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Bioassays of

Jacksonville Beach Wastewater Treatment Facility

Jacksonville Beach, Duval County, Florida

NPDES #FL0020231

Sampled 8/31/92

October 1992

Biology Section
Division of Technical Services

Bioassays of

Jacksonville Beach Wastewater Treatment Facility

Jacksonville Beach, Duval County, Florida

NPDES #FL0020231

Biology Section
Bureau of Laboratories
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Introduction

Jacksonville Beach Wastewater Facility, Jacksonville Beach, Duval County, Florida, NPDES #FL0020231, tests performed on 1 to 3 September, 1992.

This 4.5 MGD capacity facility is located at 910 South Tenth Street in Jacksonville Beach. Treatment of wastewater consists of grit removal, oxidation by contact stabilization, chlorination, and dechlorination. Effluent is discharged to a force main which collects effluents from Jacksonville Beach, Neptune Beach, and Atlantic Beach. The combined treated wastewater is discharged at Mayport Road into the St. Johns River.

The facility currently has the capability to operate a 16 MG aerated pond to provide 0.31 MGD of reclaimed water for spray irrigation to the Jacksonville Beach golf course (NPDES files).

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 with a sample of effluent from this facility. The bioassay organisms used for these tests were the water flea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Notropis leedsi*. The sample was highly toxic to *C. dubia*, producing a 24-hour $LC_{50} < 100\%$. The *C. dubia* test was terminated at 24 hours due to 100% mortality in the effluent test concentration. No mortality occurred in the 48-hour *N. leedsi* test.

Total residual chlorine of the sample was 0.06 mg/L in the laboratory. No total residual chlorine was detected in the field. Total and unionized ammonia concentrations were 1.24 mg/L and 0.02 mg/L, respectively. Further chemical analyses were performed on the sample and indicated the presence of the metals shown in Table 2. The metals detected do not appear to be present in toxic concentrations.

Unidentified organic compounds (1 µg/L) were detected in the sample, as well as aliphatics (3 µg/L) in the trip blank. None of the 24 pesticides for which this sample was analyzed were detected. This does not rule out other pesticides as a possible cause of toxicity.

Conclusion

The sample of effluent collected on 31 August, 1992, from this facility was toxic to *C. dubia*. The cause of toxicity was not determined.

Table 1. Concentration series and volumes used for the 48-hour static acute screening bioassays of the Jacksonville Beach WWTF effluent performed on 1 to 3 September, 1992.

Ceriodaphnia dubia (water flea)

Concentration	Dilution Water	Sample	Total Volume
Control	20 mL	0 mL	20 mL
85 %	3 mL	17 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 effluent from Jacksonville Beach WWF, sampled on 31 August, 1992.

Pesticides & Herbicides

none detected

Metals

Aluminum	53	µg/L	
Calcium	71.1	µg/L	
Copper	6	µg/L	T
Iron	29	µg/L	
Magnesium	25.3	µg/L	
Zinc	16	µg/L	

T Value reported is less than the practical quantitation limit.

Base-Neutral & Acid Extractables

Tentative identification and estimated concentrations:

unidentified compounds	1	µg/L	detected in sample
aliphatics	3	µg/L	detected in trip blank

Table 3. Data recorded during the 48-hour static acute screening bioassays of a sample of effluent from the Jacksonville Beach WWTP, Duval County, Florida, NPDES #FL0020231, performed on 1 to 3 September, 1992.

Facility:	**Jacksonville Beach WWTF**		**NPDES #**	**FL0020231**	Facility Type: **WWTF**
Location:	Jacksonville Beach		Contact/District:	Kathleen Gerard/NE	
County:	Duval		Test type:	static acute screen	
Sample Collection Date:	**8/31/92**	Time: 1540	# tests:	2	Receiving Water: St. Johns River
Test Beginning Date:	9/1/92	Time: 1300	Chlorination Type:	**Dechlorinated at Plant**	
Test Ending Date:	9/3/92	Time: 1315			**Page 1 of 1**

Total Residual Cl2	mg/l	Method
Field:	not detected	
Lab:	0.06	DR 100 Hach

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control Water (daphnids):	0.00	0.00
100% Sample:	1.24	0.02

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	121	127
Cond. Control Water (daphnids):	72	76
100% Sample:	151	265

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

Organism: ***Ceriodaphnia dubia*** Life stage: < 24 Hrs

LC50: < 100% *Test terminated at 24 hrs due to 100% mortality in the effluent replicates.

	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	8.2	-	23.1	23.5	-	9.4	8.7	-	153	165
Control	5	5	*	-	8.3	-	-	-	-	-	8.7	-	-	-
Control	5	5	*	-	8.3	-	-	-	-	-	8.7	-	-	-
Control	5	5	*	-	8.3	-	-	-	-	-	8.7	-	-	-
100%	5	0	*	7.4	8.4	-	22.5	23.7	-	7.7	8.7	-	783	813
100%	5	0	*	-	8.5	-	-	-	-	-	8.7	-	-	-
100%	5	0	*	-	8.5	-	-	-	-	-	8.7	-	-	-
100%	5	0	*	-	8.5	-	-	-	-	-	8.7	-	-	-

Organism: ***Notropis 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	8.3	8.4	23.9	22.5	23.4	8.9	8.6	8.4	-	-
Control	5	5	5	7.9	8.3	8.4	-	-	-	8.9	8.6	8.4	245	247
100%	5	5	5	7.4	8.1	8.3	22.0	22.5	23.3	7.7	8.4	8.3	-	-
100%	5	5	5	7.4	8.1	8.3	-	-	-	7.6	8.4	8.3	811	837

Table 4. 24-hour LC_{50} Data for Bioassay of Jacksonville Beach WWTF effluent performed on 1 to 2 September, 1992.

