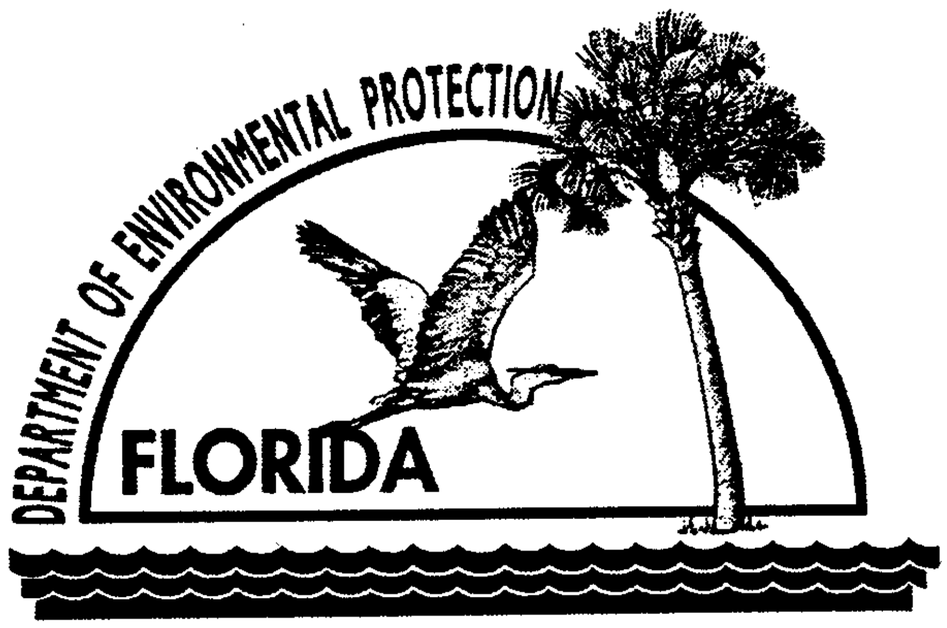


Bioassays of

Apalachicola Wastewater Treatment Facility

Apalachicola, Franklin County, Florida

NPDES #FL0038857

Sampled 2/7/94

June 1994

Biology Section
Division of Technical Services

Bioassays of

Apalachicola Wastewater Treatment Facility

Apalachicola, Franklin County, Florida

NPDES #FL0038857

Biology Section
Bureau of Laboratories
June 1994

Introduction

Apalachicola WWTF, Apalachicola, Franklin County, Florida, NPDES #FL0038857, tests performed on 8 to 9 February, 1994.

This facility is located at First Avenue East in Apalachicola, has a design flow of 1.0 MGD, and an average flow of 0.633 MGD. Treatment of wastewater consists of bar screens and an extended-aeration, activated-sludge process followed by flow-metering chlorination and a holding pond. Effluent is discharged to Huckleberry Swamp (157 acres) and then to Huckleberry Creek (facility summary provided by Dawn Gorres, FDEP Pensacola).

The toxicity tests discussed in this report were performed in accordance with methods described by Weber, 1993, *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, 4th Edition, EPA/600/4-90/027F.

Results and Discussion

The FDEP Biology Section performed two 48-hour static acute screening toxicity bioassays with a sample of effluent from this facility. The test species used for these bioassays were the water flea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Cyprinella leedsi*. Complete mortality occurred in 100% effluent in the *C. leedsi* test within 1 hour of test initiation. The results of the *C. dubia* test showed 100% mortality in 100% effluent within 24 hours. The 24-hour water-quality parameters are not available due to a laboratory error that occurred after the animals were counted at 24 hours but prior to taking water-quality measurements. Although a possibility of a D.O. crash exists, the results from the fish test suggest that D.O. was not the problem.

Total residual chlorine of the sample was < 0.03 mg/L in the laboratory. Total residual chlorine was not measured in the field. Total and unionized ammonia concentrations were 7.99 mg/L and 0.09 mg/L, respectively. Unionized ammonia levels as low as 0.08 mg/L have been found to be acutely toxic to some freshwater fish (EPA *Quality Criteria for Water, 1986*).

