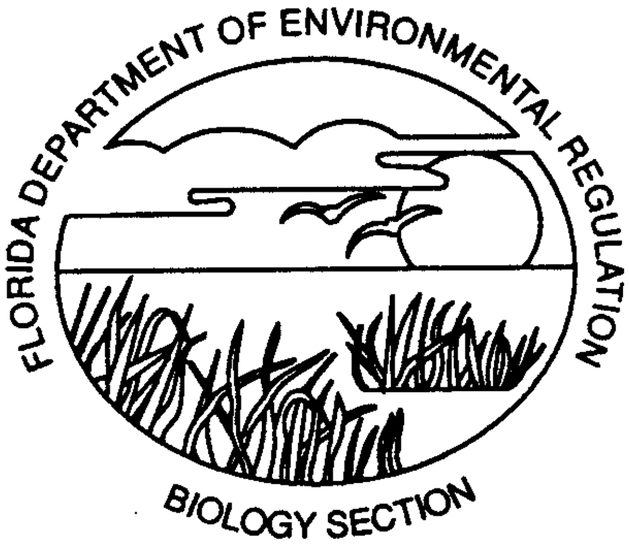


Bioassays of

Cecil Field NAS Sewage Treatment Plant

Naval Air Station, Duval County, Florida

NPDES #FL0020966

Sampled 9/5/89

November 14, 1989

Biology Section
Division of Administrative and Technical Services

Bioassays of

Cecil Field NAS Sewage Treatment Plant

Naval Air Station, Duval County, Florida

NPDES #FL0020966

Biology Section
Bureau of Laboratories
November 14, 1989

Introduction

Cecil Field NAS Sewage Treatment Plant, Duval County, Florida, NPDES #FL0020966, on 6 to 8 September, 1989.

This plant serves the personnel of Cecil Field NAS. It also provides secondary treatment for a variety of effluents generated as a result of the Naval Air Station's standard operating and maintenance procedures. The facility, with a design capacity of 0.82 MGD, discharges recovered water to the Caldwell Branch of Sal Taylor Creek.

The toxicity tests discussed in this report were performed in accordance with methods described by Peltier and Weber, 1985, *Methods for Measuring the Acute Toxicity of Effluents to Aquatic Organisms*, 3rd Edition, and by the FDER Biology Section, 1985, *Quality Assurance Manual for Performing Acute Toxicity Tests*, 2nd Edition.

Results and Discussion

The sample of chlorinated discharge from the Cecil Field STP was not toxic to the bioassay test organisms, the water flea, *Daphnia pulex*, and the fish, *Notropis leedsi*. Three deaths did occur in the 100% tests using, the water flea, *Ceriodaphnia dubia*. The chlorinated sample adversely affected the Microtox® assay organism, *Photobacterium phosphoreum*, producing an EC_{50} of 91.84%.

A portion of the sample from this facility was dechlorinated in the laboratory using sodium thiosulfate. Bioassays on this portion of the sample showed no toxicity to the bioassay organisms, *C. dubia*, *D. pulex*, or *N. leedsi*. The dechlorinated sample was stimulatory to the Microtox® assay organism, *P. phosphoreum*.

The total residual chlorine in the sample was 0.2 mg/l (Hach). Ammonia was not detected in the sample. No further chemical analyses were performed. The cause of the deaths in the *C. dubia* tests and the observed adverse affect on the Microtox® organism, *P. phosphoreum* were attributed to the total residual chlorine in the sample.

Conclusion

Some toxicity was evident in the chlorinated sample of discharge from this facility that was attributed to the total residual chlorine in the sample. This toxicity was insufficient to be a violation.

Table 1. Concentration Series and Volumes Used for These Static Bioassays.

