Florida
Department of Environmental Protection

Bioassays of the City of

Lakeland Wastewater Treatment Plant

Lakeland, Polk County, Florida

NPDES #FL0039772

Sampled 9/13/93

November 1993

Biology Section
Division of Technical Services

Bioassays of the City of

Lakeland Wastewater Treatment Plant

Lakeland, Polk County, Florida

NPDES #FL0039772

Biology Section
Bureau of Laboratories
November 1993

Introduction

City of Lakeland WWTP, Lakeland, Polk County, Florida, NPDES #FL0039772, tests performed on 14 to 16 September, 1993.

This extended aeration facility is located north of State Road 60 between Mulberry and Bartow. The wastewater treatment process includes screening, primary clarification, filtering, aeration, final clarification, polishing ponds, and chlorine disinfection. A portion of the 10.8 MGD of treated effluent is pumped to a power plant for reuse as cooling water, the remainder goes to a wetland treatment system prior to discharge to an unnamed tributary to Ellis Branch of the north branch of the Alafia River. The sample was collected at the outfall from the wetlands treatment system. The facility is currently operating under an administrative order for violating the total suspended solids limitations of their NPDES permit.

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*). Although the *Ceriodaphnia dubia* test was invalidated due to excessive control mortality, no mortality occurred in the 100% effluent test concentrations. No mortality occurred in the *Cyprinella leedsi* test. The test results did not indicate toxicity.

Total residual chlorine and total ammonia were not detected in the sample. Further chemical analyses were performed on the sample and several metals were present (Table 2). Pesticides and organics were not detected.

Conclusion

The sample of effluent collected from this facility on 13 September, 1993, did not show toxicity.

Table 1. Concentration series and volumes used for the 48-hour static acute screening bioassays of the City of Lakeland WWTP effluent performed on 14 to 16 September, 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 City of Lakeland WWTP, sampled on 13 September, 1993.

Metals

Calcium	51.5	mg/L
Iron	46	µg/L
Magnesium	14.9	mg/L

Pesticides

None Detected

Base-Neutral & Acid Extractables

None Detected

Table 3. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the City of Lakeland WWTP, Lakeland, Polk County, Florida, NPDES# FL0039772, performed on 14 to 16 September, 1993.

Facility:	City of Lakeland WWTP	NPDES #	FL0039772	Facility Type:	WWTP
Location:	N of SR 60 between Mulberry & Bartow	Contact / District:	Pat Fricano / SW		
County:	Polk	Test type:	static acute screen		Unnamed tributary to
Sample Collection Date:	9/13/93 Time: 1206	# tests:	2	Receiving Water:	Ellis branch of the North
Test Beginning Date:	9/14/93 Time: 1300	Chlorination Type:	Chlorinated*		branch of the Alafia River
Test Ending Date:	9/16/93 Time: 1300			Page 1 of 1	

*Chlorine dissipates due to the nature of the wetlands treatment system.

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:	<0.017	0.00

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	120	120
20% Dilute Mineral Water (cladocerans):	70	80
100% Sample:	135	190

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

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

	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	8.2	-	8.3	23.7	-	24.2	7.7	-	7.8	165	185
Control	5	5	3*	-	-	8.2	-	-	24.4	-	-	7.8	-	180
Control	5	5	5	-	-	8.2	-	-	24.7	-	-	7.8	-	180
Control	5	5	2*	-	-	8.2	-	-	24.7	-	-	7.8	-	180
100%	5	5	5	8.0	-	8.6	23.6	-	24.4	7.6	-	7.9	710	785
100%	5	5	5	-	-	8.6	-	-	24.3	-	-	7.8	-	780
100%	5	5	5	-	-	8.6	-	-	24.3	-	-	7.9	-	770
100%	5	5	5	-	-	8.6	-	-	24.5	-	-	7.8	-	765

*Test invalidated due to excessive control mortality.

Organism: ***Cyprinella leedsi*** Age: 10 days

	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	7.9	8.2	8.4	23.8	24.2	24.3	7.7	7.8	7.7	245	255
Control	5	5	5	7.9	8.2	8.4	23.8	24.2	24.3	7.7	7.8	7.7	245	250
100%	5	5	5	7.8	8.2	8.3	24.5	24.2	24.3	7.3	7.6	7.7	765	760
100%	5	5	5	7.8	8.2	8.3	24.5	24.2	24.3	7.2	7.6	7.6	765	765

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: City of Lakeland
Location:
County: Hillsborough
Contact/District:
NPDES Permit #: FL0039772 Outfall #:

Sample Collection: Date 9-13-93 Time 1206
Test Beginning: Date 9-14-93 Time 1300
Test Ending: Date 9-16-93 Time 1300
Organism Batch #: 38 Diluent Batch #: Well
Organism Age: 10 days old
Test Organism: Cyprinella leedsi

61855 93-SEP-14-22

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

Test Number: 2 of 2

Remarks:

