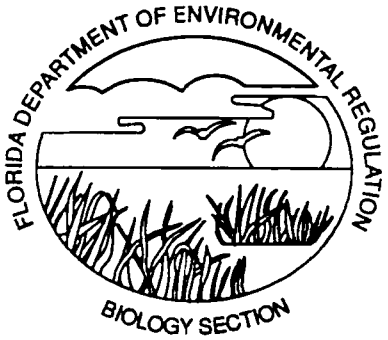


Bioassays of

Seminole Electric Cooperative

Palatka, Putnam County, Florida

NPDES #FL0036498

Sampled 3/5/90

July 6,1990

Biology Section
Division of Administrative and Technical Services

Bioassays of

Seminole Electric Cooperative

Palatka, Putnam County, Florida

NPDES #FL0036498

Biology Section
Bureau of Laboratories
July 6, 1990

Introduction

Seminole Electric Cooperative, Palatka, Putnam County, Florida, NPDES #FL0036498, 6 to 8 March, 1990.

This facility is an electric utility company that owns and operates two 600-megawatt coal-fired generator units. The main plant discharge through outfall #001 has a flow rate of approximately 5 MGD, consisting of 4 MGD blowdown water from 2 cooling towers and 1 MGD from the plant's waste treatment facility. This treated water consists of washdown water and waste from other operations. Approximately 18,000 gal/day come from the plant's sewage treatment facility which serves a daily population of approximately 375. These flows combine in a surge tank and are discharged to the St. Johns River.

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 Biology Section performed toxicity bioassays on a sample of discharge from this facility using the bioassay test organism, the waterflea, *Ceriodaphnia dubia*, and the fish, *Notropis leedsi*. The sample was not toxic to *N. leedsi*. The test using *C. dubia* was invalidated due to control mortality. Deaths occurred in each of the test concentrations. The cause of these deaths was not determined. The sample was stimulatory to the Microtox® assay test organism, *Photobacterium phosphoreum*. The total and unionized ammonia concentrations in the sample were 2.89 mg/l and 0.02 mg/l, respectively.

Conclusion

The sample of discharge from this facility was not toxic to *N. leedsi*, and was stimulatory to the Microtox® test organism, *P. phosphoreum*, on 5 March, 1990. The toxicity test using *C. dubia* proved inconclusive due to the control mortality.

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

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 static definitive bioassay of a sample of discharge from outfall #001 of the Seminole Electric Cooperative, Inc. facility, Palatka, Putnam County, Florida, NPDES #FL0036498, on 6 to 8 March, 1990.

