

Bioassays of

Briarwood Mobile Home Park
Wastewater Treatment Plant

Jacksonville, Duval County, Florida

NPDES #FL0025704

Sampled 5/22/00

July 2001

Biology Section

Division of Resource Assessment & Management

Comprehensive Quality Assurance Plan #870346G

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Bureau of Laboratories
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Introduction

Briarwood Mobile Home Park Wastewater Treatment Plant, 8406 New Kings Road, Jacksonville, Duval County, Florida, NPDES #FL0025704, tests performed on 23 to 25 May 2000.

This mobile home park wastewater treatment plant has a design flow of 0.006 MGD and an average flow of 0.0051 MGD. Wastewater is treated by the extended-aeration process. The effluent is chlorinated for disinfection and then dechlorinated with sodium sulfite prior to discharge. The treated effluent is discharged into the Class III fresh waters of Nine Mile Creek (facility summary provided by J. Lippincott, 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 from this facility. The test species used for these bioassays were the water flea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Cyprinella leedsi*. The test results indicated that the 100% sample was toxic to both the *C. dubia* and the *C. leedsi*, producing 75% mortality in the *C. dubia* within 48 hours, and 100% mortality within 45 minutes of test initiation for the *C. leedsi* (Table 1).

The initial dissolved oxygen was 1.8 mg/L. The sample was aerated for a period of 1.5 hours to increase the dissolved oxygen to 7.6 mg/L. The sample was also filtered through a 60µm screen because of the high particulate content.

Total residual chlorine was not detected in the sample in either the field or in the laboratory. Total and unionized ammonia of the sample when received were 30.3 mg/L and 3.71 mg/L, respectively. The total and unionized ammonia at 24 hours were 19.5 mg/L and 1.89 mg/L, respectively. Further chemical analyses were performed on the sample, and several metals and organics were identified (Table 2). The copper (101 µg/L), lead (16.5 µg/L), iron (2.15 mg/L), silver (0.31µg/L), and zinc (487 µg/L) concentrations in the effluent exceeded the State of Florida surface water criteria for copper (≤32.46 µg/L), lead (≤14.32 µg/L), iron (≤1mg/L), silver (<0.07 µg/L), and zinc (269 µg/L) in Class III fresh waters. The phthalate ester, bis(2-ethylhexyl) phthalate concentration (24 µg/L) also exceeded the State of Florida surface water criteria for phthalate esters (≤3.0 µg/L) (Table 2).

Unionized ammonia levels as low as 0.08 mg/L and 0.5 mg/L have been found to be acutely toxic to some freshwater fish and invertebrate species, respectively (EPA *Quality Criteria for Water 1986*, EPA 44015-86-001, 1986). The concentrations of copper, lead, zinc and bis(2-ethylhexyl) phthalate found within the sample have also been shown to be toxic to test species similar to *C. dubia* and *C. leedsi* (USEPA's Ecotox database). We attribute the observed

mortality primarily to the unionized ammonia concentration in the sample rather than the metals due to the large concentration of particulate matter in the sample.

Conclusion

The sample of effluent collected from this facility on May 22, 2000, showed toxicity to both test species, *C. dubia* within 48 hours and *C. leedsi* within 45 minutes. The observed toxicity is attributed primarily to unionized ammonia, and possibly to the copper, lead, zinc, or bis(2-ethylhexyl) phthalate concentrations or a combination of these toxicants.

Table 1. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the Briarwood Mobile Home Park Wastewater Treatment Plant, 8406 New Kings Road, Jacksonville, Duval County, Florida, NPDES# FL0025704 performed on 23 to 25 May 2000.

