
17	L	29	L	25
18	L	29	L	30
19	L	28	L	26
20	L	24	L	24

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	24.3
(100)% Effluent:	5.3%	23.7
Statistical Test:	FISHER'S	T-TEST
Pass/Fail:	PASS	PASS

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: NA

Sample 3: NA

Facility: Westinghouse Savannah River Company

NPDES Outfall: D-001 DeCl

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp.Range: 24.0-25.0 °C IWC: 101%

Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal

Started (date/time): 08-13-91/1420 h Ended (date/time): 08-18-91/ h

Dilution Water Source Alk*(mg/L) Hard*(mg/L) Conductivity*(µmhos/cm)

20% MilliQ/Perrier 65.0 78.0 230

Sample Type: [X] grab [] hr comp.

<u>Sample #</u>	<u>Date/Time Collected</u>	<u>Alk</u> (mg/L)	<u>Hard</u> (mg/L)	<u>Cond</u> (µmhos/cm)	<u>TRC</u> (ppm)	<u># Renewals</u>
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1	<u>08-12-91 / 1148 h</u>	<u>38.0</u>	<u>28.0</u>	<u>205</u>	<u>0.05**</u>	<u>2</u>
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2	<u>08-14-91 /</u> h	<u>7.0</u>	<u>16.0</u>	<u>315</u>	<u>0.08**</u>	<u>3</u>
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3	<u>08-16-91 /</u> h	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>
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*Readings reflects addition of sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.1	24.7	24.5	24.8	24.5	NA	NA	----
	Initial	7.73	7.95	7.68	7.26	8.40	NA	NA	----
DO	Final	----	7.47	7.45	7.31	7.54	7.05	NA	NA
	Initial	7.75	7.60	7.80	7.25	7.50	NA	NA	----
pH	Final	----	8.00	7.90	7.70	7.55	7.70	NA	NA

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.0	24.2	24.9	24.9	24.4	NA	NA	----
	Initial	7.60	7.74	7.34	7.51	8.45	NA	NA	----
DO	Final	----	7.51	6.58	7.28	5.65	5.76	NA	NA
	Initial	7.10	6.85	7.10	6.40	6.70	NA	NA	----
pH	Final	----	7.40	5.85	7.15	5.50	4.40	NA	NA

Comments: **TRC measured in laboratory. Test terminated on Day 5 due to mortalities in the IWC. Sodium thiosulfate added to the control and effluent (TRC reduced to <0.02ppm) prior to test and chemistry readings.

NPDES Outfall: D-001-DeCl

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	L	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	D	NA	D	NA
8	D	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	10%	NA
(100)% Effluent:	95%	NA
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.051 g/L

Sample 2: 0.080 g/L

Sample 3: NA

Comments: *TRC measured in laboratory. Test terminated on Day 3 due to complete mortality in the IWC.

NPDES Outfall: D-001A

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

Pass/Fail Test Results

% Mortality

Young/Female

Control:	0%	NA
(100)% Effluent:	100%	NA
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: NA

Sample 3: NA

ity: Westinghouse Savannah River Company

Outfall: D-001A DeCL

actory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Organism: Ceriodaphnia dubia Temp.Range: 24.0-25.4 °C IWC: 100%

Type: [] hr acute; [7] d chronic; ___ static X daily-renewal

ed (date/time): 08-13-91/1430 h Ended (date/time): 08-16-91 h

ion Water Source Alk*(mg/L) Hard*(mg/L) Conductivity*(μmhos/cm)

illiQ/Perrier 52.0 64.0 235

e Type: [X] grab [] hr comp.

e # Date/Time Collected Alk* (mg/L) Hard* (mg/L) Cond* (mS/cm) TRC (ppm) # Renewals

08-12-91	/ 1135 h	186	36.0	650	0.03**	2
08-14-91	/ h	162	36.0	4600	7.5 **	1
08-16-91	/ h	NA	NA	NA	NA **	NA

ngs reflect addition of sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
emp	Initial	24.0	24.5	24.5	NA	NA	NA	NA	----
DO	Initial	6.58	8.04	8.17	NA	NA	NA	NA	----
	Final	----	7.41	7.02	7.44	NA	NA	NA	NA
pH	Initial	7.70	7.70	7.85	NA	NA	NA	NA	----
	Final	----	7.85	8.00	7.85	NA	NA	NA	NA

(100) % Effluent

Day		0	1	2	3	4	5	6	7
omp	Initial	24.0	25.4	24.4	NA	NA	NA	NA	----
DO	Initial	7.51	7.72	6.88	NA	NA	NA	NA	----
	Final	----	7.64	7.24	5.77	NA	NA	NA	NA
pH	Initial	8.20	8.10	8.10	NA	NA	NA	NA	----
	Final	----	8.50	8.40	6.00	NA	NA	NA	NA

nts:***TRC measured in laboratory. Test terminated on Day 3 due to
te mortality in the IWC and partial mortality in the control.
a thiosulfate was added to the control and effluent (TRC reduced
.02ppm) prior to testing and chemistry readings.

NPDES outfall: D-001A-Dec1

Rep	Control		(100) % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	NA	D	NA
2	D	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	D	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	D	NA	D	NA
14	L	NA	D	NA
15	D	NA	D	NA
16	D	NA	D	NA
17	D	NA	D	NA
18	D	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	35%	NA
(100)% Effluent:	100%	NA
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.030 g/L

Sample 2: 7.500 g/L

Sample 3: NA

Facility: Westinghouse Savannah River Company

NPDES Outfall: D-001C DecI

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.8 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 08-13-91/1440 h Ended (date/time): 08-20-91/1540 h

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (µmhos/cm)

20% MilliQ/Perrier 64.0 80.0 190

Sample Type: [X] grab [] hr comp.

<u>Sample #</u>	<u>Date/Time Collected</u>	<u>Alk</u> (mg/L)	<u>Hard</u> (mg/L)	<u>Cond</u> (µmhos/cm)	<u>TRC</u> (ppm)	<u># Renewals</u>
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1	<u>08-12-91 / 1116 h</u>	<u>4.0</u>	<u>31.0</u>	<u>220</u>	<u><0.02*</u>	<u>2</u>
2	<u>08-14-91 / h</u>	<u>4.0</u>	<u>26.0</u>	<u>405</u>	<u>0.03*</u>	<u>3</u>
3	<u>08-16-91 / h</u>	<u>6.0</u>	<u>30.0</u>	<u>210</u>	<u><0.02*</u>	<u>2</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.8	24.5	24.1	25.0	24.3	24.5	24.3	----
	Final	----	7.52	7.28	7.27	7.67	7.28	7.30	7.66
DO	Initial	7.34	7.73	7.72	7.54	8.49	7.76	7.37	----
	Final	----	7.52	7.28	7.27	7.67	7.28	7.30	7.66
pH	Initial	8.00	7.80	7.80	7.35	7.50	7.60	7.80	----
	Final	----	8.05	8.10	7.80	7.60	7.80	7.90	8.00

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.9	24.5	24.1	24.0	24.5	24.7	24.0	----
	Final	----	7.71	7.36	7.36	6.73	2.40	7.30	7.42
DO	Initial	7.57	8.59	7.61	7.63	8.70	7.31	7.84	----
	Final	----	7.71	7.36	7.36	6.73	2.40	7.30	7.42
pH	Initial	6.50	6.65	6.45	6.20	6.40	6.50	6.70	----
	Final	----	6.75	6.80	6.25	4.80	5.80	7.15	6.90

Comments: *TRC measured in laboratory

NPDES Outfall: D-001C-Dec1

Rep	Control		(100) % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	16	L	11
2	L	6	L	17
3	L	25	L	12
4	L	4	L	10
5	L	15	D	0
6	L	19	L	11
7	D	5	L	13
8	L	19	L	10
9	L	16	D	4
10	L	20	D	0
11	L	26	D	0
12	L	18	L	8
13	L	18	D	0
14	L	13	D	0
15	L	0	MECHANICAL DEATH	NA
16	L	11	D	0
17	L	17	D	0
18	L	19	L	10
19	L	25	D	0
20	L	17	D	0

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	5%	15.5
(100)% Effluent:	52.6%	5.6
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	FAIL

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: Not necessary

Sample 2: 0.030 g/L

Sample 3: Not necessary

Facility: Westinghouse Savannah River Company

NPDES Outfall: D-006 DeCl

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.8 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 08-13-91/1435 h Ended (date/time): 08-20-91/1530 h

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (µmhos/cm)

20% MilliQ/Perrier 64.0 80.0 190

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk Hard Cond TRC # Renewals
(mg/L) (mg/L) (µmhos/cm) (ppm)

1	<u>08-12-91/1128 h</u>	<u>12.0</u>	<u>28.0</u>	<u>60.0</u>	<u><0.02*</u>	<u>2</u>
2	<u>08-14-91/ h</u>	<u>14.0</u>	<u>12.0</u>	<u>60.0</u>	<u><0.02*</u>	<u>3</u>
3	<u>08-16-91/ h</u>	<u>8.0</u>	<u>22.0</u>	<u>55.0</u>	<u>0.05*</u>	<u>2</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.8	24.5	24.5	24.0	24.1	24.5	24.3	----
	Initial	7.34	7.73	7.58	7.23	7.72	7.76	7.37	----
DO	Final	----	7.52	7.28	7.45	7.67	7.28	7.34	7.66
	Initial	8.00	7.80	7.95	7.70	7.90	7.60	7.80	----
pH	Final	----	8.05	8.10	7.90	7.60	7.80	7.85	8.00

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.1	24.7	24.3	24.6	24.2	25.1	24.2	----
	Initial	7.58	7.83	7.58	7.14	7.81	7.30	8.32	----
DO	Final	----	7.54	7.30	7.19	7.24	7.37	7.22	7.13
	Initial	6.70	7.70	6.85	6.35	6.50	6.40	6.50	----
pH	Final	----	7.15	6.80	6.95	6.90	6.80	6.80	7.00

Comments: *TRC measured in laboratory

NPDES Outfall: D-006-DeC1

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	27	L	32
2	L	28	L	18
3	L	22	L	20
4	L	30	L	24
5	L	23	L	34
6	L	24	L	22
7	L	30	D	9
8	L	28	L	28
9	L	23	L	22
10	L	27	L	34
11	L	20	L	23
12	L	22	L	22
13	L	24	L	28
14	L	22	L	19
15	L	26	L	28
16	L	20	L	26
17	L	22	L	22
18	L	24	L	27
19	L	25	L	23
20	L	21	L	22

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>0%</u>	<u>24.4</u>
(100)% Effluent:	<u>5%</u>	<u>24.2</u>
Statistical Test:	<u>FISHER'S</u>	<u>T-TEST</u>
Pass/Fail:	<u>PASS</u>	<u>PASS</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: Not necessary

Sample 2: Not necessary

Sample 3: 0.050 g/L

Facility: Westinghouse Savannah River Company

NPDES Outfall: DW-003 DeCl

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Caridodaphnia dubia Temp. Range: 24.0-24.7 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal

Started (date/time): 08-20-91/1400 h Ended (date/time): 08-22-91 h

Dilution Water Source Alk*(mg/L) Hard*(mg/L) Conductivity*(µmhos/cm)

20% MilliQ/Perrier 61.0 75.0 1450

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk* Hard* Cond* TRC # Renewals
(mg/L) (mg/L) (µmhos/cm) (ppm)

1	<u>08-19-91</u>	<u>0915 h</u>	<u>21.0</u>	<u>54.0</u>	<u>2000</u>	<u>1.6**</u>	<u>2</u>
2	<u>NA</u>	<u>NA h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>
3	<u>NA</u>	<u>NA h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>

*Readings reflect addition of sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.2	24.2	NA	NA	NA	NA	NA	----
	Final	----	7.64	8.48	NA	NA	NA	NA	NA
DO	Initial	7.28	7.86	NA	NA	NA	NA	NA	----
	Final	----	7.64	8.48	NA	NA	NA	NA	NA
pH	Initial	8.10	7.90	NA	NA	NA	NA	NA	----
	Final	----	7.60	7.80	NA	NA	NA	NA	NA

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.0	NA	NA	NA	NA	NA	----
	Final	----	6.96	8.44	NA	NA	NA	NA	NA
DO	Initial	7.57	7.23	NA	NA	NA	NA	NA	----
	Final	----	6.96	8.44	NA	NA	NA	NA	NA
pH	Initial	7.20	7.10	NA	NA	NA	NA	NA	----
	Final	----	7.15	7.30	NA	NA	NA	NA	NA

Comments: **TRC measured in laboratory. Test terminated on Day 2 due to complete mortality in the IWC and partial mortality in the control. Sodium thiosulfate was added (TRC reduced to <0.02ppm) prior to testing and chemistry readings.

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	D	NA	D	NA
8	D	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	D	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	D	NA	D	NA
16	D	NA	D	NA
17	D	NA	D	NA
18	D	NA	D	NA
19	L	NA	D	NA
20	D	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	40%	NA
(100)% Effluent:	100%	NA
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 1.602 g/L

Sample 2: NA

Sample 3: NA

Comments: **TRC measured in laboratory. Sodium thiosulfate was added to the control and effluent (TRC reduced to <0.02 ppm) prior to testing and chemistry readings.

NPDES Outfall: F-001-DeCl

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	D	1	D	0
2	L	0	D	0
3	D	1	L	1
4	D	1	D	0
5	D	0	D	0
6	D	1	D	0
7	L	5	D	0
8	D	1	D	2
9	D	0	L	4
10	D	0	D	0
11	D	0	D	0
12	L	1	D	0
13	L	1	D	0
14	D	0	L	2
15	D	0	L	1
16	D	1	D	0
17	L	4	D	0
18	D	1	D	0
19	L	1	D	0
20	L	1	D	0

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>65%</u>	<u>1.0</u>
(100)% Effluent:	<u>80%</u>	<u>0.5</u>
Statistical Test:	<u>NA</u>	<u>NA</u>
Pass/Fail:	<u>NA</u>	<u>NA</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 1.20g/L

Sample 2: 0.600g/L

Sample 3: 0.152g/L

Facility: Westinghouse Savannah River Company

NPDES Outfall: F-002

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-26.0 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 10-15-91/1500 h Ended (date/time): 10-22-91/1600h

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (µmhos/cm)

20% MilliQ/Perrier 62.0 81.0 155

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk (mg/L) Hard (mg/L) Cond (µmhos/cm) TRC (ppm) # Renewals

1	<u>10-14-91 / 0926 h</u>	<u>25.0</u>	<u>5.0</u>	<u>85</u>	<u><0.02*</u>	<u>2</u>
2	<u>10-16-91 / h</u>	<u>26.0</u>	<u>5.0</u>	<u>90</u>	<u><0.02*</u>	<u>3</u>
3	<u>10-18-91 / 1115 h</u>	<u>23.0</u>	<u>10.0</u>	<u>75</u>	<u><0.02*</u>	<u>2</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	26.0	25.5	25.0	24.0	24.7	24.1	24.2	----
	Final	----	7.28	7.81	7.80	7.48	7.99	7.81	7.85
DO	Initial	8.07	7.54	7.77	7.86	8.22	7.99	7.81	----
	Final	----	7.28	7.81	7.80	7.48	7.99	7.81	7.85
pH	Initial	8.10	8.10	7.95	8.00	7.85	8.00	8.15	----
	Final	----	7.95	8.00	8.00	8.00	8.00	8.15	8.00

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.0	24.2	24.6	24.1	25.0	24.2	24.0	----
	Final	----	7.50	7.90	7.72	7.73	7.73	7.82	8.04
DO	Initial	8.32	8.04	7.54	8.59	9.07	8.65	8.84	----
	Final	----	7.50	7.90	7.72	7.73	7.73	7.82	8.04
pH	Initial	6.85	7.60	6.85	7.75	7.45	7.60	7.40	----
	Final	----	7.80	7.55	7.75	7.65	7.10	7.65	7.60

Comments: *TRC measured in laboratory.

NPDES Outfall: F-002

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	25	L	22
2	L	29	L	23
3	L	29	L	34
4	D	32	D	15
5	L	31	L	27
6	L	28	L	30
7	L	34	L	31
8	L	30	L	33
9	L	36	L	36
10	L	37	L	21
11	L	31	L	30
12	L	32	L	34
13	L	43	L	37
14	L	27	L	37
15	L	38	L	24
16	L	25	L	25
17	L	24	L	27
18	L	27	L	29
19	L	21	L	24
20	L	42	L	23

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>5%</u>	<u>31.0</u>
(100)% Effluent:	<u>5%</u>	<u>28.1</u>
Statistical Test:	<u>FISHER'S</u>	<u>t-TEST</u>
Pass/Fail:	<u>PASS</u>	<u>PASS</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: NA

Sample 3: NA

Facility: Westinghouse Savannah River Company

NPDES Outfall: F-003 DeCl

Laboratory: NORMANDEAU Cert. No.: 87075 Exp. Date: SPECIAL ISSUE

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.6 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 7-25-91/1300 h Ended (date/time): 7-26-91

Dilution Water Source Alk*(mg/L) Hard*(mg/L) Conductivity*(mS/cm)

20% MiliQ/Perrier 63.0 104 1700

Sample Type: [X] grab [] hr comp.