Ceriodaphnia dubia (water flea)

Concentration	Dilution Water	Sample	Total Volume
Control	15.0 ml	0.0 ml	15 ml
10.0%	13.5 ml	1.5 ml	15 ml
30.0%	10.5 ml	4.5 ml	15 ml
50.0%	7.5 ml	7.5 ml	15 ml
70.0%	4.5 ml	10.5 ml	15 ml
85.0%	2.25 ml	12.75 ml	15 ml
100.0%	0.0 ml	15.0 ml	15 ml

Daphnia pulex (water flea)

Concentration	Dilution Water	Sample	Total Volume
Control	15.0 ml	0.0ml	15 ml
100.0%	0.0 ml	15.0 ml	15 ml

Notropis leedsi (bannerfin shiner)

Concentration	Dilution Water	Sample	Total Volume
Control	500 ml	0 ml	500 ml
10.0%	450 ml	50 ml	500 ml
30.0%	350 ml	150 ml	500 ml
50.0%	250 ml	250 ml	500 ml
70.0%	150 ml	350 ml	500 ml
85.0%	75 ml	425 ml	500 ml
100.0%	0 ml	500 ml	500 ml

Table 2. Data recorded during the 48 hour static screening bioassay of a sample of chlorinated discharge from the NAS Cecil Field STP, Duval County, Florida, NPDES #FL0020966, on 6 to 8 September, 1989.

Facility:	**NAS Cecil Field STP**		NPDES #	**FL0020966**	Facility Type: **Sewage Treatment**
Location:	Naval Air Station, Cecil Field, Florida		Contact/District:	J. Martin / NE	
County:	Duval		Test type:	Static Screen	
Sample Collection Date:	**9/5/89**	Time: 1055	# tests:	6	Receiving Water: Cadwell branch of
Test Beginning Date:	9/6/89	Time: 1130	Chlorination Type:	**Chlorinated**	Sal Taylor Creek
Test Ending Date:	9/8/89	Time: 1230			**Page 1 of 1**

Total Residual Cl2	mg/l	Method
Field:	1.4	Hach DR100
Lab:	0.2	Hach
Lab:	0.4	Iodometric

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.02	0.00
Cond. Control Water (daphnids):	0.00	0.00
100% Sample:	0.00	0.00

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	115	115
Cond. Control Water (daphnids):	85	85
100% Sample:	65	100

Salinity (ppt)	
Control Water:	0
100% Sample:	0

Organism: ***Ceriodaphnia dubia*** Life stage: neonate
LC50: -

	SURVIVAL			Dissolved Oxygen			pH			Temperature			Conductivity	
Concentrations	# at 0 hr	Live at 24 hr	Live at 48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control	5	5	5	8.6	-	7.8	8.1	-	8.2	21.3	-	21.8	-	-
Control	5	5	5	8.6	-	7.8	8.1	-	8.2	-	-	-	-	-
Control	5	5	5	8.6	-	7.8	8.1	-	8.2	-	-	-	-	-
Control	5	5	5	8.6	-	7.8	8.1	-	8.2	-	-	-	165	#
100%	5	5	5	8.4	-	7.8	7.5	-	8.1	21.3	-	21.8	-	-
100%	5	5	4	8.4	-	7.8	7.5	-	8.1	-	-	-	-	-
100%	5	5	4	8.4	-	7.8	7.5	-	8.1	-	-	-	-	-
100%	5	5	4	8.4	-	7.8	7.5	-	8.1	-	-	-	340	#

#not recorded

Organism: ***Daphnia pulex*** Life stage: neonate
LC50: -

	SURVIVAL			Dissolved Oxygen			pH			Temperature			Conductivity	
Concentrations	# at 0 hr	Live at 24 hr	Live at 48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control	5	5	5	8.6	-	8.1	8.1	-	8.1	21.1	-	21.6	-	-
Control	5	5	5	8.6	-	8.1	8.1	-	8.1	-	-	-	-	-
Control	5	5	4	8.6	-	8.1	8.1	-	8.1	-	-	-	-	-
Control	5	5	5	8.6	-	8.1	8.1	-	8.1	-	-	-	165	185
100%	5	5	5	8.1	-	8.2	7.4	-	8.2	21.2	-	21.7	-	-
100%	5	5	5	8.2	-	8.2	7.4	-	8.2	-	-	-	-	-
100%	5	5	5	8.1	-	8.1	7.4	-	8.2	-	-	-	-	-
100%	5	5	5	8.1	-	8.0	7.4	-	8.2	-	-	-	335	350

