

Bioassays of the City of

Cape Coral Wastewater Treatment Plant

Cape Coral, Lee County, Florida

NPDES #FL0030007

Sampled ~~11~~ 12/14/92

January 1993

Biology Section
Division of Technical Services

Bioassays of the City of

Cape Coral Wastewater Treatment Plant

Cape Coral, Lee County, Florida

NPDES #FL0030007

Biology Section
Bureau of Laboratories
January 1993

Introduction

City of Cape Coral WWTP, Cape Coral, Lee County, Florida, NPDES #FL0030007, tests performed on 15 to 17 ~~November~~ Dec ember, 1992.

This facility is located on 1800 Everest Parkway in Cape Coral (also known as Everest Parkway Water Reclamation Plant). The facility is permitted to operate a 7.3 mgd capacity advanced wastewater treatment plant. Treatment consists of a modified Bardenpho process and sand filtration followed by chlorine disinfection. Treated effluent is discharged to the Caloosahatchee River (NPDES files).

The toxicity tests discussed in this report were performed according to 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 FDER Biology Section performed two 48-hour static acute screening toxicity bioassays with a sample of chlorinated effluent from this facility. The bioassay organisms used for these tests were the water flea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Notropis leedsi*. The test results indicated toxicity only to *N. leedsi*; 100% mortality occurred within 24 hours of test initiation, at which time the test was terminated. No mortality occurred with the *C. dubia* for the duration of the 48-hour test.

Total residual chlorine of the sample was 0.5 mg/L in the laboratory and 1.8 mg/L in the field. It has been our experience that *C. dubia* is slightly more sensitive than *N. leedsi* to similar levels of chlorine and, therefore, is unlikely that the total residual chlorine was the cause of toxicity in the *N. leedsi* test.

Two additional 48-hour static acute screening tests were performed with an aliquot of the sample that was dechlorinated in the laboratory using the sodium thiosulfate method. The test organisms used were *C. dubia* and *N. leedsi*. The test results did not indicate toxicity since no mortality occurred in either test. Sodium thiosulfate is a chemical oxidant/reductant and, as such, affects components other than chlorine including, apparently, the undetermined toxicant(s).

Total and unionized ammonia concentrations were 0.72 mg/L and < 0.01 mg/L, respectively. Samples were not submitted for metals, organics, or pesticides analyses.

Conclusion

The sample of chlorinated effluent collected from this facility on 14 December, 1992, was toxic to *N. leedsi*. The cause of toxicity was not determined.

Table 1. Concentration series and volumes used for the 48-hour static acute screening bioassays of the City of Cape Coral WWTP effluent performed on 15 to 17 December, 1992.

Ceriodaphnia dubia (water flea)

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

Notropis 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. Data recorded during the 48-hour acute screening bioassays of a sample of chlorinated effluent from Cape Coral WWTP, Cape Coral, Lee County, Florida, NPDES# FL0030007, performed on 15 to 17 December, 1992.

Facility:	**Cape Coral WWTP**		**NPDES #**	**FL0038873**	Facility Type: **wastewater treatment**
Location:	Cape Coral		Contact/District:	Jim Grob / S	
County:	Lee		Test type:	static acute screen	
Sample Collection Date:	**12/14/92**	Time: 1015	# tests:	2	Receiving Water: Caloosahatchee River
Test Beginning Date:	12/15/92	Time: 1300	Chlorination Type:	**chlorinated**	
Test Ending Date:	12/17/92	Time: 1330			**Page 1 of 1**

Total Residual Cl2	mg/L	Method
Field:	1.8	
Lab:	0.5	DR-100

Ammonia	Total (mg/L)	Unionized (mg/L)
Control Water (fish):	< 0.02	0.00
20% Dilute Mineral Water (cladocerans):	< 0.02	0.00
100% Sample:	0.72	< 0.01

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (fish):	85	140
20% Dilute Mineral Water (cladocerans):	55	65
100% Sample:	163	286

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

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

	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	8.3	-	8.1	22.1	-	23.5	8.1	-	7.0	145	160
Control	5	5	5	-	-	8.1	-	-	-	-	-	6.9	-	145
Control	5	5	5	-	-	8.1	-	-	-	-	-	7.0	-	150
Control	5	5	5	-	-	8.1	-	-	-	-	-	7.0	-	150
100%	5	5	5	7.5	-	8.5	22.0	-	23.7	8.2	-	6.7	1320	1480
100%	5	5	5	-	-	8.5	-	-	-	-	-	6.8	-	1620
100%	5	5	5	-	-	8.5	-	-	-	-	-	6.8	-	1655
100%	5	5	5	-	-	8.5	-	-	-	-	-	6.8	-	1700

Organism: ***Notropis leedsi*** Age: 11 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	24 hour
Control	5	5	-	7.6	8.1	-	20.7	22.8	-	7.7	7.3	-	230	285
Control	5	4	-	7.7	8.1	-	-	-	-	7.7	7.3	-	230	280
100%	5	0 *	-	7.3	8.1	-	22.4	22.7	-	8.4	7.3	-	1585	1630
100%	5	0 *	-	7.3	8.1	-	-	-	-	8.4	7.3	-	1605	1650

* test terminated at 24 hours due to complete mortality in the test concentration replicates.