Sample #	Date/Time Collected	Alk* (mg/L)	Hard* (mg/L)	Cond* (mS/cm)	TRC (ppm)	# Renewals
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1	<u>07-24-91/</u> <u> </u> h	<u>**</u>	<u>**</u>	<u>**</u>	<u>1.8 ***</u>	<u>NA</u>
2	<u>07-26-91/</u> <u> </u> h	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>0.10 ***</u>	<u>NA</u>
3	<u>07-29-91/</u> <u>0946</u> h	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>

* Chemistry readings reflect addition of sodium thiosulfate.

** Measurements not taken due to laboratory error.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	NA	NA	NA	NA	NA	NA	----
	Initial	7.70	NA	NA	NA	NA	NA	NA	----
DO	Final	----	8.12	NA	NA	NA	NA	NA	NA
	Initial	7.80	NA	NA	NA	NA	NA	NA	----
pH	Final	----	8.10	NA	NA	NA	NA	NA	NA

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.6	NA	NA	NA	NA	NA	NA	----
	Initial	7.83	NA	NA	NA	NA	NA	NA	----
DO	Final	----	7.33	NA	NA	NA	NA	NA	NA
	Initial	8.10	NA	NA	NA	NA	NA	NA	----
pH	Final	----	7.90	NA	NA	NA	NA	NA	NA

Comments: ***TRC measured in laboratory. Test terminated after 24 hours due to complete mortality in the test concentration. Sodium thiosulfate was added to the control and effluent (TRC reduced to <0.02ppm) prior to testing and chemistry readings.

NPDES Outfall: F-003-DeCl

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	NA
(100)% Effluent:	100%	NA
Statistical Test:	NA	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 1.80g/L

Sample 2: NA

Sample 3: NA

Comments: *TRC measured in laboratory. Test terminated on Day 2 due to complete mortality in the test concentration.

NPDES Outfall: F-003A

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

Pass/Fail Test Results

% Mortality

Young/Female

Control:	0%
(100)% Effluent:	100%
Statistical Test:	NA
Pass/Fail:	FAIL

NA
NA
NA
NA

NPDES Outfall: F-005 DeCl

NPDES Outfall: F-005 DeCl

Laboratory: NORMANDEAU Cert. No.: 87075 Exp. Date: SPECIAL ISSUE

Test Organism: Ceriodaphnia dubia Temp. Range: 24.2-24.6 C° IWC: 100%

Test Type: ☐ hr acute; ☒ 7 d chronic; ☐ static ☒ daily-renewal

Started (date/time): 7-25-91/1315 Ended (date/time): 7-26-91

<u>Dilution Water Source</u>	<u>Alk * (mg/L)</u>	<u>Hard * (mg/L)</u>	<u>Conductivity* (mS/cm)</u>
100% DI	0	0	0
100% RO	0	0	0
100% Tap	100	100	100
50% DI + 50% Tap	50	50	50
50% RO + 50% Tap	50	50	50
25% DI + 75% Tap	75	75	75
25% RO + 75% Tap	75	75	75
12.5% DI + 87.5% Tap	87.5	87.5	87.5
12.5% RO + 87.5% Tap	87.5	87.5	87.5

20% MiliQ/Perrier	<u>41.0</u>	<u>112</u>	<u>1600</u>
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Sample Type: ☒ grab ☐ hr comp.

<u>Sample #</u>	<u>Date/Time Collected</u>	<u>Alk*</u> (mg/L)	<u>Hard*</u> (mg/L)	<u>Cond*</u> (mS/cm)	<u>TRC</u> (ppm)	<u># Renewals</u>
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1	<u>07-24-91</u> / <u>h</u>	<u>***</u>	<u>***</u>	<u>***</u>	<u>1.6</u> **	<u>NA</u>
2	<u>07-26-91</u> / <u>h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>
3	<u>07-29-91</u> / <u>0950 h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>

*Chemistry readings reflect addition of sodium thiosulfate.

*** Not measured due to laboratory error.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.6	NA	NA	NA	NA	NA	NA	----
	Final	----	8.08	NA	NA	NA	NA	NA	NA
DO	Initial	7.74	NA	NA	NA	NA	NA	NA	----
	Final	----	8.05	NA	NA	NA	NA	NA	NA
pH	Initial	7.75	NA	NA	NA	NA	NA	NA	----
	Final	----	8.05	NA	NA	NA	NA	NA	NA

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.2	NA	NA	NA	NA	NA	NA	----
	Final	----	7.80	NA	NA	NA	NA	NA	NA
DO	Initial	7.77	NA	NA	NA	NA	NA	NA	----
	Final	----	7.80	NA	NA	NA	NA	NA	NA
pH	Initial	7.10	NA	NA	NA	NA	NA	NA	----
	Final	----	7.60	NA	NA	NA	NA	NA	NA

Comments: **TRC measured in laboratory. Test terminated after 24 hours due to complete mortality in the test concentration. Sodium thiosulfate was added to the control and effluent (TRC reduced to <0.02 ppm) prior to testing.

NPDES Outfall: F-005-DeCl

Rep	Control		() % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	NA
(100)% Effluent:	100%	NA
Statistical Test:	NA	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 1.63g/L

Sample 2: NA

Sample 3: NA

Comments: *TRC measured in laboratory. The second sample was
dechlorinated with sodium thiosulfate. (TRC reduced to <0.02ppm).

NPDES Outfall: F-008-Dec1

Rep	Control		(47) % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	17	L	26
2	L	16	L	30
3	L	22	L	29
4	L	12	L	21
5	L	22	D	18
6	D	35	L	39
7	L	34	L	27
8	L	12	L	25
9	L	16	L	44
10	L	17	L	35
11	L	21	L	28
12	L	21	L	25
13	L	22	L	32
14	L	16	L	43
15	L	34	L	45
16	L	39	L	40
17	L	26	L	30
18	L	20	L	9
19	L	25	L	28
20	L	21	L	33

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	5%	22.4
(47)% Effluent:	5%	30.4
Statistical Test:	FISHER'S	NA
Pass/Fail:	PASS	PASS

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: Not necessary

Sample 2: 0.040 g/L

Sample 3: Not necessary

Facility: Westinghouse Savannah River Company

NPDES Outfall: F-008A

Laboratory: NORMANDEAU Cert. No.: 87075 Exp. Date: SPECIAL ISSUE

Test Organism: Ceriodaphnia dubia Temp.Range: 24.0-25.9 ° IWC: 9%

Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal

Started (date/time): 7-28-91/1340 h Ended (date/time): 8-01-91/1446 h

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (mS/cm)

20% MiliQ/Perrier 66.0 80.0 190

Sample Type: [X] grab [] hr comp.

Sample #	Date/Time Collected	Alk (mg/L)	Hard (mg/L)	Cond (mS/cm)	TRC (ppm)	# Renewals
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1	<u>07-24-91/</u> <u>h</u>	<u>81.0</u>	<u>29.0</u>	<u>450</u>	<u>0.05*</u>	<u>2</u>
2	<u>07-26-91/</u> <u>h</u>	<u>125</u>	<u>32.0</u>	<u>350</u>	<u>1.25*</u>	<u>2</u>
3	<u>07-29-91/</u> <u>h</u>	<u>127</u>	<u>22.0</u>	<u>500</u>	<u>0.6 *</u>	<u>3</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.4	24.2	24.6	25.2	24.0	24.5	24.0	----
	Initial	7.38	7.28	7.50	7.45	7.85	7.52	7.54	----
DO	Final	----	7.35	7.32	7.45	7.01	7.08	7.47	6.63
	Initial	8.00	7.80	8.10	8.00	7.80	7.85	8.05	----
pH	Final	----	8.00	8.10	8.00	7.90	7.90	8.00	8.00

(9) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.6	24.3	24.3	24.1	25.9	24.8	24.9	----
	Initial	7.52	7.30	8.32	7.62	7.68	7.27	7.41	----
DO	Final	----	7.44	7.24	7.33	7.42	6.82	7.28	6.67
	Initial	7.70	7.85	7.75	7.90	7.60	7.80	8.00	----
pH	Final	----	8.10	8.05	8.10	7.80	8.00	8.00	8.05

Comments: *TRC measured in laboratory

NPDES Outfall: F-008A

Rep	Control		(9) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	29	L	22
2	L	29	L	43
3	L	16	L	28
4	L	28	L	22
5	L	17	L	30
6	L	28	L	40
7	L	22	L	35
8	L	15	L	30
9	L	27	D	20
10	L	19	D	12
11	L	18	MECHANICAL DEATH	NA
12	D	5	L	28
13	L	27	L	30
14	L	30	MECHANICAL DEATH	NA
15	L	26	L	41
16	L	25	L	33
17	L	13	L	29
18	L	29	L	38
19	L	27	L	45
20	L	32	L	40

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>5%</u>	<u>23.1</u>
(9) % Effluent:	<u>10%</u>	<u>31.4</u>
Statistical Test:	<u>FISHER'S</u>	<u>NA</u>
Pass/Fail:	<u>PASS</u>	<u>PASS</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: _____

Sample 2: _____

Sample 3: _____

Facility: Westinghouse Savannah River Company

NPDES Outfall: F8-A DeCl

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.4 - 25.9°C IWC: 9*

Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal

Started (date/time): 8-27-91/1520 h Ended (date/time): 9-1-91 h

Dilution Water Source Alk (mg/L)* Hard (mg/L)* Conductivity (µmhos/cm)*

20% MilliQ/Perrier 66.0 282 0.285

Sample Type: [X] grab [] hr comp.

Sample #	Date/Time Collected	Alk* (mg/L)	Hard* (mg/L)	Cond* (µmhos/cm)	TRC* (ppm)	# Renewals
1	<u>08-27-91</u> / <u>h</u>	<u>130</u>	<u>29</u>	<u>1550</u>	<u>10</u> **	<u>2</u>
2	<u>08-28-91</u> / <u>h</u>	<u>264</u>	<u>27</u>	<u>8000</u>	<u>0.02</u> **	<u>2</u>
3	<u>08-30-91</u> / <u>h</u>				**	

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.8	24.6	24.4	24.4	25.8	NA	NA	----
	Final	----	7.68	8.08	7.27	7.26	5.51	NA	NA
DO	Initial	7.42	7.57	7.99	7.55	7.17	NA	NA	----
	Final	----	7.68	8.08	7.27	7.26	5.51	NA	NA
pH	Initial	7.80	7.60	7.90	7.75	8.00	NA	NA	----
	Final	----	7.80	8.15	8.00	8.05	7.25	NA	NA

(9) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.6	24.6	24.6	25.2	25.9	NA	NA	----
	Final	----	7.50	7.48	7.32	6.52	7.19	NA	NA
DO	Initial	7.23	7.58	6.19	7.66	7.70	NA	NA	----
	Final	----	7.50	7.48	7.32	6.52	7.19	NA	NA
pH	Initial	7.80	7.80	7.60	7.80	8.00	NA	NA	----
	Final	----	7.80	8.00	8.05	7.35	8.15	NA	NA

Comments: **TRC measured in laboratory. Sodium thiosulfated was added to the control and effluent (TRC reduced to <0.02 ppm) prior to testing and chemistry readings. Test ended on Day 5 due to complete mortality in IWC

F8-A DeCl

	Control		(9) % Effluent	
Rep	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	0	D	0
2	D	0	D	0
3	D	0	D	0
4	L	0	D	0
5	D	0	D	0
6	D	0	D	0
7	D	0	D	0
8	L	0	D	0
9	L	0	D	0
10	L	0	D	0
11	D	0	D	0
12	D	0	D	0
13	D	0	D	0
14	L	0	D	0
15	D	0	D	0
16	D	0	D	0
17	D	0	D	0
18	D	0	D	0
19	D	0	D	0
20	D	0	D	0

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>70</u>	<u>0</u>
(9) % Effluent:	<u>100</u>	<u>0</u>
Statistical Test:	<u>NA</u>	<u>NA</u>
Pass/Fail:	<u>NA</u>	<u>NA</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 10 g/L then 9% = 0.9 g/L in test sol'n

Sample 2: 0.02 g/L then 9% = 0.002 g/L in test sol'n

Sample 3: NA

Comments: *TRC measured in laboratory. Test terminated after 24 hours
due to complete mortality in the test concentration.

NPDES Outfall: H-002

Rep	Control		(100) % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	NA
(100)% Effluent:	100%	NA
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: _____

Sample 2: _____

Sample 3: _____

Comments: **TRC measured in laboratory. Test terminated on Day 4 due to complete mortality in the test concentration. Sodium thiosulfate was added to the control and effluent (TRC reduced to <0.02 ppm) prior to testing and chemistry readings.

NPDES Outfall: H-002-DeCl

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	MECHANICAL DEATH	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	NA
(100)% Effluent:	100%	NA
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.04 g/L
Sample 2: not necessary
Sample 3: NA

NPDES Outfall: H-004
Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.1-24.6 °C INC: 100%

Test Type: ☐ hr acute; ☒ 7 d chronic; ☐ static ☒ daily-renewal

Started (date/time): 08-06-91/1345 h Ended (date/time): 08-07-91 h

<u>Dilution</u>	<u>Water</u>	<u>Source</u>	<u>Alk</u> (mg/L)	<u>Hard</u> (mg/L)	<u>Conductivity</u> (mS/cm)
1	100	100	100	100	100
2	50	50	50	50	50
3	25	25	25	25	25
4	12.5	12.5	12.5	12.5	12.5
5	6.25	6.25	6.25	6.25	6.25
6	3.125	3.125	3.125	3.125	3.125
7	1.5625	1.5625	1.5625	1.5625	1.5625
8	0.78125	0.78125	0.78125	0.78125	0.78125
9	0.390625	0.390625	0.390625	0.390625	0.390625
10	0.1953125	0.1953125	0.1953125	0.1953125	0.1953125
11	0.09765625	0.09765625	0.09765625	0.09765625	0.09765625
12	0.048828125	0.048828125	0.048828125	0.048828125	0.048828125
13	0.0244140625	0.0244140625	0.0244140625	0.0244140625	0.0244140625
14	0.01220703125	0.01220703125	0.01220703125	0.01220703125	0.01220703125
15	0.006103515625	0.006103515625	0.006103515625	0.006103515625	0.006103515625
16	0.0030517578125	0.0030517578125	0.0030517578125	0.0030517578125	0.0030517578125
17	0.00152587890625	0.00152587890625	0.00152587890625	0.00152587890625	0.00152587890625
18	0.000762939453125	0.000762939453125	0.000762939453125	0.000762939453125	0.000762939453125
19	0.0003814697265625	0.0003814697265625	0.0003814697265625	0.0003814697265625	0.0003814697265625
20	0.00019073486328125	0.00019073486328125	0.00019073486328125	0.00019073486328125	0.00019073486328125
21	9.5367431640625E-05	9.5367431640625E-05	9.5367431640625E-05	9.5367431640625E-05	9.5367431640625E-05
22	4.76837158203125E-05	4.76837158203125E-05	4.76837158203125E-05	4.76837158203125E-05	4.76837158203125E-05
23	2.384185791015625E-05	2.384185791015625E-05	2.384185791015625E-05	2.384185791015625E-05	2.384185791015625E-05
24	1.1920928955078125E-05	1.1920928955078125E-05	1.1920928955078125E-05	1.1920928955078125E-05	1.1920928955078125E-05
25	5.9604644775390625E-06	5.9604644775390625E-06	5.9604644775390625E-06	5.9604644775390625E-06	5.9604644775390625E-06
26	2.9802322387695312E-06	2.9802322387695312E-06	2.9802322387695312E-06	2.9802322387695312E-06	2.9802322387695312E-06
27	1.4901161193847656E-06	1.4901161193847656E-06	1.4901161193847656E-06	1.4901161193847656E-06	1.4901161193847656E-06
28	7.450580596923828E-07	7.450580596923828E-07	7.450580596923828E-07	7.450580596923828E-07	7.450580596923828E-07
29	3.725290298461914E-07	3.725290298461914E-07	3.725290298461914E-07	3.725290298461914E-07	3.725290298461914E-07
30	1.862645149230957E-07	1.862645149230957E-07	1.862645149230957E-07	1.862645149230957E-07	1.862645149230957E-07
31	9.313225746154785E-08	9.313225746154785E-08	9.313225746154785E-08	9.313225746154785E-08	9.313225746154785E-08
32	4.656612873077392E-08	4.656612873077392E-08	4.656612873077392E-08	4.656612873077392E-08	4.656612873077392E-08
33	2.328306436538696E-08	2.328306436538696E-08	2.328306436538696E-08	2.328306436538696E-08	2.328306436538696E-08
34	1.164153218269348E-08	1.164153218269348E-08	1.164153218269348E-08	1.164153218269348E-08	1.164153218269348E-08
35	5.8207				

20% MiliQ/Perrier	<u>63.0</u>	<u>80.0</u>	<u>190</u>
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Sample Type: [X] grab [] hr comp.