Organism: ***Notropis leedsi*** Age: 17 days
LC50: -

	SURVIVAL			Dissolved Oxygen			pH			Temperature			Conductivity	
Concentrations	# at 0 hr	Live at 24 hr	Live at 48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control	5	5	5	8.0	9.0	8.6	7.7	8.1	8.1	22.3	20.0	20.3	-	-
Control	5	5	5	8.0	8.9	8.6	7.7	8.1	8.1	-	-	-	235	225
100%	5	5	5	7.7	8.9	8.6	7.2	7.9	8.0	22.7	20.0	20.3	-	-
100%	5	5	5	7.7	8.9	8.2	7.2	7.9	8.0	-	-	-	360	350

Table 3. Data recorded during the 48 hour static definitive bioassay of a sample of discharge from the NAS Cecil Field STP, Duval County, Florida, NPDES #FL0020966, on 6 to 8 September, 1989.

Facility:	**NAS Cecil Field STP**		NPDES #	**FL0020966**	Facility Type: **Sewage Treatment**
Location:	Naval Air Station, Cecil Field, Florida		Contact/District:	J. Martin / NE	
County:	Duval		Test type:	static definitive	
Sample Collection Date:	**9/5/89**	Time: 1055	# tests:	6	Receiving Water: Cadwell branch of
Test Beginning Date:	9/6/89	Time: 1130	Chlorination Type:	**dechlorinated**	Sal Taylor Creek
Test Ending Date:	9/8/89	Time: 1230	Dechlor Method:	lab, sodium thiosulfate	**Page 1 of 2**

Organism: ***Ceriodaphnia dubia*** Life stage: neonate
LC50: - Binomial: - Moving Average: - Probit: -

	SURVIVAL			Dissolved Oxygen			pH			Temperature			Conductivity	
Concentrations	# at 0 hr	Live at 24 hr	Live at 48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control	5	5	5	8.6	-	7.6	8.2	-	8.0	21.2	-	22.0	-	-
Control	5	5	5	8.7	-	7.7	8.2	-	8.1	-	-	-	-	-
Control	5	5	5	8.7	-	7.7	8.2	-	8.1	-	-	-	-	-
Control	5	5	5	8.7	-	*	8.2	-	*	-	-	-	165	*
10%	5	5	5	8.7	-	7.8	8.1	-	8.1	21.2	-	21.8	-	-
10%	5	5	5	8.7	-	7.8	8.1	-	8.1	-	-	-	-	-
10%	5	5	5	8.7	-	7.8	8.1	-	8.1	-	-	-	-	-
10%	5	5	5	8.7	-	7.8	8.1	-	8.1	-	-	-	185	195
30%	5	5	5	8.6	-	7.8	8.0	-	8.1	21.3	-	21.7	-	-
30%	5	5	5	8.6	-	7.8	8.0	-	8.1	-	-	-	-	-
30%	5	5	5	8.6	-	7.8	8.0	-	8.1	-	-	-	-	-
30%	5	5	5	8.6	-	7.8	8.0	-	8.1	-	-	-	210	220
50%	5	5	5	8.5	-	7.8	7.8	-	8.1	21.3	-	21.7	-	-
50%	5	5	5	8.5	-	7.8	7.8	-	8.1	-	-	-	-	-
50%	5	5	5	8.6	-	7.8	7.8	-	8.1	-	-	-	-	-
50%	5	5	5	8.5	-	7.8	7.8	-	8.1	-	-	-	250	250
70%	5	5	5	8.5	-	7.8	7.7	-	8.1	21.3	-	21.7	-	-
70%	5	5	5	8.6	-	7.8	7.7	-	8.1	-	-	-	-	-
70%	5	5	5	8.6	-	7.8	7.7	-	8.1	-	-	-	-	-
70%	5	5	5	8.6	-	7.8	7.7	-	8.1	-	-	-	290	310
85%	5	5	5	8.5	-	7.8	7.7	-	8.1	21.3	-	21.7	-	-
85%	5	5	5	8.5	-	7.8	7.7	-	8.1	-	-	-	-	-
85%	5	5	5	8.5	-	7.8	7.7	-	8.1	-	-	-	-	-
85%	5	5	5	8.6	-	7.8	7.7	-	8.1	-	-	-	315	340
100%	5	5	5	8.4	-	7.8	7.6	-	8.1	21.3	-	21.7	-	-
100%	5	5	5	8.4	-	7.8	7.6	-	8.1	-	-	-	-	-
100%	5	5	5	8.5	-	7.8	7.6	-	8.1	-	-	-	-	-
100%	5	5	5	8.5	-	7.8	7.6	-	8.1	-	-	-	345	375

