Florida

Department of Environmental Protection

Bioassays of the Town of

Gretna Wastewater Treatment Plant

Gretna, Gadsden County, Florida

NPDES #FL0038229

Sampled 8/23/93

November 1993

Biology Section
Division of Technical Services

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NPDES #FL0038229

Biology Section
Bureau of Laboratories
November 1993

Introduction

Town of Gretna Wastewater Treatment Plant, Gretna, Gadsden County, Florida, NPDES #FL0038229, tests performed on 24 to 26 August, 1993.

This facility is located a half mile northeast of Gretna in Gadsden County. The wastewater treatment plant has extended aeration and a 0.125 MGD design flow. Effluent goes to a holding tank then a spray field/overland-flow field. Overflow from these fields goes to a perimeter ditch then to Telogia Creek. The sample was collected from the holding tank since the spray field was not in use at the time. The facility is currently operating under a consent order due to numerous permit violations for BOD_5, ammonia, dissolved oxygen, and total suspended solids.

The toxicity tests discussed in this report were performed in accordance with methods described by Weber, 1991, *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, 4th Edition (EPA/600/4-90/027).

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* (formerly *Notropis leedsi*). The sample was toxic to *Ceriodaphnia dubia*, producing a 48-hour LC_{50} of 100%. The sample was also toxic to *Cyprinella leedsi*, producing a 24-hour $LC_{50} < 100\%$.

Total residual chlorine was not detected in the sample. Total and unionized ammonia concentrations were 8.35 mg/L and 0.07 mg/L, respectively, at the beginning of the test. At 24 hours, the total and unionized ammonia concentrations were 7.8 mg/L and 1.31 mg/L, respectively. Unionized ammonia levels as low as 0.08 mg/L and 0.5 mg/L have been found to be acutely toxic to some freshwater fish and invertebrates, respectively (EPA *Quality Criteria for Water*, 1986).

Further chemical analyses were performed on the sample and indicated the presence of the metals shown in Table 2. Cadmium (9.8 µg/L) and copper (16 µg/L) each exceeded their state water quality criterion of ≤ 1.3 µg/L (cadmium) and ≤ 13.8 µg/L (copper) for Class III freshwater. Cadmium concentrations as low as 1.0 µg/L and copper concentrations as low as 7.24 µg/L have been found to be acutely toxic to some freshwater organisms (EPA *Quality Criteria for Water*, 1986). Pesticides and organics were not detected.

Conclusion

The sample of effluent collected from this facility on 23 August, 1993, was acutely toxic to *Ceriodaphnia dubia* and *Cyprinella leedsi*. The toxicity was attributed to the unionized ammonia, cadmium, and copper constituents in the sample.

Table 1. Concentration series and volumes used for the 48-hour static acute screening toxicity bioassays of the Town of Gretna WWTP effluent performed on 24 to 26 August, 1993.

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, formerly *Notropis leedsi*)

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 on the effluent from Town of Gretna WWTP, sampled on 23 August, 1993.

Metals

Aluminum	131	µg/L	I
Cadmium	9.8	µg/L	
Calcium	26.1	mg/L	A
Copper	16	µg/L	A
Iron	161	µg/L	A
Magnesium	13.0	mg/L	A
Zinc	27	µg/L	A

Pesticides & Herbicides

None Detected

Base-Neutral & Acid Extractables

None Detected

A Value reported is the mean of two or more determinations.

I The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

Table 3. Data recorded during the 48-hour acute screening toxicity bioassays of a sample of effluent from the Town of Gretna WWTP, Gretna, Gadsden County, Florida, NPDES# FL0038229, performed 24 to 26 August, 1993.

Facility:	Town of Gretna WWTP		NPDES #	FL0038229	Facility Type: Wastewater Treatment Plant
Location:	0.5 mile north of Gretna		Contact / District:	Glenn Butts / NW	
County:	Gadsden		Test type:	static acute screen	
Sample Collection Date:	8/23/1993	Time: 1030	# tests:	2	Receiving Water: Telogia River
Test Beginning Date:	8/24/1993	Time: 1330	Chlorination Type:	Chlorinated	
Test Ending Date:	8/26/1993	Time: 1400			Page 1 of 1