<u>Sample #</u>	<u>Date/Time Collected</u>	<u>Alk</u> (mg/L)	<u>Hard</u> (mg/L)	<u>Cond</u> (mS/cm)	<u>TRC</u> (ppm)	<u># Renewals</u>
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1	08-05-91	h	12.0	20.0	50.0	<0.02*	0
2	08-07-91	h	NA	NA	NA	NA *	NA
3	08-08-91	h	NA	NA	NA	NA *	NA

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.4	NA	NA	NA	NA	NA	NA	----
	Final	----	24.4	NA	NA	NA	NA	NA	NA
DO	Initial	7.42	NA	NA	NA	NA	NA	NA	----
	Final	----	7.04	NA	NA	NA	NA	NA	NA
pH	Initial	7.80	NA	NA	NA	NA	NA	NA	----
	Final	----	8.00	NA	NA	NA	NA	NA	NA

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.3	NA	NA	NA	NA	NA	NA	----
DO	Initial	7.91	NA	NA	NA	NA	NA	NA	----
	Final	----	7.03	NA	NA	NA	NA	NA	NA
pH	Initial	6.50	NA	NA	NA	NA	NA	NA	----
	Final	----	7.20	NA	NA	NA	NA	NA	NA

Comments: *TRC measured in laboratory. Test terminated after 24 hours
due to complete mortality in the test concentration.

NPDES Outfall: H-004

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	NA
(100)% Effluent:	100%	NA
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: _____

Sample 2: _____

Sample 3: _____

Comments: *TRC measured in laboratory

NPDES Outfall: H-007

Rep	Control		(100) % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	29	L	30
2	L	16	L	19
3	L	29	L	10
4	L	25	L	28
5	L	7	L	27
6	L	25	L	23
7	L	25	L	26
8	L	24	L	27
9	L	24	L	24
10	L	9	L	21
11	L	26	D	6
12	L	22	D	12
13	L	14	L	14
14	L	15	L	21
15	L	26	L	27
16	L	19	L	26
17	L	17	L	26
18	L	12	L	23
19	L	19	L	26
20	L	29	L	25

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	20.6
(100)% Effluent:	10%	22.1
Statistical Test:	FISHER'S	NA
Pass/Fail:	PASS	PASS

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: _____

Sample 2: _____

Sample 3: _____

Facility: Westinghouse Savannah River Company

NPDES Outfall: H-007 DeCl

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp.Range: 24.0-25.9 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 08-06-91/1415 h Ended (date/time): 08-13-91/1430 h

Dilution Water Source Alk*(mg/L) Hard*(mg/L) Conductivity*(mS/cm)

20% MilliQ/Perrier 62.0 74.0 255

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk* Hard* Cond* TRC # Renewals
(mg/L) (mg/L) (mS/cm) (ppm)

1	08-05-91/	h	18.0	20.0	260	0.05**	2
2	08-07-91/	h	18.0	20.0	115	0.02**	2
3	08-09-91/	h	20.0	17.0	120	<0.02**	3

Chemistry readings reflect addition of sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.1	24.0	24.6	24.4	24.0	24.5	24.0	----
	Initial	7.39	8.08	7.88	9.23	7.84	8.02	7.74	----
DO	Final	----	6.67	7.97	8.39	7.36	7.25	7.34	7.86
	Initial	7.50	7.55	7.70	7.60	7.80	7.85	7.70	----
pH	Final	----	7.90	7.80	7.80	7.95	8.10	7.85	7.70

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.0	24.0	24.2	24.0	24.2	25.9	24.0	----
	Initial	7.58	7.43	8.23	8.81	7.94	7.96	8.11	----
DO	Final	----	6.88	7.94	9.43	7.14	7.06	6.94	7.20
	Initial	6.70	6.50	6.95	6.65	6.75	6.80	6.70	----
pH	Final	----	7.60	7.40	7.50	7.70	7.80	7.75	7.40

Comments: **TRC measured in laboratory. Sodium thiosulfate added to control & effluent (TRC reduced <0.02 ppm) prior to testing and chemistry readings.

NPDES Outfall: H-007-Dec1

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	22	L	19
2	L	27	L	14
3	L	24	L	21
4	L	24	L	26
5	L	26	L	17
6	L	29	D	0
7	L	26	L	4
8	L	14	L	9
9	L	23	L	24
10	L	25	L	26
11	L	35	L	29
12	L	13	L	15
13	L	25	L	21
14	L	19	L	23
15	L	26	L	23
16	L	27	L	6
17	L	17	L	14
18	L	26	L	17
19	L	23	L	23
20	L	24	L	9

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>0%</u>	<u>23.7</u>
(100)% Effluent:	<u>5%</u>	<u>17.0</u>
Statistical Test:	<u>FISHER'S</u>	<u>t-Test</u>
Pass/Fail:	<u>PASS</u>	<u>FAIL</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.049 g/L

Sample 2: 0.019 g/L

Sample 3: not necessary

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.0 °C IWC: 100%
Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal
Started (date/time): 08-06-91/1415 h Ended (date/time): 08-13-91/1430 h

20% MilliQ/Perrier	<u>63.0</u>	<u>80.0</u>	<u>190</u>
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Sample Type: ☒ grab ☐ hr comp.

<u>Sample #</u>	<u>Date/Time Collected</u>	<u>Alk</u> (mg/L)	<u>Hard</u> (mg/L)	<u>Cond</u> (µmhos/cm)	<u>TRC</u> (ppm)	<u># Renewals</u>
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1	<u>08-05-91</u>	<u>h</u>	<u>10.0</u>	<u>14.0</u>	<u>100</u>	<u><0.02**</u>	<u>2</u>
2	<u>08-07-91</u>	<u>h</u>	<u>10.0 *</u>	<u>12.0 *</u>	<u>85 *</u>	<u>0.04**</u>	<u>3</u>
3	<u>08-09-91</u>	<u>h</u>	<u>21.0 *</u>	<u>19.0 *</u>	<u>165 *</u>	<u>0.05**</u>	<u>2</u>

*Readings reflect addition of sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.4	24.7	24.8	24.5	24.1	24.2	24.0	----
	DO								
	Initial	7.42	7.54	7.82	8.68	7.76	7.54	8.11	----
	Final	----	7.04	7.79	8.47	7.05	7.02	7.43	7.32
pH	Initial	7.80	7.70	7.85	7.80	7.80	7.90	7.60	----
	Final	----	8.00	7.65	7.85	8.20	8.05	7.75	7.80

(100) * Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.5	24.1	24.3	24.1	24.0	24.0	24.2	----
	DO								
	Initial	7.87	8.00	7.95	8.71	7.85	7.93	7.99	----
	Final	-----	6.80	7.60	8.62	6.99	7.00	6.99	7.02
pH	Initial	6.45	6.50	6.40	6.50	6.60	6.50	6.70	----
	Final	-----	7.25	7.10	7.10	7.10	7.90	7.45	7.50

Comments: **TRC measured in laboratory. Sodium thiosulfate was added to samples 2 and 3 (TRC reduced to <0.02ppm) prior to testing and chemistry readings.

NPDES Outfall: H-008-DeC1

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	28	L	12
2	L	28	L	21
3	L	29	L	30
4	L	28	L	21
5	L	24	L	17
6	L	25	L	22
7	L	23	D	6
8	L	27	L	15
9	L	28	L	17
10	L	22	L	22
11	L	24	D	10
12	L	17	L	9
13	L	17	D	13
14	L	20	L	27
15	L	23	D	12
16	L	19	L	19
17	L	20	L	16
18	L	18	L	19
19	L	23	L	24
20	L	25	L	20

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	23.4
(100)% Effluent:	20%	17.6
Statistical Test:	FISHER'S	t-TEST
Pass/Fail:	PASS	FAIL

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: Not necessary

Sample 2: 0.04 g/L

Sample 3: 0.05 g/L

Facility: Westinghouse Savannah River Company

NPDES Outfall: H-008A

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.6-26.0 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 10-15-91/1645 h Ended (date/time): 10-16-91/1605h

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (µmhos/cm)

20% MilliQ/Perrier 62.0 81.0 155

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk Hard Cond TRC # Renewals
(mg/L) (mg/L) (µmhos/cm) (ppm)

1	<u>10-14-91 / 1216 h</u>	<u>5.0</u>	<u>8.0</u>	<u>150</u>	<u><0.02*</u>	<u>1</u>
2	<u>NA / NA h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA *</u>	<u>NA</u>
3	<u>NA / NA h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA *</u>	<u>NA</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	26.0	NA	NA	NA	NA	NA	NA	----
	Final	----	7.28	NA	NA	NA	NA	NA	NA
DO	Initial	8.07	NA	NA	NA	NA	NA	NA	----
	Final	----	7.28	NA	NA	NA	NA	NA	NA
pH	Initial	8.10	NA	NA	NA	NA	NA	NA	----
	Final	----	7.95	NA	NA	NA	NA	NA	NA

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.6	NA	NA	NA	NA	NA	NA	----
	Final	----	7.52	NA	NA	NA	NA	NA	NA
DO	Initial	8.16	NA	NA	NA	NA	NA	NA	----
	Final	----	7.52	NA	NA	NA	NA	NA	NA
pH	Initial	6.40	NA	NA	NA	NA	NA	NA	----
	Final	----	7.60	NA	NA	NA	NA	NA	NA

Comments: *TRC measured in laboratory. Test was terminated after 24 hours due to complete mortality in the effluent solution.

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	NA
(100)% Effluent:	100%	NA
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: NA

Sample 3: NA

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp.Range: 24.0-26.0 ° IWC: 50%
Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal
Started (date/time): 8-06-91/1430 h Ended (date/time): 8-13-91/1435 h

20% MiliQ/Perrier	<u>63.0</u>	<u>80.0</u>	<u>190</u>
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Sample Type: [X] grab [] hr comp.

<u>Sample #</u>	<u>Date/Time Collected</u>	<u>Alk</u> (mg/L)	<u>Hard</u> (mg/L)	<u>Cond</u> (mS/cm)	<u>TRC</u> (ppm)	<u># Renewals</u>
1	08-05-91 / h	7.0	16.0	70.0	<0.02*	2
2	08-07-91 / h	14.0	8.0	175	0.05*	2
3	08-09-91 / h	18.0	18.0	165	0.04*	3

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.4	24.7	24.0	24.0	24.4	24.3	24.2	----
	DO								
	Initial	7.42	7.54	7.86	9.45	7.67	8.06	8.30	----
	Final	----	7.04	7.79	8.93	7.24	7.23	7.48	7.33
pH	Initial	7.80	7.70	7.75	7.60	7.80	7.85	7.70	----
	Final	----	8.00	7.65	7.80	7.65	8.10	7.80	7.70

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.5	24.0	24.5	24.1	24.2	24.0	24.1	----
	DO								
	Initial	7.50	7.20	7.77	8.50	7.49	7.90	7.60	----
	Final	----	6.50	7.75	8.17	7.21	7.13	7.32	7.26
pH	Initial	6.50	6.80	7.40	6.60	7.25	7.40	7.10	----
	Final	----	7.25	7.00	7.60	7.60	8.00	7.85	7.50

Comments: *TRC measured in laboratory. Sodium thiosulfate was added to samples 2 and 3 along with their respective controls (TRC reduced to <0.02) prior to use in testing.

NPDES Outfall: H-012-DeCl

Rep	Control		(80) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	17	L	8
2	D	7	L	12
3	L	25	L	7
4	L	23	L	9
5	L	18	L	13
6	L	20	L	4
7	D	13	L	13
8	L	16	L	12
9	L	27	L	16
10	L	17	L	13
11	L	17	L	7
12	L	15	L	7
13	L	17	D	0
14	L	9	L	12
15	L	25	L	16
16	L	27	L	6
17	L	28	L	5
18	L	17	L	5
19	L	26	L	11
20	D	7	L	1

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	15%	18.6
(80)% Effluent:	5%	8.9
Statistical Test:	FISHER'S	T-TEST
Pass/Fail:	PASS	FAIL

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: not necessary

Sample 2: 0.05 g/L then 80% = 0.040 g/L

Sample 3: 0.04 g/L then 80% = 0.032 g/L

NPDES Outfall: H-012A

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia **Temp. Range:** 24.0-25.2 °C **IWC:** 16%

Test Type: ☐ hr acute; ☒ d chronic; ☐ static ☒ daily-renewal

Started (date/time): 08-06-91/1450 h Ended (date/time): 08-13-91/1515 h

[illegible]

20% MiliQ/Perrier	<u>63.0</u>	<u>80.0</u>	<u>190</u>
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Sample Type: ☒ grab ☐ hr comp.

<u>Sample #</u>	<u>Date/Time Collected</u>	<u>Alk</u> (mg/L)	<u>Hard</u> (mg/L)	<u>Cond</u> (mS/cm)	<u>TRC</u> (ppm)	<u># Renewals</u>
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1	<u>08-05-91</u>	<u>/</u>	<u>h</u>	<u>2.0</u>	<u>15.0</u>	<u>60.0</u>	<u>0.03*</u>	<u>2</u>
2	<u>08-07-91</u>	<u>/</u>	<u>h</u>	<u>5.0</u>	<u>20.0</u>	<u>45.0</u>	<u>0.35*</u>	<u>2</u>
3	<u>08-09-91</u>	<u>/</u>	<u>h</u>	<u>3.0</u>	<u>15.0</u>	<u>60.0</u>	<u>0.05*</u>	<u>3</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.4	24.7	24.8	24.5	24.3	24.8	24.3	----
	DO								
	Initial	7.42	7.54	7.82	8.68	7.55	7.53	7.35	----
	Final	----	7.04	7.79	8.47	7.05	7.20	7.54	7.30
pH	Initial	7.80	7.70	7.85	7.80	8.10	8.10	7.70	----
	Final	----	8.00	7.65	7.85	8.20	8.00	7.95	7.80

(16) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.2	24.0	24.2	24.0	24.1	24.0	24.6	----
	DO								
	Initial	7.41	7.23	7.85	8.26	7.38	7.69	7.54	----
	Final	----	7.62	7.82	8.23	7.17	6.91	7.39	7.10
pH	Initial	7.25	7.30	7.65	7.40	7.50	7.80	7.50	----
	Final	----	7.80	7.60	7.80	7.80	8.20	7.80	7.70

Comments: *TRC measured in laboratory

NPDES Outfall: H-012A

Rep	Control		(16) % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	25	D	0
2	D	22	L	23
3	L	13	D	20
4	L	23	L	25
5	L	27	L	26
6	L	26	D	13
7	L	23	D	0
8	L	22	D	14
9	L	25	D	0
10	L	23	D	4
11	L	22	D	0
12	L	20	L	14
13	L	25	D	15
14	L	21	L	23
15	L	20	L	19
16	L	27	L	20
17	L	26	L	20
18	L	23	D	12
19	L	27	D	13
20	L	28	D	15

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>5%</u>	<u>23.4</u>
(16)% Effluent:	<u>60%</u>	<u>13.3</u>
Statistical Test:	<u>FISHER'S</u>	<u>NA</u>
Pass/Fail:	<u>FAIL</u>	<u>NA</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: NA

Sample 3: NA

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Started (date/time): 08-06-91/1435 h Ended (date/time): 08-13-91/1515 h

20% MilliQ/Perrier	<u>72.0</u>	<u>74.0</u>	<u>210</u>
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Sample Type: ☒ grab ☐ hr comp.

1	<u>08-05-91</u>	<u>h</u>	<u>2.0</u>	<u>21.0</u>	<u>90</u>	<u>0.03**</u>	<u>2</u>
2	<u>08-07-91</u>	<u>h</u>	<u>3.0</u>	<u>16.0</u>	<u>650</u>	<u>0.35**</u>	<u>2</u>
3	<u>08-09-91</u>	<u>h</u>	<u>3.0</u>	<u>20.0</u>	<u>130</u>	<u>0.05**</u>	<u>3</u>

*Chemistry readings reflect addition of sodium thiosulfate.