* spilled before chemistry

Total Residual Cl2	mg/l	Method
Field:	1.4	Hach DR100
Lab:	0.2	Hach
Lab:	0.4	Iodometric

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.019	0.00
Cond. Control Water (daphnids):	0.00	0.00
100% Sample:	0.00	0.00

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	115	115
Cond. Control Water (daphnids):	85	85
100% Sample:	65	100

Salinity (ppt)	
Control Water:	0
100% Sample:	0

Table 3. Continued.

Facility:	**NAS Cecil Field STP**		**NPDES #**	**FL0020966**	**Facility Type: Sewage Treatment**
Location:	Naval Air Station, Cecil Field, Florida		Contact/District:	J. Martin / NE	
County:	Duval		Test type:	static definitive	
Sample Collection Date:	**9/5/89**	Time: 1055	# tests:	6	Receiving Water: Cadwell branch of
Test Beginning Date:	9/6/89	Time: 1130	Chlorination Type:	**dechlorinated**	Sal Taylor Creek
Test Ending Date:	9/8/89	Time: 1230	Dechlor Method:	lab, sodium thiosulfate	**Page 2 of 2**

Total Residual Cl2	mg/l	Method
Field:	1.4	Hach DR100
Lab:	0.2	Hach
Lab:	0.4	Iodometric

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.02	0.00
Cond. Control Water (daphnids):	0.00	0.00
100% Sample:	0.00	0.00

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	115	115
Cond. Control Water (daphnids):	85	85
100% Sample:	65	100

Salinity (ppt)	
Control Water:	0
100% Sample:	0

Organism: ***Daphnia pulex*** Life stage: neonate
LC50: - Binomial: - Moving Average: - Probit: -

	SURVIVAL			Dissolved Oxygen			pH			Temperature			Conductivity	
Concentrations	# at 0 hr	Live at 24 hr	Live at 48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control	5	5	5	8.6	-	8.1	8.1	-	8.1	21.1	-	21.6	-	-
Control	5	5	5	8.6	-	8.1	8.1	-	8.1	-	-	-	-	-
Control	5	5	4	8.6	-	8.1	8.1	-	8.1	-	-	-	-	-
Control	5	5	5	8.6	-	8.1	8.1	-	8.1	-	-	-	165	185
100.0%	5	5	5	8.5	-	8.2	7.7	-	8.0	21.1	-	21.6	-	-
100.0%	5	5	5	8.5	-	8.2	7.7	-	8.1	-	-	-	-	-
100.0%	5	5	5	8.5	-	8.2	7.7	-	8.1	-	-	-	-	-
100.0%	5	5	5	8.5	-	8.2	7.7	-	8.1	-	-	-	345	350

Organism: ***Notropis leedsi*** Age: 17 days
LC50: - Binomial: - Moving Average: - Probit: -

	SURVIVAL			Dissolved Oxygen			pH			Temperature			Conductivity	
Concentrations	# at 0 hr	Live at 24 hr	Live at 48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control	5	5	5	8.1	9.1	8.6	7.7	8.1	8.1	23.4	20.1	20.2	-	-
Control	5	5	5	8.2	9.2	8.6	7.7	8.1	8.1	-	-	-	235	225
10%	5	5	5	8.3	9.1	8.6	7.6	8.1	8.0	23.6	19.9	20.1	-	-
10%	5	5	5	8.3	9.1	8.5	7.6	8.1	8.0	-	-	-	245	235
30%	5	5	5	8.2	8.8	8.2	7.4	8.1	8.0	23.3	19.9	20.1	-	-
30%	5	5	5	8.3	8.9	8.2	7.4	8.1	8.0	-	-	-	270	260
50%	5	5	5	8.1	8.9	8.1	7.4	8.0	8.0	22.0	20.0	20.0	-	-
50%	5	5	5	8.1	8.9	8.1	7.4	8.0	8.0	-	-	-	295	290
70%	5	5	5	8.1	8.7	8.1	7.3	7.9	8.0	21.7	20.0	20.0	-	-
70%	5	5	5	8.1	8.5	8.1	7.3	7.9	8.0	-	-	-	320	315
85%	5	5	5	8.0	8.7	8.0	7.2	7.9	8.0	21.4	20.0	20.1	-	-
85%	5	5	5	8.0	8.7	8.1	7.2	7.9	7.9	-	-	-	335	330
100%	5	5	5	8.0	8.7	8.1	7.2	7.8	7.9	21.3	20.1	20.3	-	-
100%	5	5	5	8.0	8.7	8.0	7.2	7.8	7.9	-	-	-	355	355

