Bioassays of

Crescent City Junior/Senior High School Sewage Treatment Plant

Crescent City, Putnam County, Florida

NPDES #FL0025097

Sampled 9/21/92

November 1992

Biology Section
Division of Technical Services

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Introduction

Crescent City Junior/Senior High School STP, Crescent City, Putnam County, Florida, NPDES #FL0025097, tests performed on 22 to 24 September, 1992.

This STP is located at US 17 and Route 1 in Crescent City. The plant has a 15,000 GPD design capacity and a 7,000 GPD average daily discharge. Primary settling, aeration, and digestion are the main components of the biological/ physical treatment process at the plant. Treated wastewater is chlorinated and dechlorinated prior to discharge into Crescent Lake.

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 FDER Biology Section performed two 48-hour static acute screening toxicity bioassays on a sample of dechlorinated effluent from this facility. The sample was dechlorinated by the plant dechlorination unit. The test species used for the bioassays were the water flea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Notropis leedsi*. Test results indicated that the sample was toxic to *C. dubia*, producing a 24-hour $LC_{50} < 100\%$. The *C. dubia* had 100% mortality within 24 hours. The sample did not show toxicity to *N. leedsi*.

Total residual chlorine and total ammonia were not detected in the sample. Additional chemical analyses were performed. Aliphatic (5 µg/L) and unidentified compounds (6 µg/L) were present in the sample. The pesticide, chlorpyrifos (0.12 µg/L), was also present.

Of the metals measured (Table 2), both the copper (33 µg/L) and zinc (296 µg/L) concentrations exceeded state water quality standards corrected for sample hardness. The concentration of copper and zinc probably contributed to the toxicity of the sample as both exceed levels which have produced LC_{50}'s in other cladocerans. Previous EPA studies indicate a copper concentration of 27.3 µg/L produced an LC_{50} in *Daphnia magna*. Zinc concentrations of 40 µg/L and 72 µg/L produced LC_{50}'s in *Daphnia hyalina* and *Daphnia magna*, respectively.

Conclusion

The sample of effluent collected from this facility on 21 September, 1992, was toxic to *Ceriodaphnia dubia*. The concentration of copper and zinc probably contributed to the toxicity of the sample.

Table 1. Concentration series and volumes used for the 48-hour static acute screening bioassays of the Crescent City Junior / Senior High School STP effluent on 22 to 24 September, 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. Results of chemical analyses on the sample of effluent from the Crescent City Junior / Senior High School STP, Putnam County, on 21 September, 1992.

Metals

Calcium	55.5 mg/L
Cadmium	1.5 µg/L [A]
Copper	33 µg/L
Iron	155 µg/L
Magnesium	6.8 mg/L
Nickel	13 µg/L
Silver	1.2 µg/L [J]
Zinc	296 µg/L

Pesticides and Herbicides

Chlorpyrifos	0.12 µg/L [A]

Base-Neutral & Acid Extractables

Tentative Identification	*Estimated Concentrations*
Aliphatics	5 µg/L
Unidentified Compounds	6 µg/L

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

Table 3. Data recorded during the 48-hour static acute screening bioassays of a dechlorinated sample of effluent from the Crescent City Junior / Senior High School STP, Crescent City, Putnam County, Florida, NPDES# FL0025097, on 22 to 24 September, 1992.

Facility:	**Crescent City Junior / Senior High STP**	NPDES #	**FL0025097**	Facility Type:	**Sewage Treatment**
Location:	U.S. 17 Route 1	Contact/District:	K. Kohn / Northeast		
County:	Putnam	Test type:	static screening		
Sample Collection Date:	**9/21/92** Time: 1200	# tests:	2	Receiving Water:	Lake Crescent to
Test Beginning Date:	9/22/92 Time: 1300	Chlorination Type:	**dechlorinated**		St. Johns River
Test Ending Date:	9/24/92 Time: 1325	Dechlor Method:	plant dechlorination unit		**Page 1 of 1**

Total Residual Cl2	mg/l	Method
Field:	0.15	-
Lab:	0.0	DR-100

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

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	110	122
Cond. Control Water (daphnids):	70	75
100% Sample:	15	165

Organism: ***Ceriodaphnia dubia**** Life stage: < 24 hours
LC50: <100%
*Test terminated at 24 hours due to 100% mortality.

	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	-	8.4	8.3	-	22.5	23.3	-	8.2	8.1	-	159	163
Control	5	5	-	-	8.3	-	-	-	-	-	8.1	-	-	-
Control	5	5	-	-	8.3	-	-	-	-	-	8.1	-	-	-
Control	5	5	-	-	8.3	-	-	-	-	-	8.1	-	-	-
100%	5	0	-	6.5	7.1	-	22.0	23.5	-	8.0	7.9	-	701	732
100%	5	0	-	-	7.1	-	-	-	-	-	7.9	-	-	-
100%	5	0	-	-	7.1	-	-	-	-	-	7.9	-	-	-
100%	5	0	-	-	7.1	-	-	-	-	-	7.9	-	-	-

Organism: ***Notropis leedsi*** Age: 10 days
LC50: -

	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	8.3	8.3	23.0	22.0	21.9	8.0	8.2	8.4	-	-
Control	5	5	5	7.9	8.3	8.3	-	-	-	8.0	8.2	8.4	241	239
100%	5	5	5	6.5	6.8	6.9	22.0	22.2	22.0	7.7	7.9	8.3	-	-
100%	5	5	5	6.5	6.8	6.9	-	-	-	7.7	7.9	8.3	720	737

DEM Biology Section — Acute Bioassay Bench Sheet

Sample Source: CRESCENT CITY JR/SR HIGH
Address/City: _____
County: _____
Contact/District: KEN KOHN NE
NPDES Permit #: FL00 25097 Outfall #: _____

