Florida

Department of Environmental Protection

Bioassays of

Frog Hollow Campground Wastewater Treatment Plant

St. Augustine, St. Johns County, Florida

NPDES #FL0041998

Sampled 11/1/93

January 1994

Biology Section
Division of Technical Services

Frog Hollow Campground Wastewater Treatment Plant

St. Augustine, St. Johns County, Florida

NPDES #FL0041998

Biology Section
Bureau of Laboratories
January 1994

Introduction

Frog Hollow Campground Wastewater Treatment Plant, St. Augustine, St. Johns County, Florida, NPDES #FL0041998, tests performed on 2 to 4 November, 1993.

This facility is located north of St. Augustine on U. S. Highway 1 and serves a combined campground and mobile home park. The plant has a design flow and average flow of 5,000 GPD. Wastewater treatment at the facility includes aeration, clarification, chlorine disinfection, and dechlorination before effluent is discharged to a DOT ditch then to the Tolomato River (from NPDES file and facility summary provided by Kristen Smeltzer, FDEP Jacksonville).

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 on 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*).

Due to the low dissolved-oxygen (D.O.) concentration in the sample (0.7 mg/L), the controls and 100% sample jars in the *Cyprinella leedsi* test were aerated prior to loading. This test was also aerated continuously during the test period to prevent a D.O. crash. Toxicity was not indicated in the *C. leedsi* test.

The *Ceriodaphnia dubia* test was invalidated because the sample was not aerated to the required minimum D.O. concentration of ≥ 4.0 mg/L prior to test initiation. However, the D.O. present is known to be sufficient for this species and

there were no deaths at 24 hours. As a result, though technically invalidated, the results can be used for information. Some toxicity is indicated by the 15% mortality at 48 hours.

Total residual chlorine was not detected in the sample. Total ammonia and unionized ammonia concentrations were 1.43 mg/L and 0.002 mg/L, respectively. Further chemical analyses were performed on the sample and several metals were present (Table 2). The metals do not appear to be present in concentrations known to be acutely toxic. Pesticides and organics were not detected.

Conclusion

The sample of effluent collected from this facility on 1 November, 1993, did not show toxicity to *Cyprinella leedsi*. The results of the *Ceriodaphnia dubia* test are not valid because of the low dissolved-oxygen concentrations at test initiation. However, some toxicity was evident.

Table 1. Concentration series and volumes used for the 48-hour static acute screening toxicity bioassays of the Frog Hollow Campground WWTP effluent performed on 02 to 04 November, 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 Frog Hollow Campground WWTP, sampled on 01 November, 1993.

Metals

Aluminum	255	µg/L
Cadmium	0.16	µg/L [I]
Calcium	81.3	mg/L
Iron	99	µg/L
Magnesium	42.2	mg/L
Zinc	50	µg/L

Pesticides & Herbicides

None Detected

Base-Neutral & Acid Extractables

None Detected

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

Table 3. Data recorded during the 48-hour static acute screening bioassays of a sample of effluent from the Frog Hollow Campground WWTP, St. Augustine, St. Johns County, Florida, NPDES# FL0041998, performed on 02 to 04 November, 1993.

Facility:	**Frog Hollow Campground WWTP**	**NPDES #**	**FL0041998**	Facility Type:	**Wastewater Treatment Plant**
Location:	US Hwy 1 North of St. Augustine	Contact/District:	Kristen Smeltzer/NE		
County:	St. Johns	Test type:	static acute screen		
Sample Collection Date:	**11/1/93** Time: 1545	# tests:	2	Receiving Water:	D.O.T. ditch to Tolomato River
Test Beginning Date:	11/2/93 Time: 1430	Chlorination Type:	**Sample collected after dechlorination.**		
Test Ending Date:	11/4/93 Time: 1430			**Page 1 of 1**	

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

*The Ceriodaphnia dubia test was invalidated because the sample was not aerated to ≥ 4.0 mg/L DO prior to test initiation.