Table 4. Microtox test results, NAS Cecil Field STP, Duval County, NPDES #FL0020966, on 6 September, 1989.

% Sample	Final Reclaimed Water			
	Chlorinated		Dechlorinated	
	5-min	15-min	5-min	15-min
0	66	41	82	55
0	64	42	54	36
0	68	44	83	57
12.38	66	42	84	58
12.38	63	39	93	65
12.38	64	40	87	59
24.75	61	40	89	60
24.75	60	38	77	50
24.75	58	37	79	53
49.5	53	33	83	53
49.5	51	31	78	50
49.5	57	34	83	53
99	41	24	83	53
99	30	17	76	49
99	25	14	77	45

EC_{50} Chlorinated (15 minute, 15 °C) = 91.84% sample
EC_{50} Dechlorinated (15 minute, 15 °C) = stimulatory

EC_{50} (15 minute, 15 °C) is calculated using the Data Reduction Computer Program developed by Microbics Corporation for the Sharp Model EL-5100 calculator. (*Microbics Systems Operating Manual,* 1982, Microbics Corporation, Carlsbad, California.)

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: NAS Cecil Field
Address/City:
County: Duval
Contact/District: Jeff Martin / NE
NPDES Permit #: FL0020966 Outfall #: 001

Test Number: 1 of ~~56~~ 6 Test Type: Screening | Definitive
Static | Static Renewal | Flow-through

Remarks: * Dropped before chemistry

Sample Collection: Date 9/5/89 Time 1100
Test Beginning: Date 9/6/89 Time 1130
Test Ending: Date 9/8/89 Time 1230
Test Organism: Ceriodaphnia dubia
Life Stage/Age: neonate

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr	7.0, 7.0, 9	8.9 @ 22°C	1341 @ 22.7 °C @ 1344	23.3 @ 22.3
24 hr	7.0, 7.0, 9	8.8 @ 22°C		22° @ 22°C
48 hr	7.0, 7.0, 9	8.7 @ 23°C	1351 @ 23°C @ 1353	22.8 @ 22.8°C

		Number Live			DO (mg/l)			pH			Temp. (°C)			Cond. (µmhos/cm)		
Conc.	Chamber #	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control	1	5	5	5	8.6		7.6	8.2		8.0	21.2	—	22.0			
"	2	5	5	5	8.7		7.7	8.2		8.1						
"	3	5	5	5	8.7		7.7	8.2		8.1						
"	4	5	5	5	8.7		*	8.2		*				165		*
10%	5	5	5	5	8.7		7.8	8.1		8.1	21.2	—	21.8			
"	6	5	5	5	8.7		7.8	8.1		8.1						
"	7	5	5	5	8.7		7.8	8.1		8.1						
"	8	5	5	5	8.7		7.8	8.1		8.1				185	—	195
30%	9	5	5	5	8.6		7.8	8.0		8.1	21.3	—	21.7			
"	10	5	5	5	8.6		7.8	8.0		8.1						
"	11	5	5	5	8.6		7.8	8.0		8.1						
"	12	5	5	5	8.6		7.8	8.0		8.1				210	—	220
50%	13	5	5	5	8.5		7.8	7.8		8.1	21.3	—	21.7			
"	14	5	5	5	8.5		7.8	7.8		8.1						
"	15	5	5	5	8.6		7.8	7.8		8.1						
"	16	5	5	5	8.5		7.8	7.8		8.1				250	—	250
70%	17	5	5	5	8.5		7.8	7.7		8.1	21.3	—	21.7			
"	18	5	5	5	8.6		7.8	7.7		8.1						
"	19	5	5	5	8.6		7.8	7.7		8.1						
"	20	5	5	5	8.6		7.8	7.7		8.1				290	—	310
85%	21	5	5	5	8.5		7.8	7.7		8.1	21.3	-	21.7			
"	22	5	5	5	8.5		7.8	7.7		8.1						
"	23	5	5	5	8.5		7.8	7.7		8.1						
"	24	5	5	5	8.6		7.8	7.7		8.1				315	—	340
100%	25	5	5	5	8.4		7.8	7.6		8.1	21.3	—	21.7			
"	26	5	5	5	8.4		7.8	7.6		8.1						
"	27	5	5	5	8.5		7.8	7.6		8.1						
"	28	5	5	5	8.5		7.8	7.6		8.1				345	—	375
Measured by:		mf	mf	mf	SHW		mf	SHW		mf	SHW		mf	SHW		
Recorded by:		mf	mf	mf	mf		mf	mf		mf	mf		mf	mf		