Further chemical analyses were performed on the sample and several metals were identified (Table 2). Silver was present at 0.81 µg/L. The surface water criterion for silver is ≤ 0.07 µg/L for Class III fresh waters, while silver levels of 0.4 µg/L have been found to be acutely toxic (48-hr LC_{50}) to another cladoceran, *Daphnia magna* (EPA *AQUIRE* toxicity database). Pyrene (0.99 µg/L) was identified. No pesticides were detected.

Conclusion

The sample of effluent collected from this facility on 7 February, 1994, was toxic to *Ceriodaphnia dubia* and *Cyprinella leedsi*. The cause of toxicity was attributed to unionized ammonia, silver, and undetermined constituents.

Table 1. Concentration series and volumes used for the 48-hour static acute screening bioassays of the Apalachicola WWTF effluent performed on 8 to 9 February, 1994.

Ceriodaphnia dubia (water flea)

Concentration	Dilution Water	Sample	Total Volume
Control	20 mL	0 mL	20 mL
100 %	0 mL	20 mL	20 mL

Cyprinella leedsi (bannerfin shiner)

Concentration	Dilution Water	Sample	Total Volume
Control	500 mL	0 mL	500 mL
100 %	0 mL	500 mL	500 mL

Table 2. Results of chemical analyses of the effluent from the Apalachicola WWTF, sampled on 7 February, 1994.

Pesticides & Herbicides

none detected

Metals

Aluminum	126	µg/L [I]
Calcium	64.0	mg/L
Copper	11	µg/L
Iron	233	µg/L
Magnesium	33.8	mg/L
Silver	0.81	µg/L
Zinc	16	µg/L

Base-Neutral & Acid Extractables

Pyrene	0.99	µg/L [I]

I Value reported is less than the minimum quantitation limit, and greater than or equal to the minimum detection limit.

Table 3. Data recorded during the 48-hour static acute screening bioassays of a sample of effluent from the Apalachicola WWTP, Apalachicola, Franklin County, Florida, NPDES# FL0038857, performed on 8 to 9 February, 1994.

Facility:	**Apalachicola WWTP**		**NPDES #**	**FL0038857**	Facility Type: **Wastewater Treatment Plant**
Location:	Apalachicola		Contact/District:	Glenn Butts/NW	
County:	Franklin		Test type:	static acute screen	
Sample Collection Date:	**2/7/94**	Time: 1135	# tests:	2	Receiving Water: Huckleberry Swamp
Test Beginning Date:	2/8/94	Time: 1430	Chlorination Type:	Chlorinated	
Test Ending Date:	2/9/94	Time: 1450	*Ceriodaphnia dubia*		**Page 1 of 1**
Test Ending Date:	2/8/94	Time: 1530	*Cyprinella leedsi*		

Total Residual Cl2	mg/L	Method
Field:	not measured	
Lab:	< 0.03	DR-100

Ammonia	Total (mg/L)	Unionized (mg/L)
Control Water (fish):	<0.017	0.00
20% Dilute Mineral Water (cladocerans):	<0.017	0.00
100% Sample:	7.99	0.09

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (fish):	125	120
20% Dilute Mineral Water (cladocerans):	70	80
100% Sample:	230	315

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

Organism: ***Ceriodaphnia dubia*** Life stage: < 24 hours old

Test terminated at 24 hours.

	SURVIVAL			pH			Temperature			Dissolved Oxygen			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	24 hour
Control	5	5	-	8.0	a	-	23.2	a	-	8.2	a	-	170	a
Control	5	5	-	-	a	-	-	a	-	-	a	-	-	a
Control	5	5	-	-	a	-	-	a	-	-	a	-	-	a
Control	5	5	-	-	a	-	-	a	-	-	a	-	-	a
100%	5	0	-	7.4	a	-	23.2	a	-	7.8	a	-	1000	a
100%	5	0	-	-	a	-	-	a	-	-	a	-	-	a
100%	5	0	-	-	a	-	-	a	-	-	a	-	-	a
100%	5	0	-	-	a	-	-	a	-	-	a	-	-	a

a Spilled vials after 24-hr counts but before 24-hr parameters.