	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	21.5	-	23.2	8.1	-	9.0	150	180
Control	5	5	5	-	-	8.2	-	-	23.2	-	-	9.0	-	200
Control	5	5	5	-	-	8.2	-	-	23.0	-	-	9.1	-	200
Control	5	5	5	-	-	8.2	-	-	23.0	-	-	9.2	-	200
100%	5	5	4	6.3	-	7.2	21.8	-	23.2	2.8	-	8.8	1225	1440
100%	5	5	3	-	-	7.1	-	-	23.2	-	-	8.8	-	1710
100%	5	5	5	-	-	7.0	-	-	23.1	-	-	8.8	-	1790
100%	5	5	5	-	-	7.0	-	-	22.9	-	-	8.8	-	1820

Organism: ***Cyprinella leedsi*** Age: 9 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	24 hour	48 hour
Control	5	5	5	7.7*	8.1	8.4	22.8	22.6	23.1	8.1*	8.3	9.1	240	250
Control	5	5	5	7.9*	8.1	8.4	-	-	22.9	8.1*	8.3	9.3	240	255
100%	5	5	5	6.7*	7.0	7.1	22.7	22.6	22.8	7.5*	7.6	9.2	1430	1540
100%	5	5	5	6.4*	7.0	7.1	-	-	22.8	7.5*	7.6	9.1	1450	1585

* After aeration * After aeration

Due to the initial low DO of the sample (0.7 mg/L measured in the fish test containers), the control water and sample were aerated prior to measurement of pH and DO parameters and loading the Cyprinella leedsi. The fish controls and 100% samples were aerated continuously during the test period.

Total Residual Cl2	mg/L	Method
Field:	0.0	-
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:	1.43	0.002

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (fish):	125	120
20% Dilute Mineral Water (cladocerans):	70	80
100% Sample:	95	385

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

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Frog Hollow
Location: Frog Hollow Court + Campground
County: St. Johns
Contact/District: Kristen Smeltzer / NE
NPDES Permit #: FL00~~19~~ (FL041~~9~~ / FL0[illegible]) Outfall #:

Sample Collection: Date 11/01/93 Time 1545
Test Beginning: Date 11/02/93 Time 1430
Test Ending: Date 11/04/93 Time 1430
Organism Batch #: 117 Diluent Batch #: 29
Organism Age: < 24 hrs
Test Organism: Ceriodaphnia dubia

93 NOV 02 04 65788

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

Test Number: 1 of 2

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0	22.1 @ 22.2	8.5 @ 23.2	975 @ 1,000
	9.0 @ 9.0			9360 @ 10,000 @ 23.1 °C
24 hr	7.0 @ 7.0	22.7 @ 22.8	5.5 @ 23.5	950 @ 1,000
	9.0 @ 9.0			9420 @ 10,000 @ 23.4 °C
48 hr	7.0 @ 7.0	23.6 @ 23.7	8.4 @ 23.5	990 @ 1,000
	9.0 @ 9.0			9580 @ 10,000 @ 24.0 °C

Remarks: Test invalidated due to D.O. of 4.0 mg/L sample not being aerated prior to loading the C. dubia test organisms. MF

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	7.9		8.2	21.5		22.2	8.1		9.0	150		130
Control	B	5	5	5			8.2			22.2			9.0			130
Control	C	5	5	5			8.2			22.0			9.1			130
Control	D	5	5	5			8.2			22.0			9.2			130
100%	A	5	5	4	6.3		7.2	21.8		22.1	2.8		8.8	1225		1000
100%	B	5	5	3			7.1			22.3			8.8			1170
100%	C	5	5	5			7.0			22.1			8.8			1200
100%	D	5	5	5			7.0			22.9			8.8			1150
											invalid					
Measured/Loaded by:		MF	TM	TM	TM		TM	TM		TM	TM		TM	TM		TM
Recorded by:		MF	TM	TM	TR		TR	TR		TR	TR		TR	TR		TR

Investigators' Signatures

Tina Mikkelsen
Robin C. Reda
Marshall Faircloth

Invalid
Reviewer

Water Quality Parameters	Salt Water/ Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			0.0	—	KS
Lab Total Residual Cl2:	<0.03	<0.03	<0.03	DR-100	TM
Alkalinity:	125	70	95	Hach	TR
Hardness:	120	80	385	Hach	TR
Total Ammonia:	<0.07	<0.07	1.43	Orion	MF

Ammonia Meter #98136 Ammonia Meter Slope: 0.-54.0 MF Ammonia Blank: <0.07 Control Salinity: 0 ppt Sample Salinity: 0 ppt

form updated 7/8/93

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Eagle Lens
Location: Frog Hollow Court + Campground
County: St. Johns
Contact/District: Kristen Smeltzer / NE
NPDES Permit #: FL00 41 98 Outfall #:
FL0041998 permit
03-NOV-02-09 65255