Organism: *Ceriodaphnia dubia* Life stage: < 24 hours
LC50 = 100%

	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	48 hour
Control	5	5	5	8.1	-	8.4	23.9	-	25.5	8.1	-	7.4	160	180
Control	5	5	5	-	-	8.4	-	-	25.5	-	-	7.5	-	180
Control	5	5	5	-	-	8.4	-	-	25.5	-	-	7.5	-	180
Control	5	5	5	-	-	8.4	-	-	25.5	-	-	7.6	-	180
100%	5	4	2	7.1	-	8.7	24.2	-	25.5	4.1	-	7.4	545	580
100%	5	5	4	-	-	8.7	-	-	25.5	-	-	7.5	-	585
100%	5	5	4	-	-	8.8	-	-	25.5	-	-	7.5	-	585
100%	5	5	0	-	-	8.8	-	-	25.5	-	-	7.6	-	585

Organism: *Cyprinella leedsi* Age: 10 days
LC50: < 100%

	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	0 hour	24 hour	0 hour	24 hour
Control	5	5	a	7.7	8.3	-	24.1	23.4	-	8.2 *	8.4 **	9.7	245	245
Control	5	5	a	7.7	8.3	-	-	23.4	-	8.1 *	8.4 **	9.7	245	245
100%	5	0	a	7.1	8.5	-	24.8	23.4	-	3.5 *	7.9 **	9.2	625	590
100%	5	0	a	7.1	8.5	-	-	23.3	-	3.4 *	7.9 **	9.2	625	595

a Test terminated at 24 hours.

* DO before aeration.
** DO after aeration prior to test initiation.

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:	8.35	0.07

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	125	120
20% Dilute Mineral Water (cladocerans):	70	80
100% Sample:	200	120

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

Table 4. LC_{50} Data for Bioassay of Town of Gretna WWTP effluent performed on 24 to 26 August, 1993.

Organism	Method of Data Analysis	LC_{50} (95% Confidence Intervals)
Ceriodaphnia dubia	non-calculated	100% [a]
Cyprinella leedsi	non-calculated	< 100% [b]

[a] The LC_{50} is 100% since half the organisms died in the lowest test concentration (100%). The test ran for 48 hours.

[b] The LC_{50} is < 100% since all the organisms died in the lowest test concentration (100%). The test ran for 24 hours.

Figure 1. Town of Gretna WWTP, FL0038229

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Gretna WWTP
Location: 1/2 mile North of Gretna
County: Gadsden
Contact/District: GLEN BUTTS / NW
NPDES Permit #: FL0038229 **Outfall #:** _____

Sample Collection: Date 8/23/93 Time 1030
Test Beginning: Date 8/24/93 Time 1330
Test Ending: Date 8-26-93 Time 1400
Organism Batch #: 106 **Diluent Batch #:** 20
Organism Age: <24 hrs.
Test Organism: Ceriodaphnia dubia

60939 93AUG24-04

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

Instrument calibrations checked 8/24/93 KP

Test Number: 1 of 2

Remarks:
For Ammonia @ 24 hours from sample Jar A 100% test = 7.8

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	23.3 @ 23.4	8.6 @ 22.8	1005 @ 1,000 9460 @ 10,000 @ 24.5°C
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.5 @ 24.6	8.4 @ 24.4	1005 @ 1,000 9650 @ 10,000 @ 24.5°C
48 hr	7.0 @ 7.0 9.0 @ 9.0	23.9 @ 24.0	8.4 @ 23.9	1005 @ 1,000 9640 @ 10,000 @ 24.5°C

		Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm)		
Conc.	Chamber #	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h
Control	A	5	5	5	8.1		8.4	23.9		25.5	8.1		7.4	160		180
Control	B	5	5	5	"		8.4	"		25.5	"		7.5	"		180
Control	C	5	5	5	"		8.4	"		25.5	"		7.5	"		180
Control	D	5	5	5	"		8.4	"		25.5	"		7.6	"		180
100%	A	5	4	2	7.1		8.7	24.2		25.5	4.1		7.4	545		580
100%	B	5	5	4	"		8.7	"		25.5	"		7.5	"		585
100%	C	5	5	4	"		8.8	"		25.5	"		7.5	"		585
100%	D	5	5	0	"		8.8	"		25.5	"		7.6	"		585
Measured/Loaded by:		TM	TR	TR	TM		TR	TM		TR	TM		TR	TM		TR
Recorded by:		TR	TR	TR	TR		TR	TR		TR	TR		TR	TR		TM

Investigators' Signatures

Tina Mikulski
Tobin A. Rader
Mark Fairchild

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	TM
Alkalinity:	125	70	200	Hach	TR
Hardness:	120	80	120	Hach	TR
Total Ammonia:	<0.01	<0.01	8.35	Orion	MF