Facility:	**Briarwood Mobile Home Park WWTP**	**NPDES #**	**FL0025704**	Facility Type:	**Wastewater**
Location:	8406 New Kings Road, Jacksonville	Contact/District:	Pat O'Connor/ NE District		**Treatment Plant**
County:	Duval	Test type:	static acute screen		
Sample Collection Date:	5/22/00 Time: 0800	# tests:	2	Receiving Water:	Nine Mile Creek
Test Beginning Date:	5/23/00 Time: 1330	Chlorination Type:	Chlorinated		
Test Ending Date:	5/25/00 Time: 1415		sample collected after dechlorination		**Page 1 of 1**

Total Residual CL2	mg/L	Method
Field:	0.00	-
Lab:	<0.03	Hach

Ammonia	Total (mg/L)	Unionized (mg/L)
Control Water (fish):	< 0.017	<0.017
20% Dilute Mineral Water (cladocerans):	< 0.017	<0.017
100% Sample:	30.30	3.710
Sample at 24 hours:	19.50	1.890

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (fish):	137	127
20% Dilute Mineral Water (cladocerans):	75	82
100% Sample:	345	300

[B] Twenty-four hour measuremnets.

Salinity[C]	(ppt)
Control Water:	<1
100% Sample:	~1

[C] Salinity based on conductivity and temperature measurements.

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

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[A]			Dissolved Oxygen			Conductivity Uncorrected µmhos/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	-	-	8.4	-	8.2	24.9	-	24.3	7.4	-	7.7	175	270
Control B	0/20	5	-	-	-	-	8.2	-	-	24.1		-	7.6	-	230
Control C	0/20	5	-	-	-	-	8.2	-	-	24.0	-	-	7.8	-	230
Control D	0/20	5	-	-	-	-	8.3	-	-	24.0	-	-	7.8	-	230
100% A	20/0	5	-	-	8.3	8.2	-	25.0	24.3	-	6.5	5.6	-	1175	1260[B]
100% B	20/0	5	-	-	-	-	8.2	-	-	24.0	-	-	5.6	-	1305
100% C	20/0	5	-	-	-	8.2	-	-	24.2	-	-	5.6	-	-	1255[B]
100% D	20/0	5	-	-	-	-	8.3	-	-	24.2	-	-	5.7	-	1340

[A] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 25.0-27.5°C.
Incubator #2 temperature range for the test period was 20.5-29.0°C.

Organism: ***Cyprinella leedsi*** Life stage: 10 days

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[E]			Dissolved Oxygen			Conductivity Uncorrected µmhos/cm	
Concentrations	Volume(mL)	0 hr	24 hr	48 hr	0 hour	24 hour[D]	48 hour	0 hour	24 hour[D]	48 hour	0 hour	24 hour[D]	48 hour	0 hour	24 hour[D]
Control A	0/500	5	5	5	7.8	7.8	-	24.4	24.9	-	7.3	7.4	-	245	255
Control B	0/500	5	5	5	7.8	7.8	-	24.4	24.8	-	7.4	7.5	-	250	255
Control C	0/500	5	5	5	7.8	7.8	-	24.4	24.8	-	7.4	7.5	-	250	260
Control D	0/500	5	5	5	7.8	7.8	-	24.4	24.7	-	7.4	7.6	-	250	260
100% A	500/0	5	0	0	8.3	8.2	-	25.0	25.1	-	6.6	5.0	-	1175	1225
100% B	500/0	5	0	0	8.3	8.2	-	25.1	25.2	-	6.6	5.2	-	1205	1220
100% C	500/0	5	0	0	8.3	8.2	-	25.1	25.1	-	6.6	5.0	-	1205	1225
100% D	500/0	5	0	0	8.3	8.2	-	25.1	25.1	-	6.6	5.2	-	1210	1225

[D] Test terminated within 45 minutes due to 100% mortality in the 100% sample.

[E] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 25.0-27.5°C.
Incubator #3 temperature range for the test period was 25.0-26.0°C.

Table 2. Results of chemical analyses on the effluent from Briarwood Mobile Home Park WWTP sampled on May 22, 2000.

Metals

Aluminum	4090	µg/L	
Cadmium	0.73	µg/L	
Calcium	85.2	mg/L	
Chromium	7.6	µg/L	
Copper	101	µg/L	J
Iron	2150	µg/L	
Lead	16.5	µg/L	
Magnesium	27.6	mg/L	
Nickel	8.7	µg/L	
Selenium	3.6	µg/L	I
Silver	0.31	µg/L	
Zinc	487	µg/L	

Pesticides and Herbicides

None detected

Base, Neutral, & Acid Extractable Organics

1,4-Dichlorobenzene	0.83	µg/L	T
Bis(2-ethylhexyl)phthalate	24	µg/L	I
Phenol	4.6	µg/L	

I Value reported is less than the minimum quantitation limit and greater than or equal to the minimum detection limit.