Sample Collection: Date 11/01/93 Time 1545
Test Beginning: Date 11/02/93 Time 1430
Test Ending: Date 11/04/93 Time 1430
Organism Batch #: 46 Diluent Batch #: Well
Organism Age: 9 days old
Test Organism: Cyprinodon Variegatus

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

Test Number: 2 of 2

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	22.1@22.2	8.5@23.2	975@1,000 9360@10,000@23.1 °C
24 hr	7.0@7.0 9.0@9.0	22.7@22.8	8.5@22.8	980@1,000 9430@10,000@23.4 °C
48 hr	7.0@7.0 9.0@9.0	23.6@23.7	8.4@23.8	990@1,000 9580@10,000@24.0 °C

Remarks: Test organisms were loaded after the sample was aerated. The sample was continuously aerated for the duration of the test. mf

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	43	5	5	5	7.5	8.1	8.4	22.8	22.6	23.1	8.0	8.3	9.1	240	245	250
Control B	190	5	5	5	7.5	8.1	8.4			22.9	8.0	8.3	9.3	240	245	255
100% A	18	5	5	5	6.2	7.0	7.1	22.7	22.6	23.8	0.7	7.6	9.2	1430	1490	1540
100% B	74	5	5	5	6.2	7.0	7.1			22.8	0.7	7.6	9.1	1450	1520	1585
			after * aeration						after * aeration							
				43	*7.7					43	*8.1					
				190	7.9					190	8.1					
				18	6.7					18	7.5					
				74	6.4					74	7.5					
Measured/Loaded by:		TM	TM	TM	TM	mf	TM	TM	mf	TM	TM	mf	TM	TM	mf	TM
Recorded by:		TR	TM	TM	TR	TM	TR	TR	TM	TR	TR	TM	TR	TR	TM	TR

Investigators' Signatures

Tina Mikulski
Tobin C. Rader
Marshall Tinckler

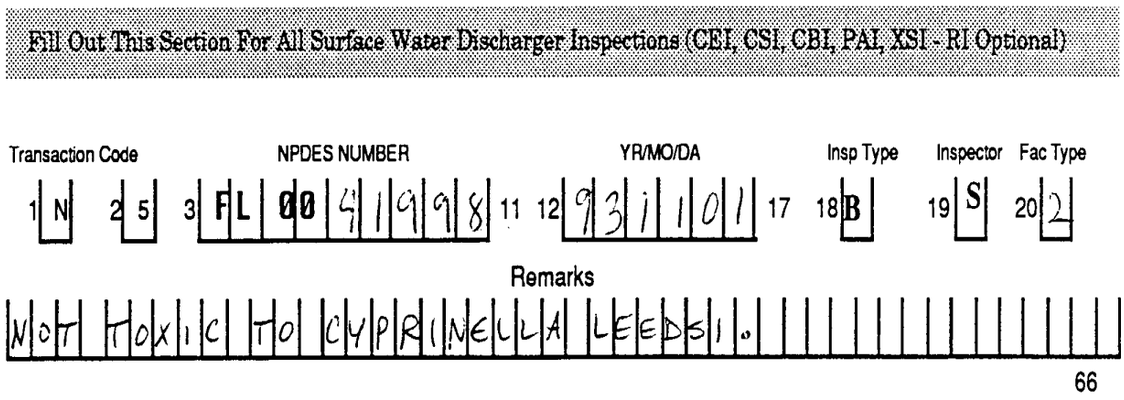
Reviewer

	Salt Water/ Well Water	20% Min Water	Sample	Method	Measured by
	Water Quality Parameters				
Field Total Residual Cl2:			0.0	—	KS
Lab Total Residual Cl2:	<0.03	<0.03	<0.03	DR-100	TM
Alkalinity:	125	70	95	Hach	TR
Hardness:	120	80	385	Hach	TR
Total Ammonia:	0.017	0.017	1.43	orion	mf

Ammonia Meter #98136 Ammonia Meter Slope: -54.0 Ammonia Blank: 0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

form updated 7/8/93

The Bioassay of the Frog Hollow Campground WWTP effluent sampled on November 1, 1993, NPDES# FL0041998.



The Priority Pollutants Analysis for the Bioassay of the Frog Hollow Campground WWTP effluent sampled on November 1, 1993, NPDES# FL0041998.