Organism: ***Cyprinella leedsi*** Age: 9 days

Organisms in 100% effluent dead within 1 hour. Test terminated.

	SURVIVAL			pH			Temperature			Dissolved Oxygen			Conductivity	
Concentrations	# at 0 hr	Live at 1 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	-	7.8	-	-	21.5	-	-	8.4	-	-	230	-
Control	5	5	-	7.8	-	-	21.4	-	-	8.5	-	-	230	-
100%	5	0	-	7.3	-	-	22.5	-	-	7.6	-	-	1005	-
100%	5	0	-	7.3	-	-	22.7	-	-	7.6	-	-	1015	-

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Apalachicola WWTP
Location: Apalachicola WWTP Effluent
County:
Contact/District: Glenn Butts / NW
NPDES Permit #: FL0038857 Outfall #:

Sample Collection: Date 2-7-94 Time 11:35
Test Beginning: Date 2-8-94 Time 1430
Test Ending: Date 2-9-94 Time 1450
Organism Batch #: 4 Diluent Batch #: 5
Organism Age: <24hrs
Test Organism: Ceriodaphnia dubia

94-FEB-08-13 69433

Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through

Test Number: 1 of 2

Remarks:
- test terminated @ 24 hours
- spilled vials after 24-hr counts but before 24-hr parameters KP 2/9/94

Instrument Calibrations:	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0@7.0 9.0@9.0	22.5@22.6	8.7@21.7	979@1,000 9450@~~10,000~~ 9,895@23.3°C
24 hr	7.0@7.0 9.0@9.0	23.5@23.5	8.4@23.5	1005@1,000 9670@10,000@23.7°C
48 hr	___@7.0 ___@___	___@___	___@___	___@1,000 ___@10,000@___°C

Conc.	Chamber #	Number Live 0 hr	24 h	48 h	pH 0 hr	24 h	48 h	Temperature (°C) 0 hr	24 h	48 h	D.O. (mg/L) 0 hr	24 h	48 h	UNCORRECTED Cond. (mmhos/cm) / Cond. (µmhos/cm) 0 hr	24 h	48 h
Control	A	5	~~5~~		8.0			23.2			8.2			170		
Control	B	5	~~5~~													
Control	C	5	~~5~~													
Control	D	5	~~5~~													
100%	A	5	0		7.4			23.2			7.8			1000		
100%	B	5	0													
100%	C	5	0													
100%	D	5	0		Survival counts were made @24hrs, but Parameters could not be taken at 24hrs since vials were spilled after counting but before parameters.											
		CHA	5 DW													
		CHB	5													
		CHC	5													
		CHD	5													
														KP		
		Test terminated												2/9/94		
		2/9/94 DW														
Measured/Loaded by:		TR	KP		KP			KP			KP			KP		
Recorded by:		DW	DW		DW			DW			DW			DW		

Investigators' Signatures
Kim G. Rader
David L. White
Kim Pearce
Tina Mikulski

Reviewer: Marshall Faulkner

form updated 7/8/93

Water Quality Parameters	Salt Water/ (Well Water)	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			not measured		
Lab Total Residual Cl2:	<0.03	<0.03	<0.03	DR-100	TR
Alkalinity:	~125	70	230	Hach	TR
Hardness:	~120	80	315	Hach	TR
Total Ammonia:	<0.017	<0.017	7.99	ORION	MF

Ammonia Meter #98136 Ammonia Meter Slope: -54.0 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Apalachicola WWTP
Location: Apalachicola WWTP Effluent
County:
Contact/District: Glenn Butts / NW
NPDES Permit #: FL0038857 Outfall #:

Sample Collection: Date 2-7-94 Time 11:35
Test Beginning: Date 2-8-94 Time 1430
Test Ending: Date 2-8-94 Time 1530
Organism Batch #: 5 Diluent Batch #: Well
Organism Age: 9 days
Test Organism: Cyprinella leedsi