Table 3. Data recorded during the 48-hour acute screening bioassays of a sample of dechlorinated effluent from Cape Coral WWTP, Cape Coral, Lee County, Florida, NPDES# FL0030007, performed on 15 to 17 December, 1992.

Facility:	Cape Coral WWTP		NPDES #	FL0038873	Facility Type: wastewater treatment
Location:	Cape Coral		Contact/District:	Jim Grob / S	
County:	Lee		Test type:	static acute screen	
Sample Collection Date:	12/14/92	Time: 1015	# tests:	2	Receiving Water: Caloosahatchee River
Test Beginning Date:	12/15/92	Time: 1300	Chlorination Type:	dechlorinated in laboratory	
Test Ending Date:	12/17/92	Time: 1330		sodium thiosulfate method	Page 1 of 1

Total Residual Cl2	mg/L	Method
Field:	1.8	
Lab:	0.5	DR-100

Ammonia	Total (mg/L)	Unionized (mg/L)
Control Water (fish):	< 0.02	0.00
20% Dilute Mineral Water (cladocerans):	< 0.02	0.00
100% Sample:	0.72	< 0.01

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (fish):	85	140
20% Dilute Mineral Water (cladocerans):	55	65
100% Sample:	163	286

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

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

	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	-	8.0	22.2	-	23.2	8.2	-	7.0	125	145
Control	5	5	5	-	-	8.1	-	-	-	-	-	7.0	-	150
Control	5	5	5	-	-	8.1	-	-	-	-	-	7.0	-	150
Control	5	5	5	-	-	8.1	-	-	-	-	-	7.0	-	150
100%	5	5	5	7.6	-	8.5	22.1	-	23.3	8.2	-	7.0	1430	1550
100%	5	5	5	-	-	8.5	-	-	-	-	-	6.9	-	1630
100%	5	5	5	-	-	8.5	-	-	-	-	-	6.9	-	1660
100%	5	5	5	-	-	8.5	-	-	-	-	-	6.9	-	1695

Organism: ***Notropis leedsi*** Age: 11 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	7.4	8.1	8.2	20.7	22.8	-	7.7	7.3	-	230	285
Control	5	5	5	7.5	8.1	8.2	-	-	-	7.7	7.3	-	230	280
100%	5	5	5	7.3	8.0	8.2	22.4	22.7	-	8.4	7.3	-	1585	1630
100%	5	5	5	7.3	8.0	8.1	-	-	-	8.4	7.3	-	1605	1650

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Cape Coral WWTP
Address/City:
County: Lee ~~Fort Myers~~ KP
Contact/District: Sonar JIM GROB
NPDES Permit #: FL00 Outfall #:
Test Number: 3+4 of I KP
Test Type: ~~Screening~~ | ~~Definitive~~
Static | Static Renewal | Flow-through
Remarks:

Sample Collection: Date 12/14/92 Time 1015
Test Beginning: Date 12/15/92 Time 1300
Test Ending: Date 12/17/92 Time 1400
Test Organism: Ceriodaphnia dubia
Life Stage/Age: < 24 hours
46683
92-DEC-15-04 verified 12/17/92 KP

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7.0; 10.0; 10	8.6 @ 22.8°C	21.9 @ 21.8	964 9700 @ 22.8°C
24 hr	7.0; 10.0; 10	8.6 @ 22.8°C	22.5 @ 22.7	930 9400 @ 23.0°C
48 hr	7.0; 10.0; 10	8.2 @ 24.8°C	22.8 @ 22.9	940 9500 @ 23.2°C

		Number Live			pH			Temp. (°C)			DO (mg/L)			Cond. (µmhos/cm)		
Conc.	Chamber #	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control	A	5	5	5	8.3		8.1	22.1		23.5	8.1		7.0	145		160
Control	B	5	5	5			8.1						6.9			145
Control	C	5	5	5			8.1						7.0			150
Control	D	5	5	5			8.1						7.0			150
A 100%	A	5	5	5	7.5		8.5	22.0		23.7	8.2		6.7	1320		1480
B 100%	B	5	5	5			8.5						6.8			1620
100%	C	5	5	5			8.5						6.8			1655
100%	D	5	5	5			8.5						6.8			1700
Measured/Loaded by:		TM	TM	TM	TR		TM	TR		TM	TR		TM	TR		TM
Recorded by:		TR	KP	TR	TM		TR	TM		TR	TM		TR	TM		TR