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.4	24.0	24.0	24.0	24.3	24.0	24.1	----
	Final	----	23.9	23.9	23.9	24.2	24.0	24.1	23.9
DO	Initial	7.66	8.20	7.78	9.11	7.53	7.84	7.59	----
	Final	----	6.90	7.82	8.52	7.07	7.37	7.66	7.37
pH	Initial	8.05	7.50	7.65	7.65	7.70	8.10	7.70	----
	Final	----	8.00	7.70	7.60	8.00	8.25	7.80	7.80

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.0	24.8	24.0	24.3	24.0	24.5	----
	DO								
	Initial	7.64	7.42	7.67	8.19	7.68	8.15	7.56	----
	Final	----	6.73	7.89	8.21	7.12	6.60	7.02	7.22
pH	Initial	7.30	7.35	7.45	7.50	7.75	8.00	7.30	----
	Final	----	7.90	7.75	7.80	8.00	8.25	7.80	7.80

Comments: **TRC measured in laboratory. Sodium thiosulfate was added to the control and effluent prior to testing and chemistry readings.

NPDES Outfall: H-012A-DeCl

Rep	Control		(16) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	11	D	1
2	L	12	L	7
3	L	19	L	5
4	L	17	D	5
5	L	12	L	14
6	L	19	D	0
7	L	14	D	0
8	D	1	L	6
9	D	0	L	13
10	L	17	D	4
11	L	18	L	16
12	L	17	L	10
13	L	20	D	0
14	L	16	L	11
15	L	11	L	10
16	L	19	L	8
17	L	17	L	10
18	L	13	D	5
19	L	18	D	5
20	L	13	D	5

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>10%</u>	<u>14.2</u>
(16)% Effluent:	<u>45%</u>	<u>6.8</u>
Statistical Test:	<u>FISHER'S</u>	<u>NA</u>
Pass/Fail:	<u>FAIL</u>	<u>NA</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.03 g/L then 16% = 0.005 g/L

Sample 2: 0.35 g/L then 16% = 0.056 g/L

Sample 3: 0.05 g/L then 16% = 0.008 g/L

NPDES Outfall: K-001
Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia **Temp.Range:** 24.0-26.0 °C **IWC:** 100%

Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal

Started (date/time): 10-15-91/1545 h Ended (date/time): 10-18-91/1500 h

<u>Dilution Water Source</u>	<u>Alk (mg/L)</u>	<u>Hard (mg/L)</u>	<u>Conductivity (μmhos/cm)</u>
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20% MilliQ/Perrier	<u>62.0</u>	<u>81.0</u>	<u>155</u>
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Sample Type: [X] grab [] hr comp.

<u>Sample #</u>	<u>Date/Time Collected</u>	<u>Alk</u> (mg/L)	<u>Hard</u> (mg/L)	<u>Cond</u> (µmhos/cm)	<u>TRC</u> (ppm)	<u># Renewals</u>
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1	<u>10-14-91</u>	<u>/</u>	<u>0944 h</u>	<u>14.0</u>	<u>13.0</u>	<u>50</u>	<u>0.48**</u>	<u>2</u>
2	<u>10-16-91</u>	<u>/</u>	<u>h</u>	<u>17.0</u>	<u>18.0</u>	<u>150</u>	<u>0.80**</u>	<u>1</u>
3	<u>NA</u>	<u>/</u>	<u>NA h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA **</u>	<u>NA</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	26.0	24.0	25.0	NA	NA	NA	NA	----
	Final	----	24.0	25.0	26.0	26.0	26.0	26.0	26.0
DO	Initial	8.07	7.28	7.77	NA	NA	NA	NA	----
	Final	----	7.28	7.81	7.80	NA	NA	NA	NA
pH	Initial	8.10	7.95	7.95	NA	NA	NA	NA	----
	Final	----	7.95	8.00	8.00	NA	NA	NA	NA

(100) * Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.1	24.6	25.4	NA	NA	NA	NA	----
	DO								
	Initial	8.67	8.41	7.65	NA	NA	NA	NA	----
	Final	----	7.62	7.90	7.83	NA	NA	NA	NA
pH	Initial	6.90	7.60	7.00	NA	NA	NA	NA	----
	Final	----	7.75	7.35	7.30	NA	NA	NA	NA

Comments: **TRC measured in laboratory. Test ended on Day 3 due to complete mortality in the effluent solution.

NPDES Outfall: K-001

Rep	Control		(100) % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	NA
(100)% Effluent:	100%	NA
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: NA

Sample 3: NA

Facility: Westinghouse Savannah River Company

NPDES Outfall: K-001 DECL

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.3 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 10-15-91/1605 h Ended (date/time): 10-17-91/1520 h

Dilution Water Source Alk (mg/L) * Hard (mg/L) * Conductivity*(μmhos/cm)

20% MilliQ/Perrier 60.0 87.0 480

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk* Hard* Cond* TRC # Renewals
(mg/L) (mg/L) (μmhos/cm) (ppm)

1	<u>10-14-91</u> / <u>0944 h</u>	<u>14.0</u>	<u>12.0</u>	<u>440</u>	<u>0.48**</u>	<u>2</u>
2	<u>10-16-91</u> / <u>h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA **</u>	<u>NA</u>
3	<u>NA</u> / <u>NA h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA **</u>	<u>NA</u>

*Readings reflect addition of sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.0	NA	NA	NA	NA	NA	----
	Final	----	7.54	7.81	NA	NA	NA	NA	NA
DO	Initial	8.19	8.78	NA	NA	NA	NA	NA	----
	Final	----	7.54	7.81	NA	NA	NA	NA	NA
pH	Initial	7.90	8.00	NA	NA	NA	NA	NA	----
	Final	----	8.10	8.00	NA	NA	NA	NA	NA

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.3	24.0	NA	NA	NA	NA	NA	----
	Final	----	7.88	7.81	NA	NA	NA	NA	NA
DO	Initial	8.07	8.28	NA	NA	NA	NA	NA	----
	Final	----	7.88	7.81	NA	NA	NA	NA	NA
pH	Initial	7.20	7.70	NA	NA	NA	NA	NA	----
	Final	----	7.75	7.50	NA	NA	NA	NA	NA

Comments: **TRC measured in laboratory. Test ended on Day 2 due to complete mortality in the effluent solution. Sodium thiosulfate was added to the control and effluent (TRC reduced to < 0.02 ppm) prior to testing and chemistry readings.

NPDES Outfall: K-001-Dec1

Rep	Control		(100) % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	NA
(100)% Effluent:	100%	NA
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.493 g/L

Sample 2: NA

Sample 3: NA

Facility: Westinghouse Savannah River Company

NPDES Outfall: K-006

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.3 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 08-20-91/1130 h Ended (date/time): 08-27-91/1150 h

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (µmhos/cm)

20% MilliQ/Perrier 63.0 82.0 190

Sample Type: [X] grab [] hr comp.

<u>Sample #</u>	<u>Date/Time Collected</u>	<u>Alk</u> (mg/L)	<u>Hard</u> (mg/L)	<u>Cond</u> (µmhos/cm)	<u>TRC</u> (ppm)	<u># Renewals</u>
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1	<u>08-19-91 / 1028 h</u>	<u>14.0</u>	<u>15.0</u>	<u>55.0</u>	<u>0.04*</u>	<u>2</u>
2	<u>08-21-91 / 1005 h</u>	<u>17.0</u>	<u>17.0</u>	<u>60.0</u>	<u><0.02*</u>	<u>3</u>
3	<u>08-23-91 / 100 h</u>	<u>16.0</u>	<u>17.0</u>	<u>80.0</u>	<u>0.05*</u>	<u>2</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.7	24.8	24.4	25.3	24.9	24.3	----
	Initial	7.72	7.24	8.18	8.15	7.81	7.62	8.14	----
DO	Final	----	7.24	8.55	7.90	7.58	7.47	7.16	7.45
	Initial	7.60	8.00	8.00	7.80	8.00	8.00	7.80	----
pH	Final	----	7.75	7.70	8.00	8.20	8.10	8.10	8.00

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.3	24.7	24.1	24.3	24.4	25.3	24.6	----
	Initial	7.20	7.89	8.86	8.37	8.27	8.01	8.66	----
DO	Final	----	7.22	8.57	7.61	7.46	7.39	6.71	7.70
	Initial	7.20	7.30	7.10	7.30	7.20	7.20	7.20	----
pH	Final	----	7.00	7.30	7.40	7.75	7.60	7.50	7.60

Comments: *TRC measured in laboratory

NPDES Outfall: K-006

Rep	Control		(100) % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	16	L	20
2	L	17	L	17
3	L	16	D	3
4	L	14	L	14
5	L	18	L	15
6	L	17	L	21
7	L	20	D	10
8	L	14	L	20
9	L	19	L	19
10	L	15	L	12
11	L	16	L	24
12	L	17	L	11
13	L	17	D	12
14	L	21	L	19
15	L	19	L	18
16	L	19	L	19
17	L	17	L	8
18	L	17	L	18
19	L	11	L	21
20	L	25	L	15

Pass/Fail Test Results

% Mortality

Young/Female

Control: 0%
 (100)% Effluent: 15%
 Statistical Test: FISHER'S
 Pass/Fail: PASS

17.2
15.8
T-TEST
PASS

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: NA

Sample 3: NA

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Started (date/time): 08-20-91/1130 h Ended (date/time): 08-21-91 h

20% MilliQ/Perrier	<u>60.0</u>	<u>83.0</u>	<u>1150</u>
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Sample Type: ☒ grab ☐ hr comp.

1	<u>08-19-91</u>	<u>/</u>	<u>1028 h</u>	<u>14.0</u>	<u>20.0</u>	<u>1500</u>	<u>0.04**</u>	<u>1</u>
2	<u> </u>	<u>/</u>	<u>h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA **</u>	<u>NA</u>
3	<u> </u>	<u>/</u>	<u>h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA **</u>	<u>NA</u>

*Readings reflect addition of sodium thiosulfate.

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.3	NA	NA	NA	NA	NA	NA	----
	Final	----	24.3	NA	NA	NA	NA	NA	NA
DO	Initial	7.85	NA	NA	NA	NA	NA	NA	----
	Final	----	7.24	NA	NA	NA	NA	NA	NA
pH	Initial	7.90	NA	NA	NA	NA	NA	NA	----
	Final	----	8.10	NA	NA	NA	NA	NA	NA

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	NA	NA	NA	NA	NA	NA	----
	Final	-----	7.19	NA	NA	NA	NA	NA	NA
DO	Initial	7.50	NA	NA	NA	NA	NA	NA	----
	Final	-----	7.19	NA	NA	NA	NA	NA	NA
pH	Initial	7.20	NA	NA	NA	NA	NA	NA	----
	Final	-----	7.40	NA	NA	NA	NA	NA	NA

Comments: **TRC measured in laboratory. Test terminated after 24 hours due to complete mortality in the IWC. Sodium thiosulfate was added (TRC reduced to <0.02ppm) prior to testing and chemistry readings.

NPDES Outfall: K-006-DeC1

Rep	Control		(100) % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	NA
(100)% Effluent:	100%	NA
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.042 g/L

Sample 2: NA

Sample 3: NA

Comments:**TRC measured in laboratory. Sodium thiosulfate was added to samples 2 and 3 (TRC reduced to <0.02ppm) prior to testing and chemistry readings.

NPDES Outfall: K-008-Dec1

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	L	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	L	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	AN	L	NA
20	L	NA	D	NA

Pass/Fail Test Results

% Mortality

Young/Female

Control:

0%

NA

(100)% Effluent:

90%

NA

Statistical Test:

FISHER'S

NA

Pass/Fail:

FAIL

NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: Not necessary

Sample 2: 0.03 g/L

Sample 3: 0.05 g/L

Facility: Westinghouse Savannah River Company

NPDES Outfall: K-010

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.3 °C FWC: 100%

Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal

Started (date/time): 08-20-91/1345 h Ended (date/time): 08-27-91/1400 h

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (µmhos/cm)

20% MilliQ/Perrier 63.0 82.0 190

Sample Type: [X] grab [] hr comp.

Sample #	Date/Time Collected	Alk (mg/L)	Hard (mg/L)	Cond (µmhos/cm)	TRC (ppm)	# Renewals
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1	<u>08-19-91 / 1014 h</u>	<u>12.0</u>	<u>11.0</u>	<u>50.0</u>	<u>0.04*</u>	<u>2</u>
2	<u>08-21-91 / 0950 h</u>	<u>15.0</u>	<u>19.0</u>	<u>75.0</u>	<u>0.05*</u>	<u>3</u>
3	<u>08-23-91 / 0950 h</u>	<u>15.0</u>	<u>12.0</u>	<u>60.0</u>	<u>0.05*</u>	<u>2</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.7	24.8	24.4	25.3	24.9	24.3	----
	Final	----	7.24	8.55	7.90	7.58	7.47	7.16	7.45
DO	Initial	7.72	7.24	8.18	8.15	7.81	7.62	8.14	----
	Final	----	7.24	8.55	7.90	7.58	7.47	7.16	7.45
pH	Initial	7.60	8.00	8.00	7.80	8.00	8.00	7.80	----
	Final	----	7.75	7.70	8.00	8.20	8.10	8.10	8.00

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.9	24.0	24.3	24.4	25.0	24.4	----
	Final	----	7.38	8.47	7.72	7.51	7.49	7.45	7.62
DO	Initial	7.61	7.53	9.13	8.54	8.71	7.69	8.80	----
	Final	----	7.38	8.47	7.72	7.51	7.49	7.45	7.62
pH	Initial	7.20	7.10	7.00	7.15	7.20	7.20	7.05	----
	Final	----	6.80	6.90	7.15	7.50	7.35	7.15	7.30

Comments: *TRC measured in laboratory

NPDES Outfall: K-010

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	23	L	14
2	L	24	L	15
3	L	20	L	10
4	L	24	L	13
5	L	18	L	21
6	L	32	L	13
7	MECHANICAL DEATH	NA	L	15
8	L	27	D	17
9	L	23	L	17
10	L	23	L	24
11	L	42	L	17
12	L	23	D	12
13	L	12	D	19
14	L	11	L	15
15	L	26	D	12
16	L	5	D	14
17	L	27	L	14
18	L	18	D	20
19	L	30	D	16
20	L	25	D	12

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	22.8
(100)% Effluent:	40%	15.5
Statistical Test:	FISHER'S	T-TEST
Pass/Fail:	FAIL	FAIL

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: NA

Sample 3: NA

Facility: Westinghouse Savannah River Company

NPDES Outfall: K-010 DeCl

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp.Range: 24.0-25.5 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 08-20-91/1400 h Ended (date/time): 08-27-91/1400 h

Dilution Water Source Alk*(mg/L) Hard*(mg/L) Conductivity*(µmhos/cm)

20% MilliQ/Perrier 61.0 71.0 270

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk* Hard* Cond* TRC # Renewals
(mg/L) (mg/L) (µmhos/cm) (ppm)

1	<u>08-19-91 / 1014 h</u>	<u>13.0</u>	<u>13.0</u>	<u>195</u>	<u>0.04**</u>	<u>2</u>
2	<u>08-21-91 / 0950 h</u>	<u>17.0</u>	<u>18.0</u>	<u>230</u>	<u>0.05**</u>	<u>3</u>
3	<u>08-23-91 / 0950 h</u>	<u>17.0</u>	<u>15.0</u>	<u>250</u>	<u>0.05**</u>	<u>2</u>

*Readings reflect addition of sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.8	24.4	24.2	24.0	25.1	24.3	----
	Final	----	7.74	8.51	7.83	7.63	7.73	7.17	7.48
DO	Initial	7.70	7.77	8.73	8.59	8.15	8.57	8.45	----
	Final	----	7.74	8.51	7.83	7.63	7.73	7.17	7.48
pH	Initial	8.10	7.75	7.85	7.90	7.80	7.85	7.80	----
	Final	----	7.60	7.80	7.95	8.20	8.10	8.05	8.00

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.1	24.6	25.5	24.5	25.0	25.2	24.1	----
	Final	----	7.12	8.52	7.12	6.15	5.35	7.36	7.27
DO	Initial	7.54	7.01	8.59	8.12	8.55	8.04	7.57	----
	Final	----	7.12	8.52	7.12	6.15	5.35	7.36	7.27
pH	Initial	7.30	7.25	7.20	7.20	7.40	7.25	7.30	----
	Final	----	7.00	7.15	7.10	6.60	5.30	4.00	4.50

Comments: **TRC measured in laboratory. Sodium thiosulfate was added (TRC reduced to <0.02ppm) prior to testing and chemistry readings.