Test Type: (Screening) | Definitive 94-FEB-08-13 69433
(Static) | Static Renewal | Flow-through

Test Number: 2 of 2

Remarks:

Cyprinella in 100% sample dead within 1 hour. Test terminated. DW

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	22.5 @ 22.6	8.7 @ 21.7	979 @ 1,000 9450 @ ~~10,000~~ 9895 @ 23.3°C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.5 @ 23.5	8.4 @ 23.8	1005 @ 1,000 9670 @ 10,000 @ 23.7°C
48 hr	___ @ 7.0 ___ @ ___	25 @ ___	___ @ ___	___ @ 1,000 ___ @ 10,000 @ ___°C

Conc.	Chamber #	Number Live 0 hr	~~24 h~~	48 h	pH 0 hr	24 h	48 h	Temperature (°C) 0 hr	24 h	48 h	D.O. (mg/L) 0 hr	24 h	48 h	UNCORRECTED Cond. (mmhos/cm) / Cond. (µmhos/cm) 0 hr	24 h	48 h
Control A	79	5	5		7.8			21.5			8.4			230		
Control B	366	5	5		7.8			21.4			8.5			230		
100% A	147	5	0		7.3			22.5			7.6			1005		
100% B	8	5	0		7.3			22.7			7.6			1015		
		test														
		terminated														
		after														
		1 hour;														
		all fish alive in control water @ 1 hr,														
		all fish dead in 100% effluent @ 1 hr.														
														KP 2/8/94		
Measured/Loaded by:		DW			KP			KP			KP			KP		
Recorded by:		KP			DW			DW			DW			DW		