Investigators' Signatures

Marshall Faircloth
Tina Mikulski
Tobi Rader
Kim Pearce

Reviewer

Water-quality Parameters

	Well Water	20% Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			1.8		RMC
Lab Tot. Resid. Cl2:	<.02	<.02	0.5	DR100	TR
Alkalinity:	85	55	163	Hach	TR
Hardness:	140	65	286	Hach	TR
Total Ammonia:	~~44~~ <.02	~~72~~ <.02	.72	~~Orion~~ Hach	TR

Ammonia * recorded wrong Ammonia Salinity
Meter Slope: _____ Blank: _____ Sample: _____ ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Cape Coral WWTP
Address/City:
County: Lee JIM GROB
Contact/District: South ~~Tom~~ McGregor KP
NPDES Permit #: FL00 Outfall #:

Test Number: ~~2~~ 4 of ~~2~~ 4 KP Test Type: (Screening) | Definitive
Static | Static Renewal | Flow-through

Sample Collection: Date 12/14/92 Time 1015
Test Beginning: Date 12/15/92 Time 1300
Test Ending: Date 12/16/92 Time 1330
Test Organism: N. Cedrus
Life Stage/Age: 11 days

46683
92-DEC-15-04 verified 12/17/92 KP

Remarks: Test Terminated at 24 hours
Cl —

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7@7; 10@10	8.6@22.8°C	21.9@21.8	964 9700 @22.8°C
24 hr	7@7; 10@10	8.6@22.8°C	22.5@22.7	930 9400 @23.0°C
**48 hr	7@7; 10@10	8.2@24.8°C	22.5@22.9	940 9500 @23.2°C

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	DO (mg/L) 0	24	48	Cond. (µmhos/cm) 0	24	48
Control	21	5	5		7.6	8.1		20.7	22.8	TM	8.2*	7.3		230	285	
Control	69	5	4		7.7	8.1					7.7	7.3		230	280	
~~Control~~ 100% MF 12/18/92	223	5	0		7.3	8.1		22.4	22.7		8.4	7.3		1585	1630	
100%	2	5	0		7.3	8.1					8.4	7.3		1605	1650	
											*7.7					
											12/15/92 TM recorded wrong					
					** Test terminated 48 hr not needed 12/17/92 TM											
Measured/Loaded by:		TM	TM		TR	MF		TR	MF		TR	MF		TR	MF	
Recorded by:		TR	TM		TM	TM		TM	TM		TM	TM		TM	TM	

Investigators' Signatures
Marshall Faircloth
Tina Mikulski
Robin Rader
Kim Pearce

Reviewer

Water-quality Parameters

	Well Water	Cond. Water (20%)	Sample	Method	Measured by
Field Tot. Resid. Cl2:			1.8		RMc
Lab Tot. Resid. Cl2:	<.02	<.02	0.5	DR100	TR
Alkalinity:	85	55	163	Hach	TR
Hardness:	140	65	286	Hach	TR
Total Ammonia:	*~~.46~~ TR <.02	*~~.72~~ TR <.02	.72	~~Orion~~ Hach	TR

Ammonia * recorded wrong
Ammonia Salinity
Meter Slope: _____ Blank: _____ Sample: _____ ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Cape Coral WWTP
Address/City:
County: Lee KP
Contact/District: Seth ~~Don Mecleger~~ JIM GROB
NPDES Permit #: FL00 Outfall #:
Test Number: 1 of X4 KP Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through
Remarks:

Sample Collection: Date 12/14/92 Time 1015
Test Beginning: Date 12/16/92 Time 1360
Test Ending: Date 12-17-92 Time 1400
Test Organism: Ceriodaphnia dubia
Life Stage/Age: < 24 hours
46683 92-DEC-15-04 verified 12/17/92 KP

DeCl

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7.7; 10.0 & 10	8.6 @ 22.8°C	21.9 & 21.8	964 9700 @ 22.8
24 hr	7.7; 10.0 10	8.6 @ 22.8°C	22.5 & 22.7	430 9400 @ 23.0°C
48 hr	7.7; 10.0 10	8.2 @ 24.8°C	22.8 & 22.9	940 9500 @ 23.2°C

		Number Live			pH			Temp. (°C)			DO (mg/L)			Cond. (µmhos/cm)		
Conc.	Chamber #	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control	A	5	5	5	8.2		8.0	22.2		23.2	8.2		7.0	125		145
Control	B	5	5	5			8.1						7.0			150
Control	C	5	5	5			8.1						7.0			150
Control	D	5	5	5			8.1						7.0			150
100%	A	5	5	5	7.6		8.5	22.1		23.3	8.2		7.0	1430		1550
100%	B	5	5	5			8.5						6.9			1630
100%	C	5	5	5			8.5						6.9			1660
100%	D	5	5	5			8.5						6.9			1695
Measured/Loaded by:		TM	TM	TM	TR		TM	TR		TM	TR		TM	TR		TM
Recorded by:		TR	TM	TR	TM		TR	TM		TR	TM		TR	TM		TR