J Estimated value

T Value reported is less than the criterion of detection.

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Briarwood MHP Effluent
County: Duval
Contact / District: Pat O'Connor / NE-DIST
NPDES Permit #: FL0025704
LIMS Sample #: 452447 LIMS Job #: TH2000-05-23-18-01
sample log
Test Type: (Screening) Definitive
(Static) Static Renewal | Flow-through
Test Number: 1 of 2

Sample Collection: Date 5/22/00 Time 0800
Test Beginning: Date 5/23/00 Time 13:30
Test Ending: Date 5/25/00 Time 14:45
Organism Batch #: (SG) 8427 Diluent Batch #: DMW #15
Organism Age: 24 hrs. SRT toxicant batch #: —
Test organism: C. dubia

Remarks: Original D.O. @ 1.8. Aerated for 1.5 hrs. and brought up to 7.6. Sample also filtered.

Conc.	Chamber #	Number Live 0 hr	24 h	48 h	pH 0 hr	24 h	48 h	Temperature (°C) 0 hr	24 h	48 h	D.O. (mg/L) 0 hr	24 h	48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
CTL	A	5	5	5	8.4	—	8.2	24.9	—	24.5	7.4	—	7.7	175	—	270
	B	5	5	5	—	—	8.2	—	—	24.1	—	—	7.6	—	—	230
	C	5	5	5	—	—	8.2	—	—	24.0	—	—	7.8	—	—	230
	D	5	5	5	—	—	8.3	—	—	24.0	—	—	7.8	—	—	230
100%	A	5	0 SD	—	8.3	8.2	—	25.0	24.3	—	6.5	5.6	—	1175	1260	—
	B	5	4 1D	3 1D	—	—	8.2	—	—	24.0	—	—	5.6	—	—	1305
	C	5	0 SD	—	—	8.2	—	—	24.2	—	—	5.6	—	—	1235	—
	D	5	2 3D	2	—	—	8.3	—	—	24.2	—	—	5.7	—	—	1340
measured by:		MF	MF	SG	MF	SG	MF	MF	SG	MF	MF	SG	MF	MF	SG	MF
recorded by:		SG	MF	SG	SG	MF	SG	SG	MF	SG	SG	MF	SG	SG	MF	

Investigators' Signatures
Shannon Gerardi
Mychal Fairbill

Temperature Range °C
Incubator # 2 20.5°-27.0°C
Room B246 25.0°-27.5°C

Salt Water / Well Water

Water Quality Parameters	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):		N/A	N/A	N/A	SG
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03	DR100	KL	SG
Alkalinity (mg/L as $CaCO_3$):	75	345	Hach	SG	SG
Hardness (mg/L as $CaCO_3$):	82	300	Hach	SG	SG
Total ammonia (mg/L as N):	<0.017	30.3	Denver	MF	SG
Salinity:	0	≈1	Ysi	SG	SG

reviewer

form updated 3/3/99

FDEP Biology Section — Acute Bioassay Bench Sheet

end date *5/23/00 (56)

Sample Source: Briarwood MHP Effluent
County: Duval
Contact / District: Pat O'Connor / NE-DIST
NPDES Permit #: FL0025704
LIMS Sample #: 457447 LIMS Job #: TLH2000-05-23-18-01
sample log ____

Sample Collection: Date 5/22/00 Time 0800
Test Beginning: Date 5/23/00 Time 13:30
Test Ending: Date 5/25/00* Time 1415
Organism Batch #: 39 Diluent Batch #: Well
Organism Age: 10 days SRT toxicant batch #: —

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

Test organism: C. cerasi

Remarks: Original D.O. @ 1.8, so sample was aerated for 1.5 hrs, and brought up to 7.6. Sample also filtered.