NPDES Outfall: K-010-DeCl

	Control		(100) % Effluent	
Rep	Adult (L/D)	# Young	Adult (L/D)	# Young
1	D	NA	D	NA
2	D	NA	D	NA
3	L	NA	MECHANICAL DEATH	NA
4	D	NA	D	NA
5	L	NA	D	NA
6	D	NA	D	NA
7	L	NA	D	AN
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	L	NA
12	D	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	D	NA	D	NA
16	L	NA	L	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>30%</u>	<u>NA</u>
(100)% Effluent:	<u>89.5%</u>	<u>NA</u>
Statistical Test:	<u>FISHER'S</u>	<u>NA</u>
Pass/Fail:	<u>FAIL</u>	<u>NA</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.036 g/L

Sample 2: 0.050 g/L

Sample 3: 0.050 g/L

Facility: Westinghouse Savannah River Company

NPDES Outfall: K-011

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-26.0 °C IWC: 94%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 10-15-91/1540 h Ended (date/time): 10-22-91/1618h

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (µmhos/cm)

20% MilliQ/Perrier 62.0 81.0 155

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk Hard Cond TRC # Renewals
(mg/L) (mg/L) (µmhos/cm) (ppm)

1	<u>10-14-91 / 1023 h</u>	<u>19.0</u>	<u>17.0</u>	<u>70</u>	<u><0.02*</u>	<u>2</u>
2	<u>10-16-91 / h</u>	<u>29.0</u>	<u>28.0</u>	<u>70</u>	<u><0.02*</u>	<u>3</u>
3	<u>10-18-91 / 0945 h</u>	<u>16.0</u>	<u>20.0</u>	<u>60</u>	<u><0.02*</u>	<u>2</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	26.0	25.5	25.0	24.0	24.7	24.1	24.2	----
	Initial	8.07	7.54	7.77	7.86	8.22	7.99	7.81	----
DO	Final	----	7.28	7.81	7.80	7.48	8.22	7.81	7.85
	Initial	8.10	8.10	7.95	8.00	7.85	8.00	8.15	----
pH	Final	----	7.95	8.00	8.00	8.00	7.85	8.15	3.00

(94) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.1	24.1	24.2	24.5	25.3	24.8	25.3	----
	Initial	8.37	8.10	7.71	7.69	8.53	8.46	8.32	----
DO	Final	----	7.38	7.82	7.51	7.82	7.57	8.15	8.15
	Initial	6.90	7.70	6.90	7.75	7.55	6.80	7.50	----
pH	Final	----	7.80	7.55	7.70	7.80	7.70	7.60	7.35

Comments: *TRC measured in laboratory.

NPDES Outfall: K-011

Rep	Control		(94) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	31	L	29
2	L	23	L	32
3	L	28	L	38
4	L	32	L	30
5	L	43	L	43
6	L	31	L	47
7	L	40	L	41
8	L	37	L	31
9	L	31	L	32
10	L	44	L	30
11	L	41	L	29
12	L	42	L	31
13	L	45	L	29
14	L	41	L	29
15	L	25	L	33
16	L	27	L	32
17	L	46	L	37
18	L	43	L	37
19	L	38	L	24
20	L	46	L	41

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>0%</u>	<u>36.7</u>
(94)% Effluent:	<u>0%</u>	<u>33.8</u>
Statistical Test:	<u>FISHER'S</u>	<u>t-TEST</u>
Pass/Fail:	<u>PASS</u>	<u>PASS</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: NA

Sample 3: NA

Facility: Westinghouse Savannah River Company

NPDES Outfall: K-011A

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-26.0 °C IWC: 7%

Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal

Started (date/time): 10-15-91/1530 h Ended (date/time): 10-18-91/1500 h

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (µmhos/cm)

20% MilliQ/Perrier 62.0 81.0 155

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk Hard Cond TRC # Renewals
(mg/L) (mg/L) (µmhos/cm) (ppm)

1	<u>10-14-91 / 1000 h</u>	<u>208</u>	<u>37.0</u>	<u>70</u>	<u>0.36**</u>	<u>2</u>
2	<u>10-16-91 / h</u>	<u>408</u>	<u>40.0</u>	<u>1100</u>	<u>20.0**</u>	<u>1</u>
3	<u>NA / NA h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA **</u>	<u>NA</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	26.0	25.5	25.0	NA	NA	NA	NA	----
	Initial	8.07	7.54	7.77	NA	NA	NA	NA	----
DO	Final	----	7.28	7.81	7.80	NA	NA	NA	NA
pH	Initial	8.10	8.10	7.95	NA	NA	NA	NA	----
	Final	----	7.95	8.00	8.00	NA	NA	NA	NA

(7) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.5	24.0	24.5	NA	NA	NA	NA	----
	Initial	8.22	7.81	7.74	NA	NA	NA	NA	----
DO	Final	----	7.55	7.86	7.58	NA	NA	NA	NA
pH	Initial	7.90	8.10	7.80	NA	NA	NA	NA	----
	Final	----	8.20	8.05	8.30	NA	NA	NA	NA

Comments: **TRC measured in laboratory. Test ended on Day 3 due to
complete mortality in the effluent solution.

NPDES Outfall: K-011A

Rep	Control		(7) % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	NA
(7)% Effluent:	100%	NA
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: NA

Sample 3: NA

Facility: Westinghouse Savannah River Company

NPDES Outfall: K-011A DeCl

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.0 °C IWC: 7%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 10-15-91/1630 h Ended (date/time): 10-20-91/1540 h

Dilution Water Source Alk*(mg/L) Hard*(mg/L) Conductivity*(μmhos/cm)

20% MilliQ/Perrier 63.0 85.0 190

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk* Hard* Cond* TRC # Renewals
(mg/L) (mg/L) (μmhos/cm) (ppm)

1	<u>10-14-91</u> / <u>1000 h</u>	<u>68.0</u>	<u>80.0</u>	<u>240</u>	<u>0.36**</u>	<u>2</u>
2	<u>10-16-91</u> / <u>h</u>	<u>206</u>	<u>49.0</u>	<u>9500</u>	<u>20.0**</u>	<u>3</u>
3	<u>NA</u> / <u>NA h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA **</u>	<u>NA</u>

*Readings reflect the addition of sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.6	24.0	24.1	24.4	24.8	NA	NA	----
	Final	----	7.36	7.84	7.67	7.85	8.03	NA	NA
DO	Initial	8.04	7.68	7.58	7.91	7.94	NA	NA	----
	Final	----	7.36	7.84	7.67	7.85	8.03	NA	NA
pH	Initial	7.80	8.00	8.25	8.10	7.95	NA	NA	----
	Final	----	8.10	8.05	8.15	8.05	8.15	NA	NA

(7) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.2	24.3	24.1	24.0	24.3	NA	NA	----
	Final	----	7.50	7.86	7.78	7.81	6.85	NA	NA
DO	Initial	8.14	7.90	7.37	8.10	8.15	NA	NA	----
	Final	----	7.50	7.86	7.78	7.81	6.85	NA	NA
pH	Initial	7.70	8.05	8.20	8.15	8.15	NA	NA	----
	Final	----	8.20	8.15	8.30	8.25	7.80	NA	NA

Comments: **TRC measured in laboratory. Sodium thiosulfate was added to the control and diluent (TRC reduced <0.02 ppm) prior to testing and chemistry readings. Test ended on Day 5 due to complete mortality in the effluent solution.

NPDES Outfall: K-011A-DeCl

Rep	Control		(7) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	D	NA	D	NA
5	L	NA	D	NA
6	D	NA	D	NA
7	L	NA	D	NA
8	D	NA	D	NA
9	D	NA	D	NA
10	D	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	D	NA	D	NA
14	D	NA	D	NA
15	L	NA	D	NA
16	D	NA	D	NA
17	L	NA	D	NA
18	D	NA	D	NA
19	D	NA	D	NA
20	D	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>55%</u>	<u>NA</u>
(7)% Effluent:	<u>100%</u>	<u>NA</u>
Statistical Test:	<u>FISHER'S</u>	<u>NA</u>
Pass/Fail:	<u>FAIL</u>	<u>NA</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.035 g/L then 7% = 0.024 g/L in test solution

Sample 2: 20.00 g/L then 7% = 1.4 g/L in test solution

Sample 3: NA

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp.Range: 24.0-26.0 °C IWC: 60%
Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal
Started (date/time): 10-15-91/1550 h Ended (date/time): 10-22-91/1623h

20% MilliQ/Perrier	<u>62.0</u>	<u>81.0</u>	<u>155</u>
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Sample Type: ☒ grab ☐ hr comp.

<u>Sample #</u>	<u>Date/Time Collected</u>	<u>Alk</u> (mg/L)	<u>Hard</u> (mg/L)	<u>Cond</u> (µmhos/cm)	<u>TRC</u> (ppm)	<u># Renewals</u>
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1	<u>10-14-91</u> / <u>1034 h</u>	<u>17.0</u>	<u>17.0</u>	<u>60</u>	<u><0.02*</u>	<u>2</u>
2	<u>10-16-91</u> / <u>h</u>	<u>96.0**</u>	<u>95.0**</u>	<u>270**</u>	<u>0.05*</u>	<u>3</u>
3	<u>10-18-91</u> / <u>1035 h</u>	<u>15.0**</u>	<u>23.0**</u>	<u>160**</u>	<u>0.05*</u>	<u>2</u>

**Readings reflect addition of sodium thiosulfate to samples 2 and 3.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	26.0	25.5	25.0	24.0	25.1	24.1	24.4	----
	DO								
	Initial	8.07	7.54	7.77	7.89	8.47	7.99	8.75	----
	Final	----	7.28	7.81	8.02	7.86	7.92	7.90	8.29
pH	Initial	8.10	8.10	7.95	8.05	7.55	8.00	7.95	----
	Final	----	7.95	8.00	8.20	8.10	7.95	8.10	7.95

(60) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.1	24.6	24.0	25.3	24.5	24.3	----
	DO								
	Initial	8.45	7.40	7.75	7.80	8.46	8.32	8.57	----
	Final	----	7.36	7.95	8.06	7.83	7.93	7.00	7.69
pH	Initial	7.45	7.84	7.10	8.00	7.65	7.10	7.70	----
	Final	----	7.80	7.70	7.75	7.85	7.90	7.30	6.85

Comments: *TRC measured in laboratory. Sodium thiosulfate was added to samples 2 and 3 prior to testing and chemistry readings (TRC reduced to <0.02 ppm.).

NPDES Outfall: L-007-DeCl

Rep	Control		(60) % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	16	L	13
2	L	16	L	15
3	L	16	L	31
4	L	22	L	31
5	L	19	L	42
6	L	17	D	27
7	L	32	L	30
8	L	26	D	16
9	L	19	L	41
10	L	31	L	48
11	L	13	L	23
12	L	29	L	36
13	L	28	L	33
14	L	14	L	15
15	L	17	L	16
16	L	10	L	16
17	L	31	L	32
18	L	31	L	31
19	L	11	L	47
20	L	30	L	30

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	21.4
(60)% Effluent:	10%	28.6
Statistical Test:	FISHER'S	NA
Pass/Fail:	PASS	PASS

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: 0.053 g/L then 60% = 0.032 g/L in test solution

Sample 3: 0.048 g/L then 60% = 0.029 g/L in test solution

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp.Range: 24.0-26.0 °C IWC: 0.4%
Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal
Started (date/time): 10-15-91/1600 h Ended (date/time): 10-22-91/1627 h

20% MilliQ/Perrier	<u>56.0</u>	<u>80.0</u>	<u>85</u>
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Sample Type: ☒ grab ☐ hr comp.

<u>Sample #</u>	<u>Date/Time Collected</u>	<u>Alk*</u> (mg/L)	<u>Hard*</u> (mg/L)	<u>Cond*</u> (mS/cm)	<u>TRC</u> (ppm)	<u># Renewals</u>
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1	<u>10-14-91</u>	<u>/ 1040 h</u>	<u>58.0</u>	<u>80.0</u>	<u>210</u>	<u>9.50**</u>	<u>2</u>
2	<u>10-16-91</u>	<u>/ h</u>	<u>74.0</u>	<u>40.0</u>	<u>1800</u>	<u>1.00**</u>	<u>3</u>
3	<u>10-18-91</u>	<u>/ 1017 h</u>	<u>78.0</u>	<u>32.0</u>	<u>2100</u>	<u>0.75**</u>	<u>2</u>

*Chemistry readings reflect addition of sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.0	24.1	24.0	25.3	25.2	24.7	----
	DO								
	Initial	8.75	7.86	8.00	8.06	8.12	8.04	7.66	----
	Final	----	7.59	7.89	7.86	7.98	8.09	7.96	8.10
pH	Initial	7.60	8.00	7.75	7.95	7.90	7.40	8.05	----
	Final	----	8.10	8.00	8.15	8.15	7.90	8.10	8.15

(0.4) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.9	24.0	25.4	24.4	25.2	25.9	----
	DO								
	Initial	8.11	7.86	8.18	7.95	7.96	8.14	7.58	----
	Final	----	7.56	7.78	7.93	7.78	8.20	7.97	8.18
pH	Initial	7.35	8.05	7.80	8.05	8.00	7.90	8.05	----
	Final	----	8.20	8.05	8.20	8.20	8.10	8.15	8.20

Comments: **TRC measured in laboratory. Sodium thiosulfate added to control & effluent (TRC reduced to <0.02 ppm) prior to testing and chemistry readings.

NPDES Outfall: L-007A-DeCl

Rep	Control		(0.4) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	21	L	29
2	L	19	L	22
3	L	17	L	30
4	L	17	L	21
5	L	21	L	30
6	L	22	L	23
7	L	16	L	25
8	L	14	L	18
9	L	25	L	19
10	L	16	L	20
11	L	14	L	25
12	L	5	L	17
13	L	21	L	13
14	L	18	L	44
15	L	24	L	16
16	L	24	L	17
17	L	32	L	36
18	L	31	L	37
19	L	30	L	36
20	L	16	L	26

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>0%</u>	<u>20.1</u>
(0.4)% Effluent:	<u>0%</u>	<u>25.2</u>
Statistical Test:	<u>FISHER'S</u>	<u>NA</u>
Pass/Fail:	<u>PASS</u>	<u>PASS</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 7.85 g/L then 0.4% = 0.031 g/L

Sample 2: 1.00 g/L then 0.4% = 0.004 g/L

Sample 3: 0.75 g/L then 0.4% = 0.003 g/L

Comments: *TRC measured in laboratory. Complete mortality was observed during the final 48 hours of this test.

NPDES Outfall: L-008

Rep	Control		(37) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	32	D	19
2	L	33	D	18
3	L	34	D	20
4	L	25	D	28
5	L	39	D	9
6	L	30	D	28
7	L	32	MECHANICAL DEATH	NA
8	L	36	D	26
9	L	35	D	19
10	L	38	D	22
11	L	36	D	19
12	L	33	D	13
13	L	30	D	20
14	L	31	D	16
15	L	30	D	19
16	L	27	D	24
17	L	31	D	31
18	L	36	D	25
19	L	35	D	32
20	L	37	D	28

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	33.0
(37)% Effluent:	100%	21.9
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: _____

Sample 2: _____

Sample 3: _____

Facility: Westinghouse Savannah River Company

NPDES Outfall: L008 DeCl

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.8 °C IWC: 37%

Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal

Started (date/time): 07-30-91/1705 h Ended (date/time): 08-06-91/1700 h

Dilution Water Source Alk* (mg/L) Hard* (mg/L) Conductivity* (mS/cm)

20% MilliQ/Perrier 59.0 83.0 230

Sample Type: [X] grab [] hr comp.

<u>Sample #</u>	<u>Date/Time Collected</u>	<u>Alk*</u> (mg/L)	<u>Hard*</u> (mg/L)	<u>Cond*</u> (mS/cm)	<u>TRC</u> (ppm)	<u># Renewals</u>
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1	<u>07-29-91 / 1210 h</u>	<u>20.0</u>	<u>21.0</u>	<u>700</u>	<u>0.05**</u>	<u>2</u>
2	<u>08-01-91 / h</u>	<u>13.0</u>	<u>16.0</u>	<u>145</u>	<u>0.05**</u>	<u>3</u>
3	<u>08-02-91 / h</u>	<u>9.0</u>	<u>12.0</u>	<u>40.0</u>	<u><0.02**</u>	<u>2</u>

*Chemistry readings reflect addition of sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.2	24.1	24.0	24.5	24.3	24.2	24.3	----
	Final	----	7.36	7.09	7.04	7.71	7.78	7.22	7.10
DO	Initial	7.56	8.16	7.14	6.94	7.85	7.65	7.26	----
	Final	----	7.36	7.09	7.04	7.71	7.78	7.22	7.10
pH	Initial	7.70	7.95	7.70	7.60	7.70	7.50	7.70	----
	Final	----	8.20	7.90	8.00	7.90	8.10	8.00	8.00

(37) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.1	24.0	24.5	24.2	24.3	25.2	24.8	----
	Final	----	7.37	6.86	7.08	5.82	7.42	7.32	6.90
DO	Initial	7.49	7.52	7.05	6.91	7.80	7.36	7.21	----
	Final	----	7.37	6.86	7.08	5.82	7.42	7.32	6.90
pH	Initial	7.50	7.90	7.40	7.40	7.35	6.90	7.50	----
	Final	----	8.00	8.00	7.90	7.10	7.80	7.50	7.60

Comments: **TRC measured in laboratory. Sodium thiosulfate was added to the control and effluent (TRC reduced to <0.02 ppm) prior to testing and chemistry readings. Complete mortality was observed during the final 48 hours of this test.