Investigators' Signatures
Marshall Faircloth
Tina Mikulda
Helen Raden
Kim Pearce

Reviewer

Water-quality Parameters

	Well Water	20% Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			1.8		RMc
Lab Tot. Resid. Cl2:	< .02	< .02	0.5 KP	DR100	TR DECHLOR SAMPLE
Alkalinity:	85	55	163	Hach	TR <0.02 TRC
Hardness:	140	65	286	Hach	TR KP 1/13/93
Total Ammonia:	~~*.46~~ TR < .02	~~*.22~~ TR < .02	.72	~~Orion~~ Hach TR	TR

Ammonia * recorded wrong
Ammonia
Salinity
Meter Slope: _____ Blank: _____ Sample: _____ ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Cape Coral WWTP
Address/City:
County: Lee JIM GROB
Contact/District: South ~~Ron MacGregor~~ KP
NPDES Permit #: FL00 Outfall #:

Sample Collection: Date 12/14/92 Time 1015
Test Beginning: Date 12/15/92 Time 1300
Test Ending: Date 12-17-92 Time 14-00
Test Organism: N. leeki
Life Stage/Age: 11 days

46683 92-DEC-15-04 verified 12/17 AZ KP

Test Number: 2 of ~~2~~ 4 KP Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through

Remarks:

DECL

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7.7 / 10.08 / 10	8.6 @ 22.8°C	21.9 @ 21.8	964 9700 @ 22.8
24 hr	7.7 / 10.10	8.6 @ 22.8°C	22.5 @ 22.7	930 9400 @ 23.0°C
48 hr	7.7 / 10.10	8.2 @ 24.8°C	22.8 @ 22.9	940 9500 @ 23.2°C

		Number Live			pH			Temp. (°C)			DO (mg/L)			Cond. (µmhos/cm)		
Conc.	Chamber #	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control	414	5	5	5	7.4	8.1	8.2	20.6	22.9	22.9	7.8	6.9	6.5	230	290	290
Control	682	5	5	5	7.5	8.1	8.2				7.8	6.9	6.5	230	295	295
100%	41	5	5	5	7.3	8.0	8.2	22.4	22.8	22.9	8.3	7.0	6.5	1600	1650	1650
100%	13	5	5	5	7.3	8.0	8.1				8.3	7.1	6.5	1605	1650	1650
Measured/Loaded by:		TM	TM	TM	TR	MF	TM	TR	MF	TM	TR	MF	TM	TR	MF	TM
Recorded by:		TM	TM	TR	TM	TM	TR	TM	TM	TR	TM	TM	TR	TM	TM	TR

Investigators' Signatures

Marshall Faircloth
Tina Mikulski
John Rader
Kim Pearce

Reviewer

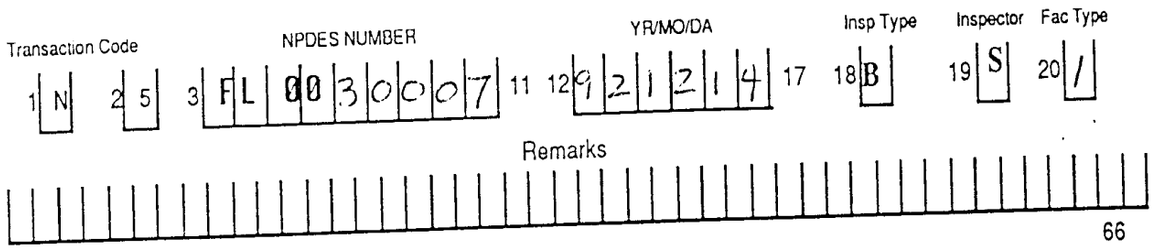
Water-quality Parameters

	Well Water	~~Cond.~~ 2090 Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			1.8	/	RMC
Lab Tot. Resid. Cl2:	<.02	<.02	~~0.5~~ KP	DR100	TR
Alkalinity:	85	55	163	Hach	TR
Hardness:	140	65	286	Hach	TR
Total Ammonia:	~~*.46~~ TR <.02	~~*.71~~ TR <.02	.72	~~Orion~~ HachTR	TR

DECHLOR SAMPLE <0.02 TRC KP 1/13/93

Ammonia * recorded wrong
Ammonia Blank:
Salinity
Meter Slope:

Fill Out This Section For All Surface Water Discharger Inspections (CEI, CSI, CBI, PAI, XSI - RI Optional)



Fill Out This Section For All Surface Water Discharger Inspections (CEI, CSI, CBI, PAI, XSI - RI Optional)