very turbid sample - particulate settled in layer ≈ 1/8" deep, mf 5-23-00

All Dead in 100% within 45 minutes of loading mf 5/23/00

Conc.	Chamber #	Number Live 0+45min 0 hr	24 h	48 h	pH 0.45min 0 hr	24 h	48 h	Temperature (°C) 0+45min 0 hr	24 h	48 h	D.O. (mg/L) 0+45min 0 hr	24 h	48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
CTL A	E1	5	5	—	7.8	7.8	—	24.4	24.9	—	7.3	7.4	—	245	255	—
B	E2	5	5	—	7.8	7.8	—	24.4	24.8	—	7.4	7.5	—	250	255	—
C	E3	5	5	—	7.8	7.8	—	24.4	24.8	—	7.4	7.5	—	250	260	—
D	E4	5	5	—	7.8	7.8	—	24.4	24.7	—	7.4	7.6	—	250	260	—
100% A	E5	5	0	—	8.3	8.2	—	25.0	25.1	—	6.6	5.0	—	1175	1225	—
B	E6	5	0	—	8.3	8.2	—	25.1	25.2	—	6.6	5.2	—	1205	1220	—
C	E7	5	0	—	8.3	8.2	—	25.1	25.1	—	6.6	5.0	—	1205	1225	—
D	E8	5	0	—	8.3	8.2	—	25.1	25.1	—	6.6	5.2	—	1210	1225	—
measured by:		SG	mf/SG	—	mf	mf	—	mf	mf	—	mf	mf	—	mf	mf	—
recorded by:		mf	mf	—	SG	SG	—	SG	SG	—	SG	SG	—	SG	SG	—

TEST TERMINATED @ DAY 0.

Investigators' Signatures
Shannon Gerardo
Marshall Faircloth

Temperature Range °C
Incubator # 3 25.0° - 26.0°C
Room B246 25.0° - 27.5°C

Salt Water (Well Water)

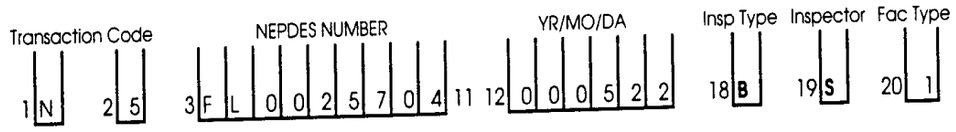
Water Quality Parameters	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):		N/A	N/A	N/A	SG
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03	DR100	FL	SG
Alkalinity (mg/L as $CaCO_3$):	137	345	~~Hach~~ 25	SG	SG
Hardness (mg/L as $CaCO_3$):	127	300	Hach	SG	SG
Total ammonia (mg/L as N):	<0.017	30.3	Denver	mf	SG
Salinity:	0	≈1	Ysi	SG	SG

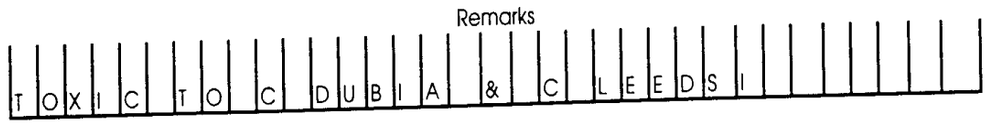
A H Wolfe
reviewer

form updated 3/3/99

The Bioassay of Briarwood Mobile Home Park WWTP effluent sampled on May 22, 2000, NPDES #FL0025704.

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

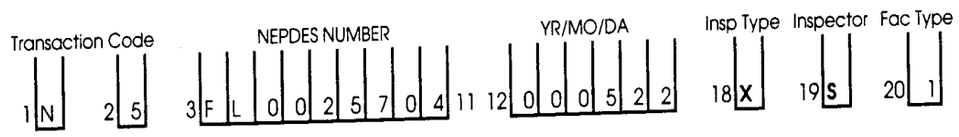


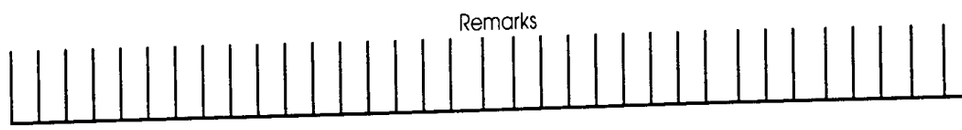


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The Priority Pollutants Analysis for Bioassay of Briarwood Mobile Home Park WWTP effluent sampled on May 22, 2000, NPDES #FL0025704.

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





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