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	24.7 @ 24.8	8.3 @ 24.6	1005 @ 1,000 9650 @ 10,000 @ 24.5 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.5 @ 24.6	8.5 @ 23.5	1006 @ 1,000 9770 @ 10,000 @ 24.5 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	24.6 @ 24.7	8.3 @ 24.6	1005 @ 1,000 9680 @ 10,000 @ 24.5 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
Control A	41	5	5	5	7.9	8.2	8.4	23.8	24.2	24.3	7.7	7.8	7.7	245	250	255
Control B	219	5	5	5	7.9	8.2	8.4	23.8	24.2	24.3	7.7	7.8	7.7	245	250	250
100% A	190	5	5	5	7.8	8.2	8.3	24.5	24.2	24.3	7.3	7.6	7.7	765	760	760
100% B	333	5	5	5	7.8	8.2	8.3	24.5	24.2	24.3	7.2	7.6	7.6	765	760	765
						KP			KP			KP			KP	
Measured/Loaded by:		TM	MF	KP	KP	MF	KP	KP	MF	KP	KP	MF	KP	KP	MF	KP
Recorded by:		MF	MF	KP	TR	KP	TR	TR	KP	TR	TR	KP	TR	TR	KP	TR

Investigators' Signatures

Adria G. Radosi
Marshall Faircloth
Tina Mikulski
Kim Pearce
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:	120	70	135	Hach	TM
Hardness:	120	80	190	Hach	TM
Total Ammonia:	<0.017	<0.017	<0.017	Orion	MF

Ammonia Meter #98136 Ammonia Meter Slope: -57.6 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: City of Lakeland
Location:
County: Hillsborough
Contact/District:
NPDES Permit #: FL0039772 Outfall #:

Sample Collection: Date 9-13-93 Time 1206
Test Beginning: Date 9-14-93 Time 1300
Test Ending: Date 9-16-93 Time 1300
Organism Batch #: 109 Diluent Batch #: 23
Organism Age: < 24 hrs
Test Organism: Ceriodaphnia dubia

61855 93-SEP-14-22

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

Test Number: 1 of 2

Remarks:
RESULTS INVALIDATED DUE TO EXCESSIVE CONTROL MORTALITY

Instrument Calibrations:	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0@7.0	24.7@24.8	8.3@24.6	1005 @ 1,000
	9.0@9.0			9650 @ 10,000 @ 24.5 °C
24 hr	7.0@7.0	24.5@24.6	23.5@8.5	1006 @ 1,000
	9.0@7.0			9770 @ 10,000 @ 24.5 °C
48 hr	7.0@7.0	24.6@24.7	8.3@24.6	1005 @ 1,000
	9.0@9.0			9680 @ 10,000 @ 24.5 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
Control	A	5	5	5	8.2		8.3	23.7		24.2	7.7		7.8	165		185
Control	B	5	5	3			8.2			24.4			7.8			180
Control	C	5	5	5			8.2			24.7			7.8			180
Control	D	5	5	2			8.2			24.7			7.8			180
100%	A	5	5	5	8.0		8.6	23.6		24.4	7.6		7.9	710		785
100%	B	5	5	5			8.6			24.3			7.8			780
100%	C	5	5	5			8.6			24.3			7.9			770
100%	D	5	5	5			8.6			24.5			7.8			765
Measured/Loaded by:		TM	MF	KP	KP		KP	KP		KP	KP		KP	KP		KP
Recorded by:		MF	MF	KP	TR		TR	TR		TR	TR		TR	TR		TR

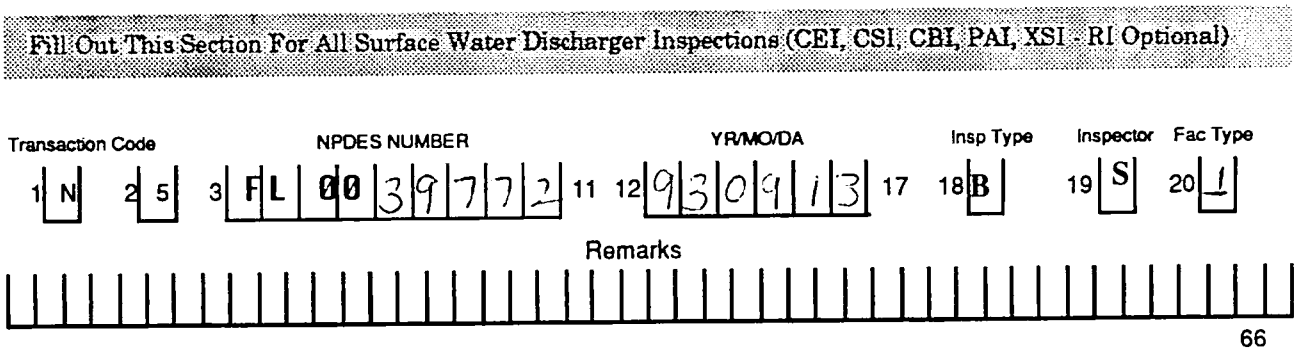
Investigators' Signatures
Tobin G. Rader
Marshall Faircloth
Tina Mikulasky
Kim Rucker
Invalid - [illegible]
Reviewer

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:	120	70	135	titration	TM
Hardness:	120	90	190	titration	TM
Total Ammonia:	<0.07	<0.07	<0.07	Orion	MF

Ammonia Meter #98136 Ammonia Meter Slope: -57.9 Ammonia Blank: [illegible] Control Salinity: 0 ppt Sample Salinity: 0 ppt

The Bioassay of the City of Lakeland WWTP effluent sampled on September 13, 1993, NPDES# FL0039772.



The Priority Pollutants Analysis for the Bioassay of the City of Lakeland WWTP effluent sampled on September 13, 1993, NPDES# FL0039772.

