

Bioassays of

Fleming Island Wastewater Treatment Plant

Orange Park, Clay County, Florida

NPDES #FL0043834

Sampled 10/8/01

January 2002

Biology Section

Division of Resource Assessment & Management

Comprehensive Quality Assurance Plan #870346G

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Introduction

Fleming Island Wastewater Treatment Plant, US Highway 17 South, Orange Park, Clay County, Florida, NPDES #FL0043834, tests performed on 9 to 11 October 2001.

This domestic wastewater treatment facility has a design flow of 1.50 MGD and average flow of 1.28 MGD. The wastewater treatment system consists of an influent screening treatment, an anoxic reactor, an oxidation ditch, a clarifier, and a chlorine contact chamber. The effluent is chlorinated for disinfection with chlorine gas and dechlorinated with sulfur dioxide gas prior to being discharged into the Class III fresh waters of the St. Johns River (facility summary provided by Brian Kelsay and Jessica Weatherby, FDEP, Jacksonville).

The toxicity tests discussed in this report were performed in accordance with methods described by Weber, 1993, *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, 4th Edition, EPA/600/4-90/027F.

Results and Discussion

The FDEP Biology Section performed two 48-hour static acute screening toxicity bioassays on a sample of effluent collected from this facility. The test species used for these bioassays were the waterflea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Cyrprinella leedsi*. The test results did not indicate toxicity to either test species within 48 hours (Table 1).

Total residual chlorine was not detected in the sample in the laboratory. Total and unionized ammonia concentrations in the sample were 0.247 mg/L and 0.002 mg/L, respectively. Further chemical analyses were performed on the sample, and several metals, an herbicide, and a pesticide were identified (Table 2). The concentration of copper in the sample (13.2 µg/L) exceeds the State of Florida water quality criteria for copper (<12.33 µg/L for a hardness of 1.5 mg/L as $CaCO_2$).

Conclusion

The sample of effluent collected from this facility on October 8, 2001, did not show acute toxicity to the either test species within 48 hours. The concentration of copper in the sample exceeded the State of Florida Class III freshwater water quality criteria.

Table 1. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the Fleming Island Wastewater Treatment Plant, US Highway 17 South, Orange Park, Clay County, Florida, NPDES# FL0043834 performed from 9 to 11 October 2001.

Facility:	**Fleming Island WWTP**		**NPDES #**	**FL0043834**	Facility Type:	**Wastewater Treatment Plant**	**Analysts:** Della Parker-Hanson, Joshua Ayres, Marshall Faircloth
Location:	US Highway 17 South		Contact/District:	J. Weatherby/Northeast			
County:	Clay		Test type:	static acute screen			
Sample Collection Date:	10/8/01	Time: 1300	# tests:	2	Receiving Water:	St. Johns River	
Test Beginning Date:	10/9/01	Time: 1200	Chlorination Type:	chlorinated			
Test Ending Date:	10/11/01	Time: 1350		sample collected after dechlorination		**Page 1 of 1**	**Reviewer:** David Whiting

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

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[A]			Dissolved Oxygen			Conductivity Uncorrected ìmhos/cm	
Concentrations	Volume(mL)	0 hr	24 hr	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 A	0/20	5	5	5	8.3	-	8.3	24.3	-	24.9	8.2	-	7.7	175	205
Control B	0/20	5	5	5	-	-	8.4	-	-	24.9	-	-	7.6	-	200
Control C	0/20	5	5	5	-	-	8.4	-	-	24.8	-	-	7.7	-	195
Control D	0/20	5	5	5	-	-	8.4	-	-	24.8	-	-	7.7	-	190
100% A	20/0	5	5	4	7.1	-	8.4	23.5	-	25.0	8.2	-	7.7	480	550
100% B	20/0	5	5	5	-	-	8.5	-	-	25.0	-	-	7.8	-	525
100% C	20/0	5	5	5	-	-	8.4	-	-	25.0	-	-	7.8	-	595
100% D	20/0	5	5	5	-	-	8.4	-	-	24.9	-	-	7.9	-	585

[A] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.5-25.0 °C.
Incubator #2 temperature range for the test period was 25.0-26.5°C.