Ammonia Meter #98136 Meter Slope: -57.9 at 24 hours -57.9
Ammonia Blank: <0.01 <0.01
Control Salinity: 0 ppt
Sample Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Gretna WWTP
Location: 1/2 mile north of Gretna
County: Gadsden
Contact/District: EGLEN BUTTS / NW
NPDES Permit #: FL0038229 Outfall #:
93AUG24-04 60939

Sample Collection: Date 8/23/93 Time 1030
Test Beginning: Date 8/24/93 Time 1530
Test Ending: Date 8/25/93 Time 1500
Organism Batch #: 35 Diluent Batch #: well
Organism Age: 10 days
Test Organism: Cyprinella leedsi

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

Test Number: 2 of 2

Remarks: Test terminated at 24hrs
VOLUMES IN JARS WERE AERATED PRIOR TO TEST INITIATION
Ammonia @ 24hrs. 7.8 mg/L
unionized 1.31 mg/L

Instrument Calibrations:	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
	meter # 7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0	23.3 @ 23.4	8.6 @ 22.8	1005 @ 1,000
	9.0 @ 9.0			9660 @ 10,000 @ 24.5°C
24 hr	7.0 @ 7.0	24.5 @ 24.6	8.4 @ 24.4	1005 @ 1,000
	9.0 @ 9.0			9650 @ 10,000 @ 24.5°C
48 hr	7.0 @ 7.0	23.9 @ 24.0	8.4 @ 23.9	1005 @ 1,000
	9.0 @ 9.0			9640 @ 10,000 @ 24.5°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	47	5	5		7.7	8.3		24.1	23.4		8.2	9.7		245	245	
Control B	22	5	5		7.7	8.3			23.4		8.1	9.7		245	245	
100% A	888	~~05~~	0		7.1	8.5		24.8	23.4		3.5	9.2		625	590	
100% B	190	~~05~~	0		7.1	8.5			23.3		3.4	9.2		625	595	
		five animals loaded at test initiation TR 8/25/93														
									Control A		8.4					
									Control B		8.4					
									100% A		7.9					
									100% B		7.9					
											↓ New D.O.'s					
											Jars aerated					
											before test					
											Initiation.					
													TM			
Measured/Loaded by:		TM	TM		TM	TM		TM	TM		TM	TM		TM	TM	
Recorded by:		TR	TR		TR	TR		TR	TR		TR	TR		TR	TR	

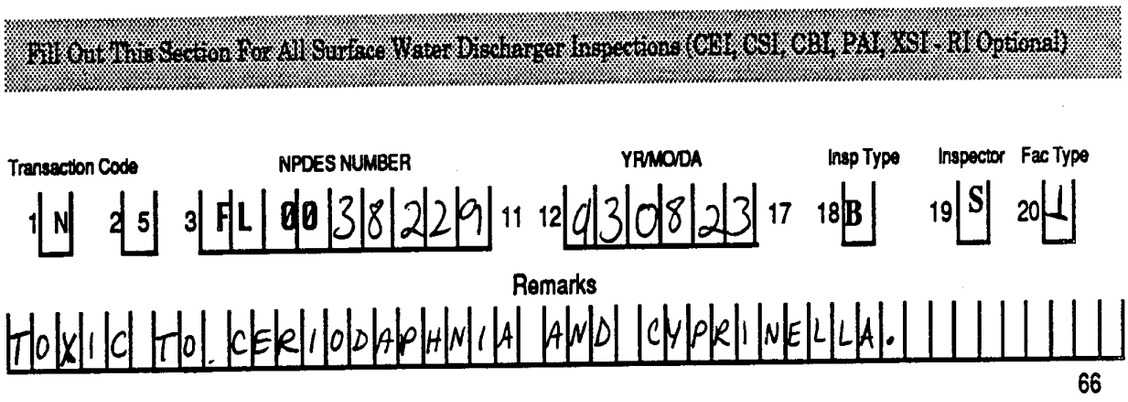
Investigators' Signatures
Tina Mikulski
Tobin C. Rader
Marshall Faircloth
Reviewer

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	TM
Alkalinity:	125	70	200	Hach	TR
Hardness:	120	80	120	Hach	TR
Total Ammonia:	<0.017	<0.017	8.35	ORION	MF

Ammonia Meter #98136 Ammonia Meter Slope: -57.9 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

form updated 7/8/93

The Bioassay of the Town of Gretna WWTP effluent sampled on August 23, 1993, NPDES# FL0038229.



The Priority Pollutants Analysis for the Bioassay of the Town of Gretna WWTP effluent sampled on August 23, 1993, NPDES# FL0038229.