Sample Collection: Date 9-21-92 Time 1200
Test Beginning: Date 9-22-92 Time 1300
Test Ending: Date 9-23-92 Time 1325
Test Organism: C. DUBIA
Life Stage/Age: < 24 HRS

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

41806 92-SEP-22-04
entered 9/24 KP

Remarks:
test terminated at 24 hours

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7,7,10@10	8.6@23.5	23.5@23.6	965 958 @23.5
24 hr	7,7,10@10	8.2@23°C	22.5@22.9	967 @22.
48 hr	7@7,10@10	8.7@23.0	22.2@22.3	944 9330 @22

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	A	5	5		8.4	8.3		22.5	23.3		8.2	8.1		159	163	
Control	B	5	5			8.3						8.1				
Control	C	5	5			8.3						8.1				
Control	D	5	5			8.3						8.1				
100%	A	5	0		6.5	7.1		22.0	23.5		8.0	7.9		701	732	
100%	B	5	0			7.1						7.9				
100%	C	5	0			7.1						7.9				
100%	D	5	0			7.1						7.9				
Measured/Loaded by:		MF	MF		KP	MF		KP	MF		KP	MF		KP	MF	
Recorded by:		MF	KP		MF	KP		MF	KP		MF	KP		MF	KP	

Investigators' Signatures

Kim Pearce
marshall fairchild

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			0.15	Hach	KK
Lab Tot. Resid. Cl2:			0.0	Hach	KP
Alkalinity:	110	70	98 15	Hach	MF/KP
Hardness:	122	75	165	Hach	MF/KP
Total Ammonia:	0.0	0.0	0.0	Hach	MF

* recorded but suspect by analyst MF

Ammonia Meter Slope: _____
Ammonia Blank: 0.0
Salinity Sample: _____ ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: CRESCENT CITY JR/SR HIGH
Address/City: _____
County: _____
Contact/District: KEN KOHN NE
NPDES Permit #: FL0025097 Outfall #: _____

Sample Collection: Date 9-21-92 Time 1200
Test Beginning: Date 9-22-92 Time 1300
Test Ending: Date 9-24 Time 1300
Test Organism: N. LEEDSI
Life Stage/Age: 10 DAYS

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

41806 92-SEP-22-04
entered 9/24 KP

Remarks:

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7@7, 10@10	8.6@23.5	23.5@23.6	965 9580 @23.5
24 hr	7@7, 10@10	8.7@23°C	22.8@23.9	967 9450@22.9
48 hr	7@7, 10@10	8.7@23.0	22.2@22.3	946 9330 @22.3

		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	57	5	5	5	7.9	8.3	8.3	23.0	22.0	21.9	8.0	8.2	8.4	247*		
control	73	5	5	5	7.9	8.3	8.3				8.0	8.2	8.4	241	237	239
100%	142	5	5	5	6.5	6.8	6.9	22.0	22.2	22.0	7.7	7.9	8.3	7**		
100%	30	5	5	5	6.5	6.8	6.9				7.7	7.9	8.3	720	733	737
														* wrong sheet recorded MF 9/22/92		
Measured/Loaded by:		MF	ME	MF	KP	MF	MF	KP	MF	MF	KP	MF	MF	KP	MF	MF
Recorded by:		KP	ME	KP	MF	KP	KP	MF	KP	KP	MF	KP	KP	MF	KP	KP

Investigators' Signatures

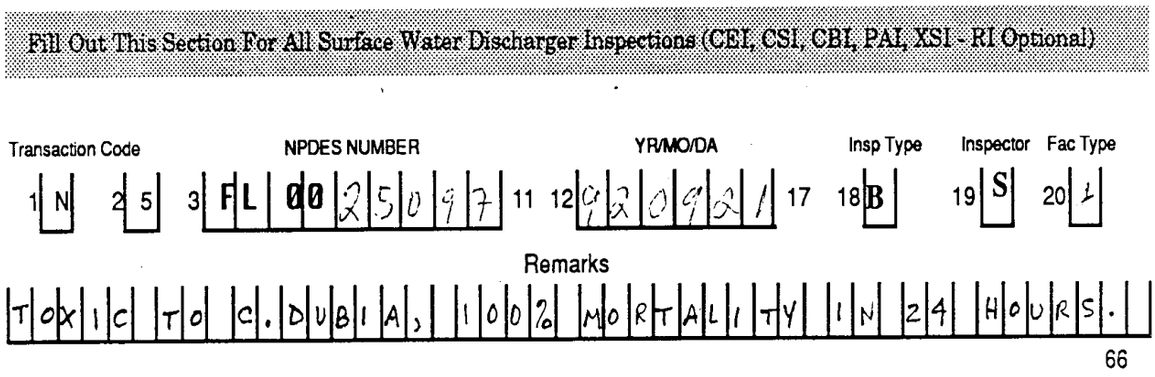
Kim Pearce
Marshall Faircloth
_____
_____
Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			0.15	Hach	KK
Lab Tot. Resid. Cl2:			0.0	Hach	KP
Alkalinity:	110	70	~~248~~ 165	Hach	MF/KP
Hardness:	122	75	165	Hach	MF/KP
Total Ammonia:	0.0	0.0	0.0	Hach	MF

Ammonia Meter Slope: _____ Ammonia Blank: _____ Salinity Sample: _____ ppt

The Bioassay of the Crescent City Junior / Senior High School STP, NPDES# FL0025097, effluent sampled on September 21, 1992.



The Priority Pollutants Analysis for the Bioassay of the Crescent City Junior / Senior High School STP, NPDES# FL0025097, effluent sampled on September 21, 1992.