NPDES Outfall: L-008-DeCl

Rep	Control		(37) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	34	D	22
2	L	43	D	11
3	L	32	D	9
4	L	27	D	24
5	L	32	D	23
6	L	25	D	7
7	L	23	D	19
8	L	35	D	24
9	L	30	D	18
10	L	24	D	17
11	D	0	D	23
12	D	0	D	34
13	L	20	D	13
14	D	0	D	19
15	L	31	D	23
16	L	16	D	10
17	L	38	D	15
18	L	26	D	22
19	L	29	D	13
20	L	32	D	22

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	15%	24.8
(37) % Effluent:	100%	18.4
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.050 g/L then 37% = 0.018 g/L

Sample 2: 0.060 g/L then 37% = 0.022 g/L

Sample 3: not necessary

Facility: Westinghouse Savannah River Company

NPDES Outfall: L-010

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.8 °C IWC: 0.4%

Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal

Started (date/time): 7-30-91/1640 h Ended (date/time): 8-06-91/1640 h

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (mS/cm)

20% MilliQ/Perrier 64.0 79.0 200

Sample Type: [X] grab [] hr comp.

<u>Sample #</u>	<u>Date/Time Collected</u>	<u>Alk</u> (mg/L)	<u>Hard</u> (mg/L)	<u>Cond</u> (mS/cm)	<u>TRC</u> (ppm)	<u># Renewals</u>
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1	<u>07-29-91 / 1206 h</u>	<u>35.0</u>	<u>50.0</u>	<u>100</u>	<u><0.02*</u>	<u>2</u>
2	<u>08-01-91 / h</u>	<u>14.0</u>	<u>*NA*</u>	<u>50.0</u>	<u><0.02*</u>	<u>3</u>
3	<u>08-02-91 / h</u>	<u>30.0</u>	<u>37.0</u>	<u>90.0</u>	<u><0.02*</u>	<u>2</u>

NA Measurement not taken due to laboratory error.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.5	24.0	24.2	25.3	24.5	24.2	24.3	----
	Initial	7.52	7.54	7.16	7.10	7.57	7.65	7.26	----
DO	Final	----	7.47	6.63	8.03	7.32	7.53	7.22	7.10
	Initial	7.85	8.05	7.70	7.70	7.95	7.50	7.70	----
pH	Final	----	8.00	8.00	7.90	8.00	8.00	8.00	8.00

(0.4) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.4	24.1	24.3	24.1	24.5	24.6	25.0	----
	Initial	7.53	7.49	7.22	7.10	7.40	7.32	7.24	----
DO	Final	----	7.38	6.86	7.11	7.32	7.50	7.11	6.96
	Initial	7.65	7.85	7.65	7.75	7.80	7.70	7.80	----
pH	Final	----	8.20	7.90	8.00	7.85	8.10	7.90	8.00

Comments: *TRC measured in laboratory

NPDES outfall: L-010

Rep	Control		(0.4) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	43	L	45
2	L	38	L	28
3	L	33	L	25
4	L	32	L	31
5	L	34	L	35
6	L	32	L	34
7	L	29	L	34
8	MECHANICAL DEATH	NA	L	39
9	L	38	L	39
10	L	29	L	55
11	D	0	L	30
12	L	36	L	34
13	L	34	L	34
14	L	27	L	39
15	L	35	L	36
16	L	29	L	35
17	L	34	L	42
18	L	33	D	32
19	L	36	L	36
20	L	30	L	30

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>5.3%</u>	<u>31.6</u>
(0.4)% Effluent:	<u>5%</u>	<u>35.7</u>
Statistical Test:	<u>FISHER'S</u>	<u>NA</u>
Pass/Fail:	<u>PASS</u>	<u>PASS</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: _____

Sample 2: _____

Sample 3: _____

Comments: *TRC measured in laboratory

NPDES Outfall: P-005

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	D	36	L	21
2	L	20	L	23
3	L	22	L	26
4	L	35	L	30
5	L	26	L	17
6	L	15	L	19
7	L	27	L	22
8	L	35	L	23
9	L	20	L	22
10	L	25	L	22
11	L	21	L	27
12	L	26	L	25
13	L	25	L	16
14	L	13	L	15
15	L	12	L	8
16	L	18	L	18
17	L	30	L	29
18	L	35	L	16
19	L	30	L	31
20	L	30	D	0

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>5%</u>	<u>25.0</u>
(100)% Effluent:	<u>5%</u>	<u>20.5</u>
Statistical Test:	<u>FISHER'S</u>	<u>T-TEST</u>
Pass/Fail:	<u>PASS</u>	<u>FAIL</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: Not necessary

Sample 2: Not necessary

Sample 3: Not necessary

Facility: Westinghouse Savannah River Company

NPDES Outfall: P-005 DeCl

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-03-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-26.0 °C IWC: 100

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 7-31-91/1530 h Ended (date/time): 8-06-91/1600 h

Dilution Water Source Alk* (mg/L) Hard* (mg/L) Conductivity* (mS/cm)

20% MiliQ/Perrier 124 168 220

Sample Type: [X] grab [] hr comp.

Sample #	Date/Time Collected	Alk* (mg/L)	Hard* (mg/L)	Cond* (mS/cm)	TRC (ppm)	# Renewals
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1	07-29-91 / 1110 h	44.0	78.0	280	0.04**	2
2	08-01-91 / h	45.0	71.0	175	<0.02**	3
3	08-02-91 / h	43.0	71.0	295	0.07**	2

*Chemistry readings reflect addition of sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.7	25.1	24.2	25.3	24.5	24.2	24.7	----
	Initial	7.58	8.02	7.16	7.10	7.57	8.00	7.93	----
DO	Final	----	7.49	6.86	8.03	7.32	7.53	7.41	7.21
	Initial	7.65	7.90	7.70	7.70	7.95	7.40	7.80	----
pH	Final	----	8.20	8.00	7.90	8.00	8.00	7.80	7.80

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.5	24.0	24.2	24.1	24.6	24.0	24.7	----
	Initial	8.07	7.66	6.50	7.20	7.64	8.22	7.79	----
DO	Final	----	7.62	6.79	7.30	7.45	7.10	7.23	6.83
	Initial	7.45	7.70	7.25	7.15	7.30	6.50	7.10	----
pH	Final	----	8.05	7.90	7.80	7.55	7.85	7.80	7.70

Comments: **TRC measured in laboratory. Sodium thiosulfate was added to the control and effluent (TRC reduced to <0.02ppm) prior to testing and chemistry reading.

NPDES Outfall: P-005-DeCl

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	28	L	23
2	L	23	L	23
3	L	22	L	22
4	L	18	D	14
5	L	15	L	15
6	L	30	D	3
7	L	27	L	13
8	L	27	L	24
9	L	20	L	15
10	L	23	L	10
11	L	25	D	8
12	L	23	L	22
13	L	27	L	22
14	L	22	L	30
15	L	22	L	24
16	L	22	L	25
17	L	18	L	16
18	L	26	L	27
19	L	25	L	25
20	L	24	L	23

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>0%</u>	<u>23.3</u>
(100)% Effluent:	<u>15%</u>	<u>19.2</u>
Statistical Test:	<u>FISHER'S</u>	<u>T-TEST</u>
Pass/Fail:	<u>PASS</u>	<u>FAIL</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.04 g/L
 Sample 2: not necessary
 Sample 3: 0.078 g/L

Comments: *TRC measured in laboratory

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	43	L	30
2	L	29	D	21
3	L	38	L	40
4	L	36	L	34
5	L	22	L	44
6	L	41	L	35
7	L	21	L	25
8	L	23	L	28
9	L	36	MECHANICAL DEATH	NA
10	L	28	L	33
11	L	32	L	40
12	L	33	L	42
13	L	31	L	24
14	L	35	L	30
15	L	24	L	45
16	L	32	L	35
17	L	37	L	22
18	L	35	L	30
19	L	35	L	44
20	L	23	L	42

Pass/Fail Test Results% MortalityYoung/Female

Control:
 (100)% Effluent:
 Statistical Test:
 Pass/Fail:

0%
 5.3%
 FISHER'S
 PASS

31.7
 33.9
 NA
 PASS

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: NA

Sample 3: NA

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp.Range: 24.0-25.8 °C IWC: 100%
Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal
Started (date/time): 7-30-91/1770 h Ended (date/time): 8-06-91/1710 h

20% MilliQ/Perrier	<u>63.0</u>	<u>16.0</u>	<u>215</u>
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Sample Type: ☒ grab ☐ hr comp.

<u>Sample #</u>	<u>Date/Time Collected</u>	<u>Alk*</u> (mg/L)	<u>Hard*</u> (mg/L)	<u>Cond*</u> (mS/cm)	<u>TRC</u> (ppm)	<u># Renewals</u>
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1	<u>07-29-91</u> / <u>1255 h</u>	<u>12.0</u>	<u>20.0</u>	<u>335</u>	<u>0.03**</u>	<u>2</u>
2	<u>08-01-91</u> / <u>h</u>	<u>14.0</u>	<u>18.0</u>	<u>500</u>	<u>0.06**</u>	<u>3</u>
3	<u>08-02-91</u> / <u>h</u>	<u>16.0</u>	<u>13.0</u>	<u>50.0</u>	<u><0.02**</u>	<u>2</u>

*Chemistry readings reflect addition of sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.4	24.1	24.5	24.2	24.3	24.2	24.3	----
	DO								
	Initial	7.74	7.59	7.25	7.38	7.54	7.65	7.26	----
	Final	----	7.35	6.55	7.59	7.45	7.55	7.22	7.10
pH	Initial	7.55	7.50	7.60	7.65	7.70	7.50	7.70	----
	Final	----	8.20	8.10	7.90	7.80	8.05	8.00	8.00

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.2	24.5	24.5	24.5	24.3	24.7	----
	DO								
	Initial	8.25	7.70	7.07	7.19	7.58	7.73	8.04	----
	Final	----	7.47	6.93	7.64	7.43	7.47	6.82	6.45
pH	Initial	6.60	7.95	6.90	6.70	6.55	6.40	6.80	----
	Final	----	7.50	7.90	7.70	7.40	7.75	7.10	7.20

Comments:**TRC measured in laboratory. Sodium thiosulfate was added to the control and effluent (TRC reduced to <0.02 ppm) prior to testing and chemistry readings.

NPDES Outfall: P-007-DeCl

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	D	0	D	0
2	D	0	D	1
3	L	0	D	0
4	D	0	D	0
5	L	0	D	0
6	L	7	D	0
7	L	9	D	0
8	L	10	D	0
9	D	0	D	0
10	D	0	D	0
11	D	0	D	0
12	L	10	D	4
13	D	0	L	2
14	D	0	D	3
15	L	8	D	0
16	D	0	D	0
17	L	13	L	9
18	L	12	D	0
19	D	0	L	5
20	L	9	D	4

Pass/Fail Test Results

% Mortality

Young/Female

Control:
 (100)% Effluent:
 Statistical Test:
 Pass/Fail:

50%

85%

FISHER'S

FAIL

3.9

1.4

NA

NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.030 g/L

Sample 2: 0.387 g/L

Sample 3: not necessary

Facility: Westinghouse Savannah River Company

NPDES Outfall: P-013A DeCl

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp.Range: 24.0-25.2 °C IWC: 6%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 10-15-91/1640 h Ended (date/time): 10-19-91/1600 h

Dilution Water Source Alk*(mg/L) Hard*(mg/L) Conductivity*(µmhos/cm)

20% MilliQ/Perrier 60.0 86.0 500

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk* Hard* Cond* TRC # Renewals
(mg/L) (mg/L) (µmhos/cm) (ppm)

1	<u>10-14-91 / 1110 h</u>	<u>74.0</u>	<u>78.0</u>	<u>550</u>	<u>7.70**</u>	<u>2</u>
2	<u>10-16-91 / h</u>	<u>170</u>	<u>15.0</u>	<u>25100</u>	<u>35.0**</u>	<u>2</u>
3	<u>NA / NA h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA **</u>	<u>NA</u>

*Readings reflect the addition of sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.0	24.3	24.9	NA	NA	NA	----
	Final	----	7.63	7.85	7.69	8.09	NA	NA	NA
DO	Initial	8.10	7.77	7.54	7.88	NA	NA	NA	----
	Final	----	7.63	7.85	7.69	8.09	NA	NA	NA
pH	Initial	7.50	8.05	7.70	8.05	NA	NA	NA	----
	Final	----	8.05	8.00	8.15	8.05	NA	NA	NA

(6) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.3	25.2	24.6	24.0	NA	NA	NA	----
	Final	----	7.90	7.83	7.75	7.93	NA	NA	NA
DO	Initial	7.98	7.77	7.43	7.98	NA	NA	NA	----
	Final	----	7.90	7.83	7.75	7.93	NA	NA	NA
pH	Initial	7.70	8.15	8.00	8.20	NA	NA	NA	----
	Final	----	7.95	8.15	8.20	8.10	NA	NA	NA

Comments: **TRC measured in laboratory. Sodium thiosulfate was added to the control and diluent (TRC reduced <0.02 ppm) prior to testing and chemistry readings. Test ended on Day 4 due to complete mortality in the effluent solution.

NPDES Outfall: P-013A-DeCl

Rep	Control		(6) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	D	NA	D	NA
2	L	NA	D	NA
3	D	NA	D	NA
4	D	NA	D	NA
5	D	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	D	NA	D	NA
10	D	NA	D	NA
11	D	NA	D	NA
12	D	NA	D	NA
13	D	NA	D	NA
14	D	NA	D	NA
15	L	NA	D	NA
16	D	NA	D	NA
17	D	NA	D	NA
18	D	NA	D	NA
19	L	NA	D	NA
20	D	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>70%</u>	<u>NA</u>
(6)% Effluent:	<u>100%</u>	<u>NA</u>
Statistical Test:	<u>FISHER'S</u>	<u>NA</u>
Pass/Fail:	<u>FAIL</u>	<u>NA</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 7.590 g/L then 6% = 0.455 g/L in test solution
Sample 2: 35.060 g/L then 6% = 2.104 g/L in test solution
Sample 3: NA

Facility: Westinghouse Savannah River Company

NPDES Outfall: P-019

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-26.0 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 10-15-91/1615 h Ended (date/time): 10-22-91/1620h

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (μmhos/cm)

20% MilliQ/Perrier 62.0 81.0 155

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk Hard Cond TRC # Renewals
(mg/L) (mg/L) (μmhos/cm) (ppm)

1	<u>10-14-91 / 1119 h</u>	<u>25.0</u>	<u>20.0</u>	<u>190</u>	<u>0.05*</u>	<u>2</u>
2	<u>10-16-91 / h</u>	<u>22.0</u>	<u>20.0</u>	<u>90</u>	<u>0.05*</u>	<u>3</u>
3	<u>10-18-91 / 1235 h</u>	<u>15.0</u>	<u>17.0</u>	<u>210</u>	<u>0.05*</u>	<u>2</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	26.0	25.5	25.0	24.0	24.7	24.1	24.2	----
	Initial	8.07	7.54	7.77	7.86	8.22	7.99	7.81	----
DO	Final	----	7.28	7.81	7.80	7.48	7.99	7.81	7.85
	Initial	8.10	8.10	7.95	8.00	7.85	8.00	8.15	----
pH	Final	----	7.95	8.00	8.00	8.00	8.00	8.15	8.00

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.2	24.1	24.1	25.4	24.6	24.6	----
	Initial	8.91	8.88	7.96	8.42	8.40	8.93	8.53	----
DO	Final	----	7.51	7.84	8.05	7.89	8.06	7.14	8.06
	Initial	8.40	7.70	7.80	7.65	7.40	6.70	7.25	----
pH	Final	----	7.70	7.40	7.65	7.50	7.40	6.00	7.55

Comments: *TRC measured in laboratory.

NPDES Outfall: P-019

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	27	L	19
2	L	40	L	26
3	L	25	D	15
4	L	25	L	20
5	L	28	L	25
6	L	26	L	35
7	L	28	L	27
8	L	21	L	21
9	L	19	L	29
10	L	20	L	33
11	L	17	L	8
12	L	12	D	9
13	L	24	L	23
14	L	10	L	21
15	L	42	L	17
16	D	11	L	16
17	L	31	D	4
18	L	25	L	20
19	L	34	D	21
20	L	39	L	0

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>5%</u>	<u>25.2</u>
(100)% Effluent:	<u>20%</u>	<u>19.4</u>
Statistical Test:	<u>FISHER'S</u>	<u>t-TEST</u>
Pass/Fail:	<u>PASS</u>	<u>FAIL</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: NA

Sample 3: NA

Comments: **TRC measured in laboratory. Sodium thiosulfate was added to the control and diluent (TRC reduced <0.02 ppm) prior to testing and chemistry readings.