Organism	Method of Data Analysis	24-Hour LC_{50} (95% Confidence Intervals)
Dechlorinated effluent		
Ceriodaphnia dubia	not calculated	< 100% [a]

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

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Jacksonville Beach STP
Address/City:
County: DUVAL
Contact/District: KATHLEEN GERARD / NE
NPDES Permit #: FL00 20231 Outfall #:

Sample Collection: Date 8-31-92 Time 1540
Test Beginning: Date 9-1-92 Time 1300
Test Ending: Date 9/2/92 Time 1315
Test Organism: Ceriodaphnia dubia
Life Stage/Age: C 24hrs

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

40272 92-SEP-01-15
entered 9/3

Remarks:

Test Terminated @ 24 hrs.
9/2/92 mf

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7@7.10,10	8.5@24°C	24.0@24.0	988@24.0°C 9810
24 hr	7@7.10,10	8.7@23°C	22.8@22.8°C	976 9700@23.2°C
48 hr	7@7,10@10		23.9@23.9	972/9650

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	8.2		23.1	23.5		9.4	8.7		153	165	
Control	B	5	5			8.3						8.7				
Control	C	5	5			8.3						8.7				
Control	D	5	5			8.3						8.7				
100%	A	5	0		7.4	8.4		22.5	23.7		7.7	8.7		783	893	
100%	B	5	0			8.5						8.7				
100%	C	5	0			8.5						8.7				
100%	D	5	0			8.5						8.7				
Measured/Loaded by:		mf	mf		MF	mf		MF	mf		MF	mf		MF	mf	
Recorded by:		mf	mf		MF	mf		KP	mf		KP	mf		MF	mf	

Investigators' Signatures

Kim Pearce
Marshall Faircloth

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			not	detected	
Lab Tot. Resid. Cl2:	0.0	0.0	.06	DR100	KP
Alkalinity:	121	72	151	Hach	KP
Hardness:	127	76	265	Hach	KP
Total Ammonia:	0.0	0.0	1.24	Orion	mf

Ammonia Meter Slope: -56.1
Ammonia Blank: 0.0
Salinity Sample: 0. ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Jacksonville Beach STP
Address/City:
County: DUVAL
Contact/District: K. GERARD / Northeast
NPDES Permit #: FL00 20231 Outfall #:

Sample Collection: Date 8/31/92 Time 1540
Test Beginning: Date 9/1/92 Time 1300
Test Ending: Date 9-3-92 Time 1300
Test Organism: Nitzschia closterium
Life Stage/Age: 10 days

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

40272 92-SEP-01-15
entered 9/3

Remarks:

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7@7, 10@10	8.5@24°C	24.0@24.0	988 / 980 @ 24.0°C
24 hr	7@7, 10@10	8.7@23°C	22.8@22.8	976 / 960 @ 23.2
48 hr	7@7, 10@10	8.5@24.0	23.9@23.9	972/965 @ 24.0

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	75	5	5	5	7.9	8.3	8.4	23.9	22.5	23.4	8.9	8.6	8.4			
Control	149	5	5	5	7.9	8.3	8.4				8.9	8.6	8.4	245	240	247
100%	92	5	5	5	7.4	8.1	8.3	22.0	22.5	23.3	7.7	8.4	8.3			
100%	16	5	5	5	7.4	8.1	8.3				7.6	8.4	8.3	811	818	837
Measured/Loaded by:		MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF
Recorded by:		MF	MF	KP	MF	MF	KP	KP	KP	KP	KP	MF	KP	MF	MF	KP

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Marshall Faircloth

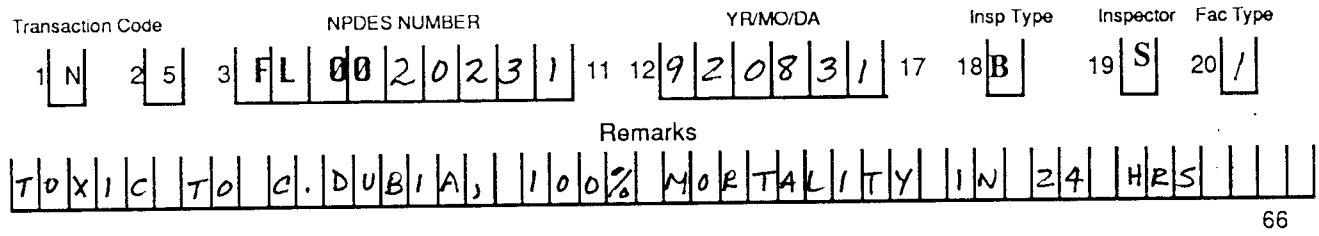
Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			not detected		
Lab Tot. Resid. Cl2:	0.0	0.0	.06	DR-100	KP
Alkalinity:	121	72	151	Hach	KP
Hardness:	127	76	265	Hach	KP
Total Ammonia:	0.0	0.0	1.24	Orion	MF

Ammonia Meter Slope: -56.1
Ammonia Blank: 0.0
Salinity Sample: _____ ppt

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)