Investigators' Signatures
Steve H Wolfe
Marshall Faircloth II

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			1.4	Hach DR10	J. Martin
Lab Tot. Resid. Cl2:			0.2, 0.4	pul/Tolo	JMF
Alkalinity:	115	85	85	Hach	mf
Hardness:	115	85	100	Hach	mf
Total Ammonia:	.019	0.0	0.0	Orion	SHW

slope = −58.9

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: CECIL FIELD NAS
Address/City: _____
County: _____
Contact/District: _____
NPDES Permit #: _____ Outfall #: _____

Sample Collection: Date 9/5/89 Time 11:00
Test Beginning: Date 9/6/89 Time 1130
Test Ending: Date 9/8/89 Time 1230
Test Organism: ~~Ceriod~~, Daphnia pulex C. lab sp
Life Stage/Age: neonate

Test Number: 2 of ~~56~~ Test Type: (Screening) (Definitive)
(Static) Static Renewal Flow-through

Remarks: After Cl_2

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr				
24 hr				
48 hr				

Conc.	Chamber #	Number Live			DO (mg/l)			pH			Temp. (°C)			Cond. (µmhos/cm)		
		0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control		5	5	5	8.6		7.8	8.1		8.2	21.3		21.8	~~165~~		
"		5	5	5	8.6		7.8	8.1		8.2						
"		5	5	5	8.6		7.8	8.1		8.2						
"		5	5	5	8.6		7.8	8.1		8.2				165		
100%		5	5	5	8.4		7.8	7.5		8.1	21.3		21.8			
"		5	5	4	8.4		7.8	7.5		8.1						
"		5	5	4	8.4		7.8	7.5		8.1						
"		5	5	4	8.4		7.8	7.5		8.1				340		
Measured by:		mf	mf	mf	SHW		mf	SHW		mf	SHW		mf	SHL		
Recordad by:		mf	mf	mf	mf		mf	mf		mf	mf		mf	[illegible]		

Investigators' Signatures

Steven H Ward
Marshall Faulk

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:					
Alkalinity:					
Hardness:					
Total Ammonia:					

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: Cecil Field NAS
Address/City:
County:
Contact/District:
NPDES Permit #: **Outfall #:**

Sample Collection: Date 9/5/89 Time 11:00
Test Beginning: Date 9/6 Time 1130
Test Ending: Date 9/8/89 Time 1230
Test Organism: Nitrogen ludsi
Life Stage/Age: 17 days

Test Number: B of 86 **Test Type:** Screening (Definitive) Static | Static Renewal | Flow-through