Facility:	Seminole Electric Cooperative, Inc.	NPDES #	FL0036498	Facility Type:	Power Plant
Location:	State Rd. 17, Palatka	Contact/District:	J. Carver		
County:	Putnam	Test type:	static definitive		
Sample Collection Date:	3/5/90 Time: 1245	# tests:	2	Receiving Water:	St. Johns River
Test Beginning Date:	3/6/90 Time: 1400	Chlorination Type:	unknown		
Test Ending Date:	3/7/90 Time: 1400			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	0	0	11.0	-	-	8.0	-	-	22.6	-	-	-	-
Control	5	1	1	10.8	-	-	8.0	-	-	-	-	-	-	-
Control	5	3	2	11.0	-	-	8.0	-	-	-	-	-	-	-
Control	5	4	2	10.8	-	-	8.0	-	-	-	-	-	558	-
10%	5	0	0	10.6	-	-	7.9	-	-	22.8	-	-	-	-
10%	5	2	1	10.5	-	-	7.9	-	-	-	-	-	-	-
10%	5	3	1	10.6	-	-	7.9	-	-	-	-	-	-	-
10%	5	1	1	10.6	-	-	7.9	-	-	-	-	-	775	-
30%	5	1	0	10.4	-	-	7.7	-	-	22.8	-	-	-	-
30%	5	4	3	10.2	-	-	7.7	-	-	-	-	-	-	-
30%	5	3	3	10.2	-	-	7.7	-	-	-	-	-	-	-
30%	5	2	2	10.2	-	-	7.7	-	-	-	-	-	1146	-
50%	5	4	3	10.0	-	-	7.5	-	-	22.8	-	-	-	-
50%	5	4	3	9.8	-	-	7.5	-	-	-	-	-	-	-
50%	5	3	3	9.7	-	-	7.5	-	-	-	-	-	-	-
50%	5	1	0	9.7	-	-	7.5	-	-	-	-	-	1434	-
70%	5	2	2	9.4	-	-	7.3	-	-	22.6	-	-	-	-
70%	5	3	3	9.2	-	-	7.3	-	-	-	-	-	-	-
70%	5	3	2	9.2	-	-	7.3	-	-	-	-	-	-	-
70%	5	3	2	9.2	-	-	7.3	-	-	-	-	-	1845	-
85%	5	2	2	8.8	-	-	7.5	-	-	22.5	-	-	-	-
85%	5	2	2	8.6	-	-	7.5	-	-	-	-	-	-	-
85%	5	1	1	8.6	-	-	7.5	-	-	-	-	-	-	-
85%	5	3	3	8.6	-	-	7.5	-	-	-	-	-	2210	-
100%	5	1	1	8.6	-	-	7.1	-	-	22.6	-	-	-	-
100%	5	2	2	8.1	-	-	7.1	-	-	-	-	-	-	-
100%	5	2	1	8.1	-	-	7.1	-	-	-	-	-	-	-
100%	5	3	3	8.2	-	-	7.1	-	-	-	-	-	2380	-

Total Residual Cl2	mg/l	Method
Field:	-	-
Lab:	-	-
Lab:	-	-

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control Water (daphnids):	0.38	0.02
100% Sample:	2.89	0.02

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	124	118
Cond. Control Water (daphnids):	89	65
100% Sample:	357	34

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

-continued-

Table 2. Continued.

Facility: Seminole Electric Cooperative
Location: State Rd. 17, Palatka
County: Putnam
Sample Collection Date: 3/5/90 Time: 1245
Test Beginning Date: 3/6/90 Time: 1400
Test Ending Date: 3/8/90 Time: 1410

NPDES # FL0036498
Contact/District: J. Carver
Test type: static definitive
tests: 2
Chlorination Type: unknown

Facility Type: Power Plant
Receiving Water: St. Johns River

Organism: *Notropis leedsi* Age: 18 days
LC50: - Binomial: - Moving Average: - Probit: -

SURVIVAL			
Concentrations	# at 0 hr	Live at 24 hr	Live at 48 hr
Control	5	5	5
Control	5	5	5
10%	5	5	5
10%	5	5	5
30%	5	5	5
30%	5	5	5
50%	5	4	4
50%	5	5	5
70%	5	5	5
70%	5	5	5
85%	5	5	5
85%	5	5	5
100%	5	5	5
100%	5	5	5

Dissolved Oxygen			pH			Temperature			Conductivity	
0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
8.4	8.7	8.0	7.8	8.1	8.2	21.0	19.6	20.8	-	-
8.4	8.7	8.0	7.8	8.1	8.3	-	-	-	230	235
8.4	8.6	8.3	7.7	8.0	8.2	21.0	19.4	20.2	-	-
8.4	8.6	8.3	7.7	8.0	8.2	-	-	-	623	635
8.4	8.4	8.4	7.5	7.9	8.1	21.0	19.3	20.0	-	-
8.4	8.4	8.4	7.5	7.9	8.1	-	-	-	1011	1045
8.4	8.1	8.3	7.4	7.8	7.9	21.0	19.3	20.0	-	-
8.4	8.3	8.3	7.4	7.8	7.9	-	-	-	1494	1500
8.3	8.3	8.3	7.2	7.6	7.8	21.4	19.4	20.0	-	-
8.2	8.3	8.3	7.2	7.6	7.8	-	-	-	1987	1995
8.2	8.3	8.2	7.1	7.5	7.6	21.8	19.4	20.0	-	-
8.2	8.3	8.2	7.1	7.5	7.6	-	-	-	2380	2390
8.2	8.3	8.2	6.9	7.4	7.5	22.0	19.8	20.7	-	-
8.1	8.3	8.2	6.9	7.4	7.4	-	-	-	2700	2750

Total Residual Cl2	mg/l	Method
Field:	-	-
Lab:	-	-
Lab:	-	-

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control Water (daphnids):	0.38	0.02
100% Sample:	2.89	0.02

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	124	118
Cond. Control Water (daphnids):	89	65
100% Sample:	357	34

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

Table 3. Microtox test results, Seminole Electric Cooperative, Inc., Putnam County, NPDES #FL0036498, on 6 March , 1990.

% Sample	Final Reclaimed Water	
	5-min	15-min
0	89	50
0	80	41
0	71	38
12.38	84	46
12.38	92	52
12.38	80	45
24.75	80	46
24.75	76	42
24.75	99	56
49.5	89	54
49.5	97	56
49.5	89	48
99	98	60
99	96	58
99	94	58

EC_{50} sample (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, CA).

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: Seminole Electric
Address/City:
County: PUTNAM
Contact/District: G. Markham / NE
NPDES Permit #: _____ Outfall #: 001

Sample Collection: Date 3/5/98 Time 1245
Test Beginning: Date 3/6/98 Time 1400
Test Ending: Date 3/7/98 Time 1400
Test Organism: Ceriodaphnia dubia
Life Stage/Age: Neonate

Test Number: 1 of 2 **Test Type:** Screening | Definitive
Static | Static Renewal | Flow-through

Remarks: Control Mortality 24hr, Test terminated
EPA (i) DAT50

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr	7a 7.9 9	8.1@23°C	1378@23.9 1377	232@23.5
24 hr	7c 7.9 9	8.5@24°		229@23.2
48 hr				

		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		5	0		11.0			8.0			23.6					
Control		5	1		10.8			8.0								
Control		5	3		11.0			8.0								
Control		5	4		10.8			8.0						558		
10 %		5	0		10.6			7.9			23.8					
10 %		5	2		10.5			7.9								
10 %		5	3		10.6			7.9								
10 %		5	1		10.6			7.9						775		
30 %		5	1		10.4			7.7			23.8					
30 %		5	4		10.2			7.7								
30 %		5	3		10.2			7.7								
30 %		5	2		10.2			7.7						1144		
50 %		5	4		10.0			7.5			23.8					
50 %		5	4		9.8			7.5								
50 %		5	3		9.7			7.5								
50 %		5	1		9.7			7.5						1434		
70 %		5	2		9.4			7.3			23.6					
70 %		5	3		9.2			7.3								
70 %		5	3		9.2			7.3								
70 %		5	3		9.2			7.3						1845		
85 %		5	2		8.8			7.2			23.5					
85 %		5	2		8.6			7.2								
85 %		5	1		8.6			7.2								
85 %		5	3		8.6			7.2						2210		
100 %		5	1		8.3			7.1			22.6					
100 %		5	2		8.1			7.1								
100 %		5	2		8.1			7.1								
100 %		5	3		8.2			7.1						2380		
Measured by:		SHW	MF		RF			RF			RF			RF		
Recorded by:		SHW	MF		MF			MF			MF			MC		

Investigators' Signatures

Marshall Faircloth
Andy Ciancaglini
Steven H. Wolfe
Russell Frydenborg
Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:					
Alkalinity:	174	99	357		AHW
Hardness:	113	65	34		AHW
Total Ammonia:	0.0	0.38	2.89	Orion Specific ion	AHW

slope = -55.9

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: Seminole Electric
Address/City:
County: PUTNAM
Contact/District: G. Mackman / NE
NPDES Permit #: _____ Outfall #: _____

Sample Collection: Date 3/5/90 Time 1245
Test Beginning: Date 3/6/90 Time 1400
Test Ending: Date 3/8/90 Time 1410
Test Organism: Mysidopsis bahia
Life Stage/Age: 18

Test Number: 2 of 2 **Test Type:** Screening | Definitive
Static | Static Renewal | Flow-through

Remarks:

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr				
24 hr				
48 hr	7.0 7.9	8.50 24°	1350 1382 24	23.5 23.8

		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		5	5	5	8.4	8.7	8.0	7.8	8.1	8.2	21.0	19.6	20.8			
Control		5	5	5	8.4	8.7	8.0	7.8	8.1	8.3				230		235
10 %		5	5	5	8.4	8.6	8.3	7.7	8.0	8.2	21.0	19.4	20.2			
10 %		5	5	5	8.4	8.6	8.3	7.7	8.0	8.2				623		635
30 %		5	5	5	8.4	8.4	8.4	7.5	7.9	8.1	21.0	19.3	20.6			
30 %		5	5	5	8.4	8.4	8.4	7.5	7.9	8.1				1011		1045
50 %		5	4	4	8.4	8.1	8.3	7.4	7.8	7.9	21.0	19.3	20.0			
50 %		5	5	5	8.4	8.3	8.3	7.4	7.8	7.9				1444		1500
70 %		5	5	5	8.3	8.3	8.3	7.2	7.6	7.8	21.4	19.4	20.0			
70 %		5	5	5	8.2	8.3	8.3	7.2	7.6	7.8				1917		1995
85 %		5	5	5	8.2	8.3	8.2	7.1	7.5	7.6	21.8	19.4	20.0			
85 %		5	5	5	8.2	8.3	8.2	7.1	7.5	7.6				2380		2390
100 %		5	5	5	8.2	8.3	8.2	6.9	7.4	7.5	22.0	19.8	20.7			
100 %		5	5	5	8.1	8.3	8.2	6.9	7.4	7.4				2700		2750
Measured by:		RBF	MF	MF	RF	MF	SW	RF	MF	SW	RF	MF	SW	RF		SW
Recorded by:		RBF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF		MF

Investigators' Signatures

Marshall Faircloth
Molly Cleary
Steven A. Wolf
Terrill Lindsay
Reviewer

Water-quality Parameters

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

Requestor: Bradley R. Marshman

MICROTOX™ Data Reduction Sheet

SOURCE: Seminole Electric Putnam county st Johns River

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

SAMPLE DATA:

SAMPLE TYPE (EFFLUENT, LEACHATE, ETC.):

DATE ASSAYED: 6/7/90 TIME: 2:00 PM

VISUAL COLOR: clear CORRECTION REQUIRED: YES NO

VISUAL TURBIDITY: SEPARATION REQUIRED: YES NO

INITIAL pH: pH ADJUSTED TO: WITH:

OSMOTICALLY ADJUSTED WITH: MOAS (DRY NaCl) OTHER

PRIMARY DILUTION OF SAMPLE:

OPERATOR: Mel Cooper REAGENT VIAL LOT NO. M-

REMARKS:

MICROTOX™ TEST

SAMPLE CUVETTE	% SAMPLE	READINGS 5 MIN	READINGS 15 MIN	Γ5	Γ15	NOTES
A1	0	89	50	X	X	
B1		80	41			
C1		71	38			
A2	12.38	84	46		-.10	
B2		92	52			
C2		80	45			
A3	24.75	80	46		-.10	
B3		76	42			
C3		99	56			
A4	49.5	89	54		-.18	
B4		97	56			
C4		89	48			
A5	99	98	60		-.27	
B5		96	58			
C5		94	58			
EC_{50} (MIN, °C)					stimulatory	

REVIEWED BY:

DATE: 7/24/90