NPDES Outfall: P-019-DeCl

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	NA	L	NA
2	L	NA	D	NA
3	L	NA	L	NA
4	L	NA	L	NA
5	L	NA	D	NA
6	L	NA	L	NA
7	L	NA	D	NA
8	L	NA	L	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	L	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	L	NA
18	L	NA	L	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	NA
(100)% Effluent:	60%	NA
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.050 g/L

Sample 2: 0.053 g/L

Sample 3: 0.048 g/L

Facility: Westinghouse Savannah River Company

NPDES Outfall: S-002

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.7 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 08-27-91/1420 h Ended (date/time): 09-03-91/1445 h

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (μmhos/cm)

20% MilliQ/Perrier 66.0 80.0 195

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk Hard Cond TRC # Renewals
(mg/L) (mg/L) (μmhos/cm) (ppm)

1	<u>08-27-91 /</u> <u>h</u>	<u>40.0</u>	<u>41.0</u>	<u>115</u>	<u>0.04*</u>	<u>2</u>
2	<u>08-28-91 /</u> <u>0920 h</u>	<u>38.0</u>	<u>50.0</u>	<u>115</u>	<u><0.02*</u>	<u>3</u>
3	<u>08-30-91 /</u> <u>1018 h</u>	<u>42.0</u>	<u>41.0</u>	<u>115</u>	<u><0.02*</u>	<u>2</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.3	25.0	24.9	25.3	24.1	24.3	25.7	----
	Initial	7.61	7.48	7.89	7.27	7.54	7.66	7.32	----
DO	Final	----	7.62	8.08	7.27	7.43	7.55	7.29	7.55
	Initial	7.85	7.70	8.00	8.10	8.05	8.10	8.05	----
pH	Final	----	7.70	8.20	8.00	8.15	8.15	8.15	8.10

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.0	24.6	24.3	24.5	24.3	24.8	24.1	----
	Initial	7.19	8.29	8.25	7.58	7.84	7.30	7.67	----
DO	Final	----	7.64	8.16	7.43	7.09	7.19	7.42	7.23
	Initial	7.10	6.90	7.30	7.00	6.85	6.85	7.30	----
pH	Final	----	7.60	7.65	7.80	7.80	7.60	7.85	8.00

Comments: *TRC measured in laboratory

NPDES Outfall: S-002

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	34	L	27
2	L	25	L	28
3	L	28	L	29
4	L	36	L	25
5	L	26	L	22
6	L	31	L	27
7	L	17	L	35
8	L	30	L	25
9	L	26	L	15
10	L	0	L	25
11	L	23	L	26
12	L	20	L	21
13	L	39	L	43
14	L	33	L	45
15	L	23	L	26
16	D	4	L	25
17	L	32	L	25
18	L	29	D	0
19	L	32	L	14
20	L	32	L	23

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>5%</u>	<u>26.0</u>
(100)% Effluent:	<u>5%</u>	<u>25.3</u>
Statistical Test:	<u>FISHER'S</u>	<u>WILCOXON</u>
Pass/Fail:	<u>PASS</u>	<u>PASS</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: NA

Sample 3: NA

(TRC reduced to <0.02ppm) prior to testing and chemistry readings.

NPDES Outfall: S-002-Dec1

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	31	L	32
2	L	27	L	30
3	L	36	L	33
4	L	32	L	30
5	L	27	L	27
6	L	27	L	20
7	L	27	D	6
8	L	27	L	25
9	L	36	L	37
10	L	41	L	29
11	L	15	L	17
12	L	34	L	39
13	L	35	L	23
14	D	6	L	31
15	L	34	L	34
16	L	17	D	5
17	L	28	L	27
18	L	32	L	32
19	L	31	L	32
20	L	29	L	26

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>5%</u>	<u>28.6</u>
(100)% Effluent:	<u>10%</u>	<u>26.8</u>
Statistical Test:	<u>FISHER'S</u>	<u>WILCOXON</u>
Pass/Fail:	<u>PASS</u>	<u>PASS</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.040 g/L

Sample 2: Not necessary

Sample 3: Not necessary

Laboratory: NORMANDEAU Cert. No.: 87075 Exp. Date: SPECIAL ISSUE

Started (date/time): 7-16-91/1510 Ended (date/time): 7-18-91

20% MiliQ/Perrier	<u>62.0</u>	<u>76.0</u>	1750
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Sample Type: ☒ grab ☐ hr comp.

			(mg/L)	(mg/L)	(mS/cm)	(ppm)	
1	07-15-91	1422 h	41.0	46.0	1800	5.0 **	NA
2	NA	NA h	NA	NA	NA	NA	NA
3	NA	NA h	NA	NA	NA	NA	NA

*Chemistry readings reflect addition of sodium thiosulfate.

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.3	24.2	NA	NA	NA	NA	NA	----
	Final	----	7.30	7.31	NA	NA	NA	NA	NA
DO	Initial	8.67	7.82	NA	NA	NA	NA	NA	----
	Final	----	7.30	7.31	NA	NA	NA	NA	NA
pH	Initial	7.50	7.60	NA	NA	NA	NA	NA	----
	Final	----	8.10	8.10	NA	NA	NA	NA	NA

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.5	24.0	NA	NA	NA	NA	NA	----
DO	Initial	8.71	7.51	NA	NA	NA	NA	NA	----
	Final	----	7.72	7.28	NA	NA	NA	NA	NA
pH	Initial	7.80	7.80	NA	NA	NA	NA	NA	----
	Final	----	8.10	8.20	NA	NA	NA	NA	NA

Comments: **TRC measured in laboratory. Test terminated on Day 2 due to complete mortality in the effluent concentration, and partial mortality in the control. TRC was reduced via aeration and addition of sodium thio - sulfate to the control and effluent (TRC reduced to <0.02ppm prior to test.

NPDES Outfall: S-011-DeCl

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	NA	D	NA
2	D	NA	D	NA
3	L	NA	D	NA
4	D	NA	D	NA
5	D	NA	D	NA
6	L	NA	D	NA
7	D	NA	D	NA
8	D	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	D	NA	D	NA
12	L	NA	D	NA
13	D	NA	D	NA
14	D	NA	D	NA
15	D	NA	D	NA
16	D	NA	D	NA
17	D	NA	D	NA
18	D	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	60%	NA
(100)% Effluent:	100%	NA
Statistical Test:	NA	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 2.0g/L

Sample 2 NA

Sample 3 NA

Facility: Westinghouse Savannah River Company

NPDES Outfall: T-005

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.8 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 08-01-91/1455 h Ended (date/time): 08-08-91/1550 h

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (mS/cm)

20% MiliQ/Perrier 64.0 80.0 190

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk (mg/L) Hard (mg/L) Cond (mS/cm) TRC (ppm) # Renewals

1	<u>08-01-91</u> / <u>h</u>	<u>28.0</u>	<u>50.0</u>	<u>120</u>	<u>0.04*</u>	<u>3</u>
2	<u>08-02-91</u> / <u>h</u>	<u>19.0</u>	<u>28.0</u>	<u>80.0</u>	<u>0.13*</u>	<u>2</u>
3	<u>08-05-91</u> / <u>h</u>	<u>31.0</u>	<u>30.0</u>	<u>110</u>	<u>0.18*</u>	<u>2</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.2	25.3	24.5	24.2	24.3	24.4	24.7	----
	Final	----	8.03	7.32	7.53	7.22	7.10	7.04	7.79
DO	Initial	7.16	7.10	7.57	7.65	7.26	7.42	7.54	----
	Final	----	8.03	7.32	7.53	7.22	7.10	7.04	7.79
pH	Initial	7.70	7.70	7.95	7.50	7.70	7.80	7.70	----
	Final	----	7.90	8.00	8.00	8.00	8.00	8.00	7.65

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.0	24.6	24.4	24.6	25.4	24.1	----
	Final	----	7.08	7.27	7.82	7.03	6.84	6.96	7.87
DO	Initial	6.94	7.28	7.58	8.37	7.70	7.66	7.69	----
	Final	----	7.08	7.27	7.82	7.03	6.84	6.96	7.87
pH	Initial	6.90	7.00	7.00	6.40	7.10	6.90	7.10	----
	Final	----	7.50	7.30	7.65	7.05	7.40	7.50	7.30

Comments: *TRC measured in laboratory

NPDES Outfall: T-005

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	41	L	35
2	L	38	L	25
3	L	36	L	39
4	L	33	L	36
5	L	35	L	28
6	L	35	L	27
7	L	24	L	25
8	L	28	L	33
9	L	37	L	28
10	L	45	L	44
11	L	28	L	28
12	L	31	D	29
13	L	30	L	32
14	L	39	L	32
15	L	42	L	29
16	L	25	L	29
17	L	45	L	50
18	L	38	L	44
19	L	40	L	29
20	L	34	L	38

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	35.2
(100)% Effluent:	5%	33.0
Statistical Test:	FISHER'S	T-TEST
Pass/Fail:	PASS	PASS

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: _____

Sample 2: _____

Sample 3: _____

Facility: Westinghouse Savannah River Company

NPDES Outfall: T-005-DeCl

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp.Range: 24.0-26.0 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal

Started (date/time): 08-01-91/1505 h Ended (date/time): 08-08-91/1600 h

Dilution Water Source Alk* (mg/L) Hard* (mg/L) Conductivity* (mS/cm)

20% MilliQ/Perrier 64.0 82.0 320

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk* (mg/L) Hard* (mg/L) Cond* (mS/cm) TRC (ppm) # Renewals

1	<u>08-01-91</u> / <u> </u> h	<u>32.0</u>	<u>55.0</u>	<u>290</u>	<u>0.04**</u>	<u>3</u>
2	<u>08-02-91</u> / <u> </u> h	<u>34.0</u>	<u>25.0</u>	<u>210</u>	<u>0.13**</u>	<u>2</u>
3	<u>08-05-91</u> / <u> </u> h	<u>44.0</u>	<u>30.0</u>	<u>310</u>	<u>0.18**</u>	<u>2</u>

*Chemistry reading reflects addition of sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.2	24.0	24.5	24.3	24.4	25.6	24.0	----
	Initial	7.07	7.46	7.43	7.81	7.98	7.50	7.74	----
DO	Final	----	7.35	7.25	7.88	7.55	7.17	6.95	7.86
	Initial	7.60	7.60	7.70	7.40	7.70	7.60	7.50	----
pH	Final	----	8.00	7.90	8.20	7.75	7.90	7.95	7.70

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.2	24.0	24.6	24.0	24.2	24.0	24.0	----
	Initial	6.99	7.14	7.46	7.85	7.81	8.00	7.28	----
DO	Final	----	7.36	7.18	7.55	7.12	6.66	7.28	7.64
	Initial	7.00	6.85	6.85	7.00	6.50	6.90	6.85	----
pH	Final	----	7.60	7.50	7.80	7.40	7.50	7.50	7.60

Comments: **TRC measured in laboratory. Sodium thiosulfate was added to the control and effluent (TRC reduced to <0.02 ppm) prior to testing and chemistry readings.

NPDES Outfall: T-005-DeCl

	Control		(100) % Effluent	
Rep	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	0	L	0
2	L	0	D	0
3	L	0	D	0
4	L	0	L	0
5	L	0	D	0
6	L	0	L	0
7	D	0	L	0
8	L	0	L	0
9	L	0	L	0
10	L	0	L	0
11	L	0	L	0
12	L	0	L	0
13	L	0	L	0
14	D	0	D	0
15	L	0	L	0
16	L	0	L	0
17	L	0	L	0
18	L	0	L	0
19	L	0	L	0
20	D	0	L	0

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>15%</u>	<u>0</u>
(100)% Effluent:	<u>20%</u>	<u>0</u>
Statistical Test:	<u>FISHER'S</u>	<u>NA</u>
Pass/Fail:	<u>PASS</u>	<u>NA</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.043 g/L

Sample 2: 0.133 g/L

Sample 3: 0.180 g/L

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-03-93

Started (date/time): 7-30-91/1555 h Ended (date/time): 8-06-91/1605 h

20% MiliQ/Perrier	<u>64.0</u>	<u>79.0</u>	200
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Sample Type: ☒ grab ☐ hr comp.

1	<u>07-29-91</u>	<u>/</u>	<u>0912 h</u>	<u>58.0</u>	<u>20.0</u>	<u>750</u>	<u>0.09*</u>	<u>2</u>
2	<u>08-01-91</u>	<u>/</u>	<u>h</u>	<u>134</u>	<u>19.0</u>	<u>1100</u>	<u>13.0*</u>	<u>1</u>
3	<u>08-02-91</u>	<u>/</u>	<u>h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA *</u>	<u>NA</u>

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.5	24.0	24.2	NA	NA	NA	NA	----
	Final	----	7.47	6.63	8.03	NA	NA	NA	NA
DO	Initial	7.52	7.54	7.16	NA	NA	NA	NA	----
	Final	----	7.47	6.63	8.03	NA	NA	NA	NA
pH	Initial	7.85	8.05	7.70	NA	NA	NA	NA	----
	Final	----	8.00	8.00	7.90	NA	NA	NA	NA

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.4	24.8	24.4	NA	NA	NA	NA	----
	DO								
	Initial	7.17	7.68	6.99	NA	NA	NA	NA	----
	Final	----	7.30	6.83	7.25	NA	NA	NA	NA
pH	Initial	7.55	7.60	7.80	NA	NA	NA	NA	----
	Final	----	8.00	7.85	8.30	NA	NA	NA	NA

Comments: *TRC measured in laboratory. Test terminated on day 3 due to complete mortality in the IWC.

NPDES Outfall: T-007

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	NA	D	NA
2	L	NA	D	NA
3	L	NA	D	NA
4	L	NA	D	NA
5	L	NA	D	NA
6	L	NA	D	NA
7	L	NA	D	NA
8	L	NA	D	NA
9	L	NA	D	NA
10	L	NA	D	NA
11	L	NA	D	NA
12	L	NA	D	NA
13	L	NA	D	NA
14	L	NA	D	NA
15	L	NA	D	NA
16	L	NA	D	NA
17	L	NA	D	NA
18	L	NA	D	NA
19	L	NA	D	NA
20	L	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	NA
(100)% Effluent:	100%	NA
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: Not necessary

Sample 2: Not necessary

Sample 3: Not necessary

Facility: Westinghouse Savannah River Company

NPDES Outfall: T-007-DeCl

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-24.9 °C IWC: 100%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 07-30-91/1615 h Ended (date/time): 08-02-91 h

Dilution Water Source Alk* (mg/L) Hard* (mg/L) Conductivity* (mS/cm)

20% MilliQ/Perrier 62.0 90.0 240

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk* (mg/L) Hard* (mg/L) Cond* (mS/cm) TRC (ppm) # Renewals

1	<u>07-29-91 / 0912 h</u>	<u>60.0</u>	<u>22.0</u>	<u>950</u>	<u>0.09**</u>	<u>2</u>
2	<u>08-01-91 / h</u>	<u>138</u>	<u>26.0</u>	<u>10000</u>	<u>13.0**</u>	<u>1</u>
3	<u>08-02-91 / h</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA**</u>	<u>NA</u>

*Chemistry readings reflect addition to sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.1	24.8	24.0	NA	NA	NA	NA	----
	Initial	7.52	8.03	7.19	NA	NA	NA	NA	----
DO	Final	----	7.47	6.98	7.13	NA	NA	NA	NA
	Initial	7.70	7.90	7.80	NA	NA	NA	NA	----
pH	Final	----	8.20	7.90	8.10	NA	NA	NA	NA

(100) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.5	24.8	24.2	NA	NA	NA	NA	----
	Initial	7.37	8.72	6.96	NA	NA	NA	NA	----
DO	Final	----	7.58	6.76	6.75	NA	NA	NA	NA
	Initial	7.55	7.75	8.00	NA	NA	NA	NA	----
pH	Final	----	8.10	7.80	8.50	NA	NA	NA	NA

Comments: **TRC measured in laboratory. Test terminated on Day 3 due to complete mortality in the test concentration. Sodium thiosulfate was added to the control and effluent (TRC reduced to <0.02 ppm) prior to testing and chemistry readings.

NPDES Outfall: T-007-DeCl

Rep	Control		(100) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	D	NA	D	NA
2	D	NA	D	NA
3	D	NA	D	NA
4	D	NA	D	NA
5	D	NA	D	NA
6	D	NA	D	NA
7	D	NA	D	NA
8	D	NA	D	NA
9	D	NA	D	NA
10	D	NA	D	NA
11	D	NA	D	NA
12	D	NA	D	NA
13	D	NA	D	NA
14	D	NA	D	NA
15	D	NA	D	NA
16	D	NA	D	NA
17	D	NA	D	NA
18	D	NA	D	NA
19	D	NA	D	NA
20	D	NA	D	NA

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	100%	NA
(100)% Effluent:	100%	NA
Statistical Test:	FISHER'S	NA
Pass/Fail:	FAIL	NA

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.060 g/L

Sample 2: 13.02 g/L

Sample 3: NA

Comments: *TRC measured in laboratory

NPDES Outfall: X-004

Rep	Control		(0.002) % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	21	L	22
2	L	32	L	28
3	L	26	D	13
4	L	17	L	29
5	L	28	L	22
6	L	27	L	22
7	L	9	D	11
8	L	24	L	21
9	D	27	L	26
10	L	26	L	30
11	L	18	L	15
12	L	16	L	27
13	L	25	L	28
14	L	25	L	16
15	L	13	L	23
16	L	22	L	27
17	L	24	L	26
18	L	25	L	27
19	L	23	L	26
20	L	25	L	26

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	5%	22.7
(0.002)% Effluent:	10%	23.3
Statistical Test:	FISHER'S	NA
Pass/Fail:	PASS	PASS

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: NA

Sample 3: NA

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp.Range: 24.0-25.8 °C IWC: 0.01%
Test Type: [] hr acute; [7] d chronic; ___ static X daily-renewal
Started (date/time): 08-13-91/1455 h Ended (date/time): 08-20-91/1555 h

<u>Dilution Water Source</u>	<u>Alk (mg/L)</u>	<u>Hard (mg/L)</u>	<u>Conductivity (μmhos/cm)</u>
20% MilliQ/Perrier	64.0	80.0	190

Sample Type: ☒ grab ☐ hr comp.

<u>Sample #</u>	<u>Date/Time Collected</u>	<u>Alk</u> (mg/L)	<u>Hard</u> (mg/L)	<u>Cond</u> (μmhos/cm)	<u>TRC</u> (ppm)	<u># Renewals</u>
1	<u>08-12-91</u> / <u>1040 h</u>	<u>17.0</u>	<u>23.0</u>	<u>70.0</u>	<u>0.04*</u>	<u>2</u>
2	<u>08-14-91</u> / <u>h</u>	<u>16.0</u>	<u>18.0</u>	<u>70.0</u>	<u><0.02*</u>	<u>3</u>
3	<u>08-16-91</u> / <u>h</u>	<u>14.0</u>	<u>23.0</u>	<u>75.0</u>	<u>0.08*</u>	<u>2</u>

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.8	24.5	24.5	24.0	24.1	24.5	24.3	----
	DO								
	Initial	7.34	7.73	7.58	7.23	7.72	7.76	7.37	----
	Final	----	7.52	7.28	7.45	7.67	7.28	7.34	7.66
pH	Initial	8.00	7.80	7.95	7.70	7.90	7.60	7.80	----
	Final	----	8.05	8.10	7.90	7.60	7.80	7.85	8.00

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.0	24.2	24.6	24.2	24.5	24.3	24.0	----
	DO								
	Initial	7.34	7.68	7.63	7.26	7.48	7.67	7.20	----
	Final	----	7.58	7.47	7.20	7.10	7.35	7.28	7.34
pH	Initial	7.85	7.70	7.85	7.45	7.65	7.60	7.80	----
	Final	----	7.95	7.85	7.80	7.80	7.90	7.85	8.05

Comments: *TRC measured in laboratory

NPDES Outfall: X-008

Rep	Control		(0.01) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	32	L	27
2	L	41	L	20
3	L	24	L	28
4	L	25	L	18
5	L	26	L	24
6	L	24	D	8
7	L	27	D	5
8	L	24	L	25
9	L	28	L	21
10	L	25	L	33
11	L	20	L	31
12	L	29	L	26
13	L	29	L	24
14	L	27	L	15
15	L	26	L	27
16	L	17	L	27
17	L	26	L	25
18	L	27	L	19
19	L	24	L	22
20	L	22	L	19

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	26.2
(0.01)% Effluent:	10%	22.2
Statistical Test:	FISHER'S	T-TEST
Pass/Fail:	PASS	FAIL

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: NA

Sample 3: NA

Facility: Westinghouse Savannah River Company

NPDES Outfall: X-008 DeCl

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.2 °C IWC: 0.01%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 08-13-91/1500 h Ended (date/time): 08-20-91/1600 h

Dilution Water Source Alk*(mg/L) Hard*(mg/L) Conductivity (μmhos/cm)

20% MilliQ/Perrier 30.0 82.0 180

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk* Hard* Cond* TRC # Renewals
(mg/L) (mg/L) (μmhos/cm) (ppm)

1	<u>08-12-91 / 1040 h</u>	<u>18.0</u>	<u>23.0</u>	<u>235</u>	<u>0.04**</u>	<u>2</u>
2	<u>08-14-91 / h</u>	<u>16.0</u>	<u>18.0</u>	<u>70.0</u>	<u><0.02**</u>	<u>3</u>
3	<u>08-16-91 / h</u>	<u>16.0</u>	<u>22.0</u>	<u>270</u>	<u>0.08**</u>	<u>2</u>

*Readings reflect addition of sodium thiosulfate.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.1	24.6	24.5	24.0	24.1	25.2	24.0	----
	Final	----	7.53	7.34	7.45	7.67	7.28	7.62	7.10
DO	Initial	7.11	7.80	7.58	7.23	7.72	7.32	7.47	----
	Final	----	7.53	7.34	7.45	7.67	7.28	7.62	7.10
pH	Initial	7.70	7.70	7.95	7.70	7.90	7.60	7.70	----
	Final	----	7.85	7.60	7.90	7.60	7.80	7.75	8.10

(0.01) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.2	24.6	24.6	24.7	24.6	24.6	24.0	----
	Final	----	7.38	7.37	7.20	7.31	7.35	7.06	7.01
DO	Initial	7.31	7.59	7.63	7.13	7.56	7.51	7.24	----
	Final	----	7.38	7.37	7.20	7.31	7.35	7.06	7.01
pH	Initial	7.60	7.70	7.85	7.35	7.70	7.70	7.80	----
	Final	----	8.00	7.90	7.80	7.70	7.90	7.95	8.20

Comments: **TRC measured in laboratory. Sodium thiosulfate was added to the control and effluent (TRC reduced to <0.02ppm) prior to testing and chemistry readings.

NPDES Outfall: X-008-DeCl

Rep	Control		(0.01) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	24	L	31
2	L	27	L	30
3	L	21	L	11
4	L	27	L	10
5	L	29	L	29
6	L	26	L	18
7	L	24	L	23
8	L	21	L	27
9	L	10	L	26
10	L	26	L	30
11	L	18	L	19
12	L	24	L	29
13	L	19	L	20
14	L	22	L	23
15	L	15	L	26
16	L	26	L	25
17	L	18	L	26
18	L	20	L	20
19	L	0	L	27
20	L	13	L	22

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>0%</u>	<u>20.5</u>
(0.01)% Effluent:	<u>0%</u>	<u>23.6</u>
Statistical Test:	<u>FISHER'S</u>	<u>NA</u>
Pass/Fail:	<u>PASS</u>	<u>PASS</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: 0.040 g/L then 0.01%

Sample 2: Not necessary

Sample 3: 0.080 g/L then 0.01%

Facility: Westinghouse Savannah River Company

NPDES Outfall: X-011

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.8 °C IWC: 0.0001%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 08-13-91/1500 h Ended (date/time): 08-20-91/1600 h

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (μmhos/cm)

20% MilliQ/Perrier 64.0 80.0 190

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk (mg/L) Hard (mg/L) Cond (μmhos/cm) TRC (ppm) # Renewals

1	<u>08-12-91 / 1058 h</u>	<u>61.0</u>	<u>68.0</u>	<u>175</u>	<u><0.02*</u>	<u>2</u>
2	<u>08-14-91 / h</u>	<u>68.0</u>	<u>86.0</u>	<u>220</u>	<u><0.02*</u>	<u>3</u>
3	<u>08-16-91 / h</u>	<u>57.0</u>	<u>60.0</u>	<u>165</u>	<u><0.02*</u>	<u>2</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.8	24.5	24.5	24.0	24.1	24.5	24.3	----
	Initial	7.34	7.73	7.58	7.23	7.72	7.76	7.37	----
DO	Final	----	7.52	7.28	7.45	7.67	7.28	7.34	7.66
	Initial	8.00	7.80	7.95	7.70	7.90	7.60	7.80	----
pH	Final	----	8.05	8.10	7.90	7.60	7.80	7.85	8.00

(0.0001)% Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.5	24.3	25.3	24.8	24.5	24.0	24.2	----
	Initial	7.09	7.68	7.44	7.36	7.42	7.73	7.08	----
DO	Final	----	7.48	7.51	7.24	7.54	7.23	7.15	7.10
	Initial	7.55	7.75	7.85	7.60	7.80	7.65	7.90	----
pH	Final	----	7.95	7.90	7.80	7.70	7.90	8.00	8.05

Comments: *TRC measured in laboratory

NPDES Outfall: X-011

Rep	Control		(0.0001) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	24	L	22
2	L	22	L	27
3	L	22	L	19
4	L	20	L	25
5	L	20	L	19
6	L	24	D	5
7	L	27	L	25
8	L	27	L	21
9	L	31	L	24
10	L	29	L	28
11	L	23	L	24
12	L	27	L	18
13	L	24	L	23
14	L	23	L	22
15	L	25	L	23
16	L	26	L	19
17	L	25	D	18
18	L	22	L	24
19	L	25	L	26
20	L	20	L	20

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	24.3
(0.0001)% Effluent:	10%	21.6
Statistical Test:	FISHER'S	WILCOXON
Pass/Fail:	PASS	FAIL

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: NA

Sample 3: NA

Facility: Westinghouse Savannah River Company

NPDES Outfall: X-013

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-25.8 °C IWC: 0.0002%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 08-13-91/1510 h Ended (date/time): 08-20-91/1610 h

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (μmhos/cm)

20% MilliQ/Perrier 64.0 80.0 190

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk Hard Cond TRC # Renewals
(mg/L) (mg/L) (μmhos/cm) (ppm)

1	<u>08-12-91</u> / <u>1053 h</u>	<u>163</u>	<u>41.0</u>	<u>1450</u>	<u>110 *</u>	<u>2</u>
2	<u>08-14-91</u> / <u>h</u>	<u>12.0</u>	<u>39.0</u>	<u>1600</u>	<u>80 *</u>	<u>3</u>
3	<u>08-16-91</u> / <u>h</u>	<u>123</u>	<u>53.0</u>	<u>1450</u>	<u>90 *</u>	<u>2</u>

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.8	24.5	24.5	24.0	24.1	24.5	24.3	----
	Final	----	7.52	7.28	7.45	7.67	7.28	7.34	7.66
DO	Initial	7.34	7.73	7.58	7.23	7.72	7.76	7.37	----
	Final	----	7.52	7.28	7.45	7.67	7.28	7.34	7.66
pH	Initial	8.00	7.80	7.95	7.70	7.90	7.60	7.80	----
	Final	----	8.05	8.10	7.90	7.60	7.80	7.85	8.00

(0.0002) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	25.2	24.0	25.0	24.1	24.2	24.1	24.4	----
	Final	----	7.41	7.55	7.16	7.55	7.21	7.28	6.92
DO	Initial	7.32	7.68	7.47	7.44	7.52	7.65	7.17	----
	Final	----	7.41	7.55	7.16	7.55	7.21	7.28	6.92
pH	Initial	7.70	7.70	7.90	7.60	7.70	7.70	7.90	----
	Final	----	7.95	7.90	7.80	7.75	7.90	8.00	8.05

Comments: *TRC measured in laboratory. The TRC is reduced to <0.02 during dilution to 0.0002%.

NPDES Outfall: X-013

Rep	Control		(0.0002) % Effluent	
	Adult(L/D)	# Young	Adult(L/D)	# Young
1	L	19	L	26
2	L	29	L	27
3	L	31	L	25
4	L	29	L	24
5	L	23	L	24
6	L	17	L	27
7	L	23	D	11
8	L	27	L	22
9	L	27	L	17
10	L	28	L	30
11	L	23	L	28
12	L	24	L	24
13	L	28	L	14
14	L	31	L	9
15	L	23	L	8
16	L	27	L	24
17	L	13	L	14
18	L	14	L	9
19	L	15	L	27
20	MECAHNICAL DEATH	NA	L	8

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	0%	23.7
(0.0002)% Effluent:	5%	19.9
Statistical Test:	FISHER'S	T-TEST
Pass/Fail:	PASS	FAIL

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: NA

Sample 3: NA

Facility: Westinghouse Savannah River Company

NPDES Outfall: X-014 DeCl

Laboratory: NORMANDEAU Cert. No.: 91079 Exp. Date: 02-01-93

Test Organism: Ceriodaphnia dubia Temp. Range: 24.0-26.0 °C IWC: 0.002%

Test Type: [] hr acute; [7] d chronic; static X daily-renewal

Started (date/time): 10-15-91/1515 h Ended (date/time): 10-22-91/1621h

Dilution Water Source Alk (mg/L) Hard (mg/L) Conductivity (µmhos/cm)

20% MilliQ/Perrier 62.0 81.0 155

Sample Type: [X] grab [] hr comp.

Sample # Date/Time Collected Alk (mg/L) Hard (mg/L) Cond (µmhos/cm) TRC (ppm) # Renewals

1	<u>10-14-91 / 1158 h</u>	<u>101</u>	<u>23.0</u>	<u>420</u>	<u><0.02*</u>	<u>2</u>
2	<u>10-16-91 / h</u>	<u>43.0**</u>	<u>100 **</u>	<u>140**</u>	<u>0.05*</u>	<u>3</u>
3	<u>10-18-91 / 0930 h</u>	<u>200 **</u>	<u>16.0**</u>	<u>700**</u>	<u>0.03*</u>	<u>2</u>

**Readings reflect addition of sodium thiosulfate to samples 2 and 3.

Control

Day		0	1	2	3	4	5	6	7
Temp	Initial	26.0	25.5	24.8	25.0	24.6	24.1	24.1	----
	Final	----	7.28	7.81	7.74	7.05	7.94	7.74	8.13
DO	Initial	8.07	7.54	7.99	7.75	8.11	8.02	8.17	----
	Final	----	7.28	7.81	7.74	7.05	7.94	7.74	8.13
pH	Initial	8.10	8.10	7.90	8.00	7.90	7.50	8.00	----
	Final	----	7.95	8.00	8.20	8.10	8.10	8.00	8.15

(0.002) % Effluent

Day		0	1	2	3	4	5	6	7
Temp	Initial	24.2	24.0	24.0	24.0	24.1	24.7	24.0	----
	Final	----	7.41	7.90	8.16	8.20	8.05	7.78	8.21
DO	Initial	8.25	7.71	8.17	8.07	8.14	7.83	8.11	----
	Final	----	7.41	7.90	8.16	8.20	8.05	7.78	8.21
pH	Initial	7.40	8.00	7.85	8.05	8.00	8.00	8.00	----
	Final	----	8.05	7.95	8.20	8.15	8.15	8.10	8.20

Comments: *TRC measured in laboratory. Sodium thiosulfate was added to samples 2 and 3 prior to testing and chemistry readings (TRC reduced to <0.02 ppm.).

NPDES Outfall: X-014-DeCl

Rep	Control		(0.002) % Effluent	
	Adult (L/D)	# Young	Adult (L/D)	# Young
1	L	23	L	29
2	L	23	L	28
3	L	27	L	28
4	L	34	L	27
5	L	9	L	28
6	L	28	L	28
7	L	20	L	26
8	L	28	L	23
9	L	36	L	40
10	L	37	L	23
11	L	30	L	30
12	L	19	L	33
13	L	29	L	21
14	L	45	L	37
15	L	18	L	27
16	L	37	L	40
17	L	24	L	25
18	L	37	L	39
19	MECHANICAL DEATH	NA	L	34
20	L	36	L	32

<u>Pass/Fail Test Results</u>	<u>% Mortality</u>	<u>Young/Female</u>
Control:	<u>0%</u>	<u>28.4</u>
(0.002)% Effluent:	<u>0%</u>	<u>29.9</u>
Statistical Test:	<u>FISHER'S</u>	<u>NA</u>
Pass/Fail:	<u>PASS</u>	<u>PASS</u>

Amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) added to diluent and effluent:

Sample 1: NA

Sample 2: 0.053 g/L then 0.002% = 10.6×10^{-5} g/L in test sol'n

Sample 3: 0.024 g/L then 0.002% = 4.8×10^{-7} g/L in test sol'n

END

**DATE
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