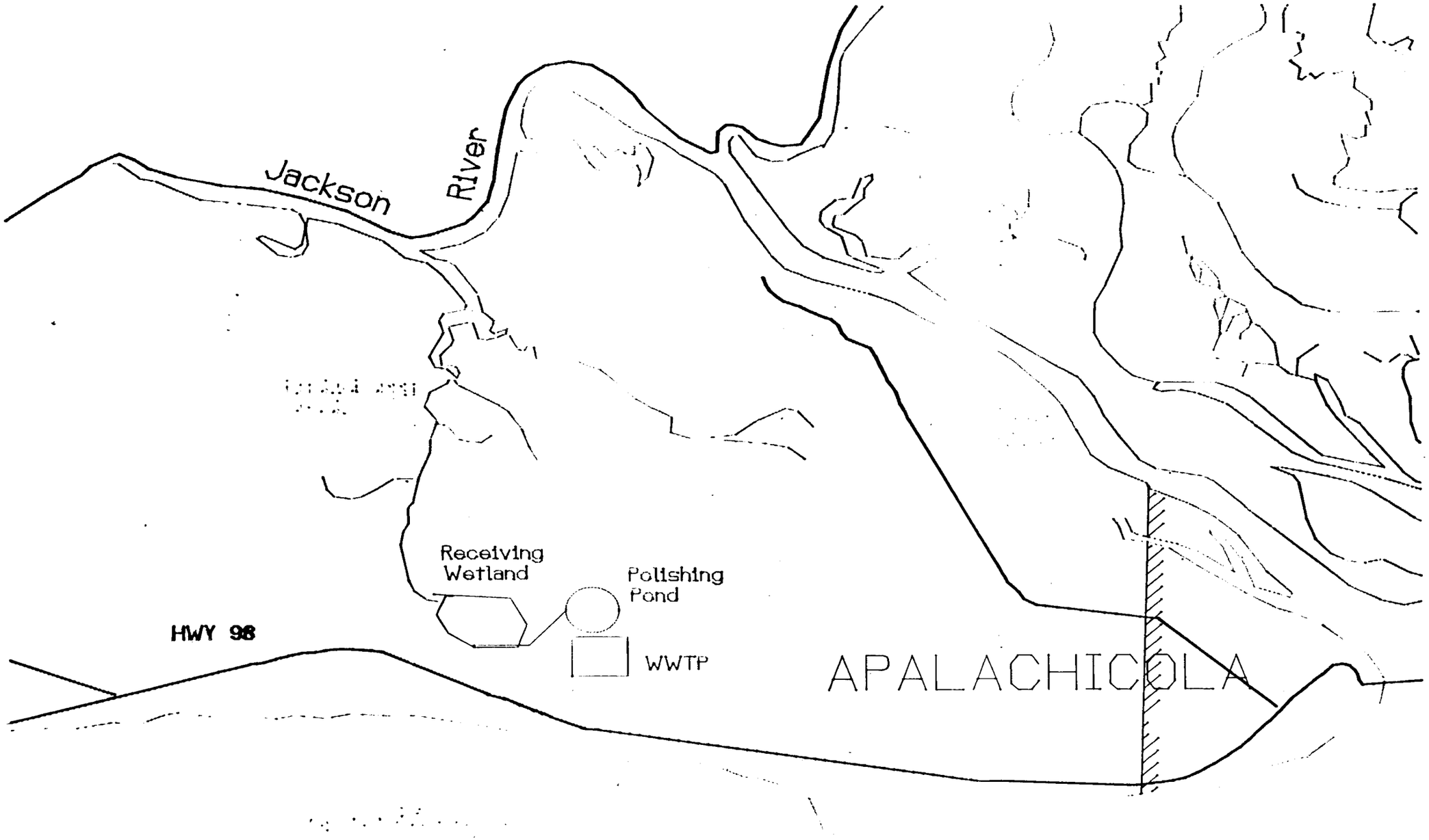
Investigators' Signatures

Tobin G. Rader
David Alt
Kim Pearce
Tina Mikulsky
Marshall Faircloth
Reviewer

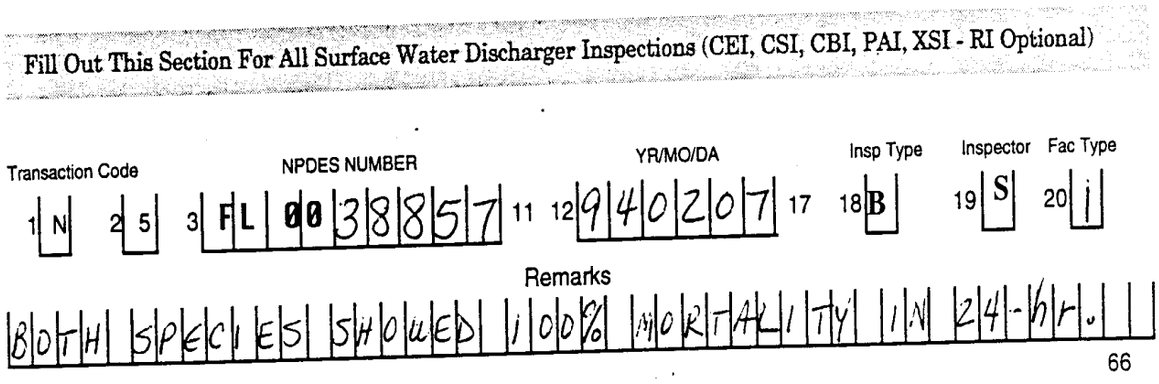
form updated 7/8/93

Water Quality Parameters	Salt Water/ (Well Water)	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			not measured		
Lab Total Residual Cl2:	<0.03	<0.03	<0.03	DR-100	TR
Alkalinity:	125	70	230	Hach	TR
Hardness:	120	80	315	Hach	TR
Total Ammonia:	<0.017	<0.017	7.99	ORION	MF

Ammonia Meter #98136 Ammonia Meter Slope: -54.0 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt


Jackson River
Receiving Wetland
Polishing Pond
WWTP
HWY 98
APALACHICOLA

The Bioassay of Apalachicola WWTF effluent sampled on 7 February, 1994, NPDES #FL0038857.



The Priority Pollutants Analyses for the Bioassay of Apalachicola WWTF effluent sampled on 7 February, 1994, NPDES #FL0038857.