Remarks: dec 12

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr				
24 hr				
48 hr				

Conc	Chamber #	Number Live			DO (mg/l)			pH			Temp. (°C)			Cond. (µmhos/cm)		
		0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control	81	5	5	5	8.1	7.1	8.6	7.4	8.1	8.1	23.4	20.1	20.2			
"	18	5	5	5	8.0	7.2	8.6	7.4	8.1	8.1				235		225
10%	61	5	5	5	8.3	7.1	8.6	7.2	8.1	8.0	23.6	19.9	20.1			
"	11	5	5	5	8.3	7.1	8.5	7.2	8.1	8.0				245		235
20%	19	5	5	5	8.2	8.8	8.2	7.3	8.1	8.0	23.3	19.9	20.1			
"	—	5	5	5	8.3	8.9	8.2	7.3	8.1	8.0				270		260
50%	186	5	5	5	8.1	8.9	8.1	7.4	8.0	8.0	22.0	20.0	20.0			
"	99	5	5	5	8.1	8.9	8.1	7.4	8.0	8.0				295		290
70%	68	5	5	5	8.1	8.7	8.1	7.4	7.9	8.0	21.7	20.0	20.0			
"	180	5	5	5	8.1	8.7	8.1	7.4	7.9	8.0				320		315
85%	62	5	5	5	8.0	8.7	8.0	7.6	7.9	7.9	21.4	20.0	20.1			
"	3	5	5	5	8.0	8.7	8.1	7.6	7.9	7.9		20.1		335		330
100%	10	5	5	5	8.0	8.7	8.1	7.7	7.8	7.9	21.3	20.0	20.3			
"	37	5	5	5	8.0	8.7	8.0	7.7	7.8	7.9				355		355
								7.7								
								7.7								
								7.6								
								7.6								
								7.4								
								7.4								
								7.4								
								7.4								
								7.3								
								7.3								
								7.2								
								7.2								
								7.2								
								7.2								
Measured by:		SHW	SHW	MF	SHW	SHW	MF	SHW	SHW	MF	SHW	SHW	MF	SHW		MF
Recorded by:		MF	MF	MF	MGC	MF	MF	MC	MF	MF	MGC	MF	MF	MGC		MF

Investigators' Signatures

Steven H Wolfe

Marshall Trimble

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:					
Alkalinity:					
Hardness:					
Total Ammonia:					

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: Cecil Field NAS
Address/City:
County:
Contact/District:
NPDES Permit #: Outfall #:

Sample Collection: Date 9/5/87 Time 11:00
Test Beginning: Date 9/6 Time 1130
Test Ending: Date 9/8/87 Time 1230
Test Organism: N. seedsi
Life Stage/Age: 17 days

Test Number: 4 of ~~26~~ Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through

Remarks: Cl2

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr				
24 hr				
48 hr				

Conc.	Chamber #	Number Live 0	24	48	DO (mg/l) 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	Cond. (µmhos/cm) 0	24	48
Control	64	5	5	5	8.0	9.0	8.6	7.7	8.1	8.1	22.3	20.0	20.3			
"	113	5	5	5	8.0	8.9	8.6	7.7	8.1	8.1				235	~~225~~ 240	225
100%	14	5	5	5	7.7	8.9	8.2	7.2	7.9	8.0	22.1	20.0	20.3			
"	87	5	5	5	7.7	8.9	8.2	7.2	7.9	8.0				360	~~345~~ 350	350
Measured by:		SHW	SHW	MF	SHW	SHW	MF	SHW	SHW	MF	SHW	SHW	MF	SHW		MF
Recorded by:		MF	MF	MF	MEC	MF	MF	MEC	MF	MF	MEC	MF	MF	MEC		MF

Investigators' Signatures

Steven H Wolfe

Marshall Faircloth

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:					
Alkalinity:					
Hardness:					
Total Ammonia:					

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: Cecil Field NAS
Address/City:
County:
Contact/District:
NPDES Permit #: **Outfall #:**

Sample Collection: Date 9/5/89 Time 11:00
Test Beginning: Date 9/6 Time 1130
Test Ending: Date 9/8/89 Time 1230
Test Organism: Daphnia pulex
Life Stage/Age: Neonate

Test Number: 5 of 6 **Test Type:** (Screening) | Definitive
(Static) | Static Renewal | Flow-through