Organism: ***Cyprinella leedsi*** Life stage: 5 days

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[B]			Dissolved Oxygen			Conductivity Uncorrected ìmhos/cm	
Concentrations	Volume(mL)	0 hr	24 hr	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 A	0/500	5	5	5	7.8	8.4	8.6	24.7	24.8	24.6	7.2	7.7	7.8	270	290
Control B	0/500	5	3	3	7.8	8.4	8.6	24.6	24.9	24.7	7.2	7.7	7.8	270	290
Control C	0/500	5	5	5	7.8	8.4	8.6	24.5	24.4	24.7	7.2	7.8	7.8	270	300
Cotnrol D	0/500	5	5	5	7.8	8.5	8.6	24.6	24.3	24.6	7.2	7.8	7.7	270	310
100% A	500/0	5	5	5	7.2	8.1	8.2	24.0	24.2	25.0	7.9	7.8	7.4	490	525
100% B	500/0	5	5	5	7.2	8.1	8.2	23.7	24.7	25.0	7.9	7.7	7.5	490	560
100 % C	500/0	5	4	4	7.2	8.1	8.2	23.7	24.8	24.8	7.9	7.6	7.5	490	575
100% D	500/0	5	5	5	7.2	8.1	8.2	23.7	24.7	24.8	8.0	7.6	7.5	490	545

[B] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.5-25.0°C.
Incubator #3 temperature range for the test period was 24.5-25.0°C.

Data Transcription Verification	
date:	1/9/02
by:	Della Parker-Hanson Cathy Oaks

Total Residual CL2	mg/L	Method
Field:	<0.01	-
Lab:	<0.03	Hach

Ammonia	Total (mg/L)	Unionized (mg/L)
Control water (fish):	<0.017	<0.017
Control water (water flea):	<0.017	<0.017
100% Sample:	0.247	0.002

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control water (fish):	155	153
Control water (water flea):	78	82
100% Sample:	82	105

Table 2. Results of chemical analyses on the effluent from Fleming Island Wastewater Treatment plant sampled on October 8, 2001.

Metals

Cadmium	0.039	µg/L	[I]
Calcium	22	mg/L	
Copper	13.2	µg/L	
Iron	120	µg/L	[I]
Lead	0.91	µg/L	[I]
Magnesium	10.8	mg/L	
Nickel	1.9	µg/L	[I]
Zinc	42	µg/L	

Pesticides and Herbicides

Atrazine	2	µg/L	
Fonofos	0.23	µg/L	[I]

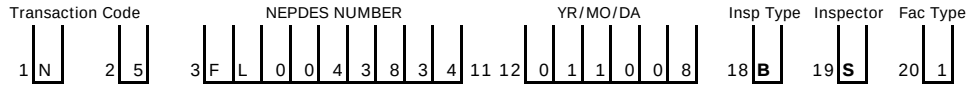
Base, Neutral, & Acid Extractable Organics

None detected

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

The Bioassay of Fleming Island Wastewater Treatment Plant effluent sampled on October 8, 2001, NPDES #FL0043834.

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

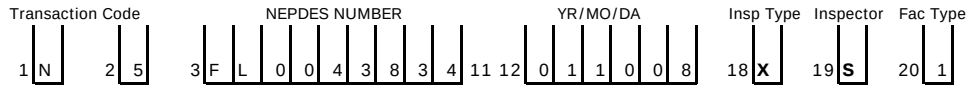


Remarks

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The Priority Pollutants Analysis for Bioassay of Fleming Island Wastewater Treatment Plant effluent sampled on October 8, 2001, NPDES #FL0043834.

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



Remarks

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