Remarks: de Cl_2 + Cl_2

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr				
24 hr				
48 hr				

Conc.	Chamber #	Number Live 0	24	48	DO (mg/l) 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	Cond. (µmhos/cm) 0	24	48	
Control		5	5	5	8.6		8.1	8.1		8.1	21.1	–	21.6	~~165~~	–	~~185~~	SHW
"		5	5	5	8.6		8.1	8.1		8.1							
"		5	5	4	8.6		8.1	8.1		8.1							
"		5	5	5	8.6		8.1	8.1		8.1				165	–	185	
10%		5	5	5	8.5		8.2	7.7		8.2	21.1	–	21.6	~~345~~	–	~~350~~	SHW
"		5	5	5	8.5		8.2	7.7		8.2							
"		5	5	5	8.5		8.2	7.7		8.2							
"		5	5	5	8.5		8.2	7.7		8.2				345	–	350	
100%		5	5	5	8.1		8.2	7.4		8.2	21.2	–	21.7	~~335~~	–	~~350~~	SHW
"		5	5	5	8.2		8.2	7.4		8.2							
"		5	5	5	8.1		8.1	7.4		8.1							
"		5	5	5	8.1		8.0	7.4		8.0				335	–	352	
										8.1							
										8.1							
										8.1							
										8.1							
										8.0							
										8.1							
										8.1							
										8.1							
										8.2							
										8.2							
										8.2							
										8.2							
Measured by:		SHW	MF	MF	SHW		MF	SHW		MF	SHW		MF	SHW		MF	
Recorded by:		MF	MF	MF	MF		MF	MF		MF	MF		MF	MF		MF	

Investigators' Signatures

Steven H Wolfe

Marshall Faircloth

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:					
Alkalinity:					
Hardness:					
Total Ammonia:					

MICROTOX™ Data Reduction Sheet

SOURCE: Cecil Field Chlorinated

GRAPH CALC EC 50 (15 MIN, 15 °C) = 91.84 %SAMPLE mg/L

SAMPLE DATA:

SAMPLE TYPE (EFFLUENT, LEACHATE, ETC.): Chlorinated

DATE ASSAYED: 9-6-89 TIME: 1450

VISUAL COLOR: clear CORRECTION REQUIRED: YES (NO)

VISUAL TURBIDITY: none SEPARATION REQUIRED: YES (NO)

INITIAL pH: pH ADJUSTED TO: WITH:

OSMOTICALLY ADJUSTED WITH: MOAS (DRY NaCl) OTHER

PRIMARY DILUTION OF SAMPLE:

OPERATOR: [illegible] REAGENT VIAL LOT NO. M- [illegible]

REMARKS:

MICROTOX™ TEST

SAMPLE CUVETTE	% SAMPLE	READINGS 5 MIN	READINGS 15 MIN	Γ5	Γ15	NOTES
A1	0	66	41	X	X	
B1		64	42			
C1		68	44			
A2	12.38	66	42		0.05	
B2		63	39			
C2		64	40			
A3	24.75	61	40		0.10	
B3		60	38			
C3		58	37			
A4	49.5	53	33		0.30	
B4		51	31			
C4		57	34			
A5	99	41	24		1.31	
B5		30	17			
C5		25	14			
EC50 (15 MIN, 15° C)					91.84	

REVIEWED BY:
DATE:

MICROTOX™ Data Reduction Sheet

SOURCE: Cecil Field NAS deck.

GRAPH CALC EC 50 (15 MIN, 15 °C) = Stimulatory %SAMPLE mg/L

SAMPLE DATA:

SAMPLE TYPE (EFFLUENT, LEACHATE, ETC.): dock

DATE ASSAYED: 9-6-89 TIME: 1430

VISUAL COLOR: clear CORRECTION REQUIRED: YES (NO)

VISUAL TURBIDITY: none SEPARATION REQUIRED: YES (NO)

INITIAL pH: pH ADJUSTED TO: WITH:

OSMOTICALLY ADJUSTED WITH: MOAS (DRY NaCl) OTHER

PRIMARY DILUTION OF SAMPLE:

OPERATOR: Linda Champion REAGENT VIAL LOT NO. M- NLN

REMARKS:

MICROTOX™ TEST

SAMPLE CUVETTE	% SAMPLE	READINGS 5 MIN	READINGS 15 MIN	Γ5	Γ15	NOTES
A1	0	82	55	X	X	
B1		54	36			
C1		83	57			
A2	12.38	84	58	-0.17	-0.19	
B2		93	65			
C2		97	59			
A3	24.75	89	60	-0.11	-.10	
B3		74	51			
C3		79	53			
A4	49.5	83	53	-.10	-.05	
B4		78	50			
C4		83	53			
A5	99	83	53	-.65	0.04	
B5		76	49			
C5		77	45			
EC_{50} (MIN, °C)						Stimulatory

REVIEWED BY:
DATE: