Florida

Department of Environmental Protection

Bioassays of

Goodbread Mobile Home Park
Sewage Treatment Plant

Yulee, Nassau County, Florida

NPDES #FL0032662

Sampled 3/1/93

August 1993

Biology Section
Division of Technical Services

Bioassays of

Goodbread Mobile Home Park
Sewage Treatment Plant

Yulee, Nassau County, Florida

NPDES #FL0032662

Biology Section
Bureau of Laboratories
August 1993

Introduction

Goodbread Mobile Home Park Sewage Treatment Plant, Yulee, Nassau County, Florida, NPDES #FL0032662, tests performed on 2 to 4 March, 1993.

This facility, is located on Goodbread Circle north of Yulee on US 17 and is a 5,000 gpd extended-aeration sewage treatment plant. Chlorinated effluent is discharged to an unnamed pond to Lofton Creek. The sample was collected at the point of discharge prior to the effluent entering the pond.

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 chlorinated effluent from this facility. Two additional bioassays were performed on an aliquot of effluent which had been dechlorinated in the laboratory with sodium thiosulfate. The test species used for these bioassays were the water flea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Cyprinella leedsi* (formerly *Notropis leedsi*).

The test results indicated that both the chlorinated and dechlorinated aliquots were toxic to *C. dubia*, producing 48-hour LC_{50}'s < 100% in both tests. The bioassays with *C. leedsi* produced 48-hour LC_{50}'s > 100%.

The total residual chlorine concentration of the sample effluent was measured at 0.7 mg/L in the field and 0.25 mg/L in the laboratory. The total and unionized ammonia concentrations in the sample were 0.66 mg/L and 0.01 mg/L, respectively. Additional chemical analyses were performed on the sample and several metals were detected (Table 2). None of the metals appear to be present in concentrations which are known to be acutely toxic. Pesticides and organics were not detected.

Toxicity in the chlorinated aliquot may be attributed partially to the total residual chlorine (0.25 mg/L). Total residual chlorine concentrations as low as 0.028 mg/L have been shown to cause mortality in another cladoceran, *Daphnia magna*. The cause of toxicity in the dechlorinated sample was not determined and may be attributed to unknown constituents in the sample.

Conclusion

The sample of effluent collected from this facility on 1 March, 1993, showed toxicity to *C. dubia*. The toxicity is attributed to the total residual chlorine and unknown constituent(s) in the sample.

Table 1. Concentration series and volumes used for the 48-hour static acute screening bioassays of the Goodbread Mobile Home Park effluent performed on 2 to 4 March, 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 Goodbread Mobile Home Park STP, sampled on 1 March, 1993.

Metals

Aluminum	294	µg/L	J
Cadmium	0.13	µg/L	T
Calcium	79	mg/L	A
Copper	8	µg/L	T
Iron	144	µg/L	A
Magnesium	5.2	mg/L	A
Zinc	46	µg/L	A

A Value reported is the mean of two or more determinations.
J Estimated value.
T Value reported is less than the practical quantitation limit.

Table 3. Data recorded during the 48-hour acute screening bioassays of a sample of chlorinated effluent from the Goodbread Mobile Home Park STP, Yulee, Nassau County, Florida, NPDES# FL0032662, performed on 2 to 4 March, 1993.

Facility:	Goodbread MHP STP		NPDES #	FL0032662	Facility Type: STP
Location:	Yulee		Contact / District:	Ken Kohn/C	
County:	Nassau		Test type:	static acute screen	
Sample Collection Date:	3/1/93	Time: 1430	# tests:	2	Receiving Water: Pond to Lofton Creek
Test Beginning Date:	3/2/93	Time: 1400	Chlorination Type:	Chlorinated	
Test Ending Date:	3/4/93	Time: 1400			Page 1 of 1

Total Residual Cl2	mg/l	Method
Field:	0.70	-
Lab:	0.25	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:	0.655	0.012

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	120	125
20% Dilute Mineral Water (cladocerans):	65	70
100% Sample:	225	215

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

Organism: ***Ceriodaphnia dubia*** Life stage: < 24 hours
LC50: <100%

	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	8.5	-	8.2	22.6	-	23.4	7.6	-	7.9	160	160
Control	5	5	5	-	-	8.2	-	-	-	-	-	8.0	-	160
Control	5	5	5	-	-	8.2	-	-	-	-	-	8.0	-	165
Control	5	5	5	-	-	8.3	-	-	-	-	-	8.1	-	180
100%	5	1	0	7.6	-	8.7	22.6	-	23.6	5.6	-	7.9	645	670
100%	5	0	0	-	-	8.7	-	-	-	-	-	7.9	-	700
100%	5	1	0	-	-	8.7	-	-	-	-	-	8.0	-	700
100%	5	0	0	-	-	8.7	-	-	-	-	-	8.0	-	745

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	0 hour	48 hour
Control	5	5	5	7.8	8.1	8.2	22.0	23.1	22.5	7.5	7.7	7.6	235	260
Control	5	5	5	7.8	8.1	8.3	-	-	-	7.5	7.6	7.7	235	255
100%	5	4	4	7.5	8.1	8.3	23.0	23.1	22.6	4.8	6.8	7.5	730	730
100%	5	5	4	7.5	8.0	8.3	-	-	-	4.8	6.6	7.5	730	730

Table 4. Data recorded during the 48-hour acute screening bioassays of a sample of dechlorinated effluent from the Goodbread Mobile Home Park STP, Yulee, Nassau County, Florida, NPDES# FL0032662, performed on 2 to 4 March, 1993.

Facility:	Goodbread MHP STP		NPDES #	FL0032662	Facility Type: STP
Location:	Yulee		Contact / District:	Ken Kohn/C	
County:	Nassau		Test type:	static acute screen	
Sample Collection Date:	3/1/93	Time: 1430	# tests:	2	Receiving Water: Pond to Lofton Creek
Test Beginning Date:	3/2/93	Time: 1400	Chlorination Type:	Dechlorinated in lab	
Test Ending Date:	3/4/93	Time: 1400		w/ Sodium Thiosulfate	Page 1 of 1

Total Residual Cl2	mg/l	Method
Field:	0.70	-
Lab:	0.02	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:	0.655	0.012

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	120	125
20% Dilute Mineral Water (cladocerans):	65	70
100% Sample:	225	215

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

Organism: ***Ceriodaphnia dubia*** Life stage: < 24 hours
LC50: <100%

	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	8.5	-	8.3	22.9	-	23.3	7.6	-	8.0	160	160
Control	5	5	5	-	-	8.3	-	-	-	-	-	8.1	-	165
Control	5	5	5	-	-	8.3	-	-	-	-	-	8.1	-	165
Control	5	5	5	-	-	8.3	-	-	-	-	-	8.2	-	165
100%	5	1	0	7.7	-	8.6	22.9	-	23.4	6.3	-	7.7	690	660
100%	5	0	0	-	-	8.7	-	-	-	-	-	7.8	-	700
100%	5	0	0	-	-	8.7	-	-	-	-	-	7.8	-	700
100%	5	0	0	-	-	8.7	-	-	-	-	-	7.8	-	725

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	0 hour	48 hour
Control	5	5	5	7.7	8.2	8.2	22.0	23.1	22.5	7.6	7.9	7.8	230	250
Control	5	5	5	7.8	8.1	8.2	-	-	-	7.6	8.0	7.9	235	260
100%	5	5	5	7.6	8.1	8.2	23.0	23.2	22.5	5.9	6.9	7.5	725	730
100%	5	5	5	7.6	8.1	8.2	-	-	-	5.9	7.0	7.5	735	730

Table 5. 48-hour LC_{50} Data for the Bioassay of the Goodbread Mobile Home Park STP effluent performed on 2 to 4 March, 1993.

Organism	Method of Data Analysis	48-Hour LC_{50}
Chlorinated effluent		
Ceriodaphnia dubia	non-calculated	< 100% [a]
Cyprinella leedsi (Formerly *Notropis leedsi*)	non-calculated	> 100%
Dechlorinated effluent		
Ceriodaphnia dubia	non-calculated	< 100% [a]
Cyprinella leedsi (Formerly *Notropis leedsi*)	non-calculated	> 100%

[a] The LC_{50} is < 100% since all the organisms died in the lowest test concentration (100%). Test ran for 48 hours.

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Goodbread MHP
Location: Goodbread MHP
County:
Contact/District: Ken Kohn / ~~Tech~~ NE
NPDES Permit #: FL00 32662 Outfall #:

Sample Collection: Date 3/1/93 Time 1430
Test Beginning: Date 3/2/93 Time 1400
Test Ending: Date 3-4-93 Time 1400
Organism Batch #: 9 Diluent Batch #: 4
Organism Age: <24 hours
Test Organism: Ceriodaphnia dubia

Test Type: (Screening) | Definitive
(Static) | Static ~~Renewal~~ | Flow-through
Test Number: x3 of x4 KR
Remarks: 93-MAR-02-29 50736

Cl

Instrument Calibrations: pH Temperature °C D.O. mg/L Conductivity µmhos/cm

0 hr 7.0 @ 7.0 22.6 @ 22.8 8.4 @ 24.2 978 @ 1,000
9.0 @ 9.0 9700 @ 10,000

24 hr 7.0 @ 7.0 23.8 @ 23.9 8.4 @ 24.0 980 @ 1,000 @ 24.4
9.0 @ 9.0 9730 @ 10,000

48 hr 7.0 @ 7.0 23.3 @ 23.4 8.4 @ 23.6 975 @ 1,000 @ 24.2
9.0 @ 9.0 9730 @ 10,000

		Number Live			pH			Temperature (°C)			D.O. (mg/L)			Cond. (mmhos/cm) Cond. (µmhos/cm)		
Conc.	Chamber #	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control	A	5	5	5	8.5		8.2	22.6		23.4	7.6		7.9	160		160
Control	B	5	5	5			8.2						8.0			160
Control	C	5	5	5			8.2						8.0			165
Control	D	5	5	5			8.3						8.1			180
100%	A	5	1	0	7.6		8.7	22.6		23.6	5.6		7.9	645		670
100%	B	5	0	0			8.7						7.9			700
100%	C	5	1	0			8.7						8.0			700
100%	D	5	0	0			8.7						8.0			745
Measured/Loaded by:		TM	TM	TM	TR		TM	TR		TM	TR		TM	TR		TM
Recorded by:		TR	TR	TM	EAM		TR	EAM		TR	EAM		TR	EAM		TR

Investigators' Signatures

Marshall Faircloth
Tobin Rader
Tina Mikulsky

Reviewer

form updated 10/20/92

Water Quality Parameters	Salt Water/ Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			0.7		KR
Lab Total Residual Cl2:	10.02	0.02	0.25	DR100	TM
Alkalinity:	120	65	225	Hach	TR
Hardness:	125	70	215	Hach	TR
Total Ammonia:	<0.017	<0.017	0.055	Orion	MF

Cl_2 Blank: 0.02 Ammonia Meter Slope: -57.9 Ammonia Blank: <0.017 Sample Salinity: ____ ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Goodbread MHP
Location: Goodbread MHP
County:
Contact/District: Ken Kohn / NE
NPDES Permit #: FL0032662 Outfall #:

Sample Collection: Date 3/1/93 Time 14:30
Test Beginning: Date 3/2/93 Time 1400
Test Ending: Date 3-4-93 Time 1400
Organism Batch #: 9 Diluent Batch #: well #10
Organism Age: 9 days
Test Organism: Mysidopsis bahia

Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through
Test Number: 24 of 24 KP
Remarks: 93-MAR-02-29 50736

Cl⁻

Instrument Calibrations: pH Temperature °C D.O. mg/L Conductivity µmhos/cm

0 hr 7.0 @ 7.0 22.6 @ 22.8 8.4 @ 24.2 978 @ 1,000 24.9°C
9.0 @ 9.0 9700 @ 10,000

24 hr 7.0 @ 7.0 23.8 @ 23.9 8.4 @ 24.0 980 @ 1,000 24.4°C
9.0 @ 9.0 9730 @ 10,000

48 hr 7.0 @ 7.0 23.3 @ 23.4 8.4 @ 23.6 975 @ 1,000 @ 24.2
9.0 @ 9.0 9730 @ 10,000

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temperature (°C) 0	24	48	D.O. (mg/L) 0	24	48	Cond. (mmhos/cm) Cond. (µmhos/cm) 0	24	48
Control	4	5	5	5	7.8	8.1	8.2	22.0	23.1	22.5	7.5	7.7	7.6	235	245	260
Control	190	5	5	5	7.8	8.1	8.3				7.5	7.6	7.7	235	245	255
100%	413	5	4	4	7.5	8.1	8.3	23.0	23.1	22.6	4.8	6.8	7.5	730	720	730
100%	37	5	5	4	7.5	8.0	8.3				4.8	6.6	7.5	730	720	730
Measured/Loaded by:		TM	TM	TM	TR	TM	TM	TR	TM	TM	TR	TM	TM	TR	TM	TM
Recorded by:		TR	TR	TM	EAM	TR	TR	EAM	TR	TR	EAM	TR	TR	EAM	TR	TR

Investigators' Signatures

Marshall Faircloth
Robin Rader
Tina M. Kubalik

Reviewer

form updated 10/20/92

	Salt Water/ Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			0.7	DR-100	KK
Lab Total Residual Cl2:	0.02	0.02	0.25	DPD KP 3/8/93	TM
Alkalinity:	120	65	225	Hach	TR
Hardness:	125	70	215	Hach	TR
Total Ammonia:	<0.017	<0.017	0.655	Orion	MF

Cl2 Blank: 0.02 Ammonia Meter Slope: 52.9 Ammonia Blank: <0.017 Sample Salinity: ____ ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Goodbread MHP
Location: Goodbread MHP
County: NE
Contact/District: Ken Kohn / ~~Central~~ District
NPDES Permit #: FL0032662 Outfall #:

Sample Collection: Date 3/1/93 Time 1430
Test Beginning: Date 3/2/93 Time 1400
Test Ending: Date 3-4-93 Time 1400
Organism Batch #: 9 Diluent Batch #: 4
Organism Age: < 24 hours
Test Organism: Ceriodaphnia dubia

Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through
Test Number: 1 of 4 KP
Remarks: 93-MAR-02-29 50736

dcd

Instrument Calibrations: pH | Temperature °C | D.O. mg/L | Conductivity µmhos/cm

0 hr 7.0 @ 7.0 / 9.0 @ 9.0 | 22.6 @ 22.8 | 8.4 @ 24.2 | 978 @ 1,000 / 9700 @ 10,000 @ 24.4°C
24 hr 7.0 @ 7.0 / 9.0 @ 9.0 | 23.8 @ 23.9 | 8.4 @ 24.0 | 980 @ 1,000 / 9730 @ 10,000 @ 24.4°C
48 hr 7.0 @ 7.0 / 9.0 @ 9.0 | 23.3 @ 23.4 | 8.4 @ 23.6 | 975 @ 1,000 / 9730 @ 10,000 @ 24.3°C

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temperature (°C) 0	24	48	D.O. (mg/L) 0	24	48	Cond. (mmhos/cm) Cond. (µmhos/cm) 0	24	48
Control	A	5	5	5	8.5		8.3	22.9		23.3	7.6		8.0	160		160
Control	B	5	5	5			8.3						8.1			165
Control	C	5	5	5			8.3						8.1			165
Control	D	5	5	5			8.3						8.2			165
100%	A	5	1	0	7.7		8.6	22.9		23.4	6.3		7.7	690		660
100%	B	5	0	0			8.7						7.8			700
100%	C	5	0	0			8.7						7.8			700
100%	D	5	0	0			8.7						7.8			725
Measured/Loaded by:		TM	TM	TM	MF		TM	MF		TM	MF		TM	MF		TM
Recorded by:		TR	TR	TM	EAM		TR	EAM		TR	EAM		TR	EAM		TR

Investigators' Signatures

Marshall Faircloth
Tobin Rader
Tina Mikulski

Reviewer

Water Quality Parameters	Salt Water/ Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			0.7		KK
Lab Total Residual Cl2:	0.02	0.02	0.02	DR100	TM
Alkalinity:	120	65	225	Hach	TR
Hardness:	125	70	215	Hach	TR
Total Ammonia:	<0.017	<0.017	0.655	Orion	MF

Cl_2 Blank: 0.02 Ammonia Meter Slope: -57.9 Ammonia Blank: <0.017 Sample Salinity: 00t

Form updated 10/29/92

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Goodbread MHP
Location: Goodbread MHP
County:
Contact/District: Ken Kohn / ~~Central~~ NE
NPDES Permit #: FL0032662 Outfall #:

Sample Collection: Date 3/1/93 Time 1430
Test Beginning: Date 3/2/93 Time 1400
Test Ending: Date 3-4-93 Time 1400
Organism Batch #: 9 Diluent Batch #: well
Organism Age: 9 days
Test Organism: Notropis leedsi

Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through
Test Number: 2 of ~~24~~ 4 KP
Remarks: 93-MAR-02-29 50736
dcl IN LAB W/SODIUM THIOSULFATE

Instrument Calibrations: pH Temperature °C D.O. mg/L Conductivity µmhos/cm

0 hr 7.0 @ 7.0 9.0 @ 9.0 — 22.6 @ 22.8 — 8.4 @ 24.2 — 978 @ 1,000; 9700 @ 10,000
24 hr 7.0 @ 7.0 9.0 @ 9.0 — 23.8 @ 23.9 — 8.4 @ 24.0 — 980 @ 1,000; 9730 @ 10,000 (24.4)
48 hr 7.0 @ 7.0 9.0 @ 9.0 — 23.3 @ 23.4 — 8.4 @ 23.6 — 975 @ 1,000; 9730 @ 10,000 (24.2)

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temperature (°C) 0	24	48	D.O. (mg/L) 0	24	48	Cond. (mmhos/cm) Cond. (µmhos/cm) 0	24	48
Control	26	5	5	5	7.7	8.2	8.2	22.0	23.1	22.5	7.6	7.9	7.8	230	240	250
Control	88	5	5	5	7.8	8.1	8.2				7.6	8.0	7.9	235	240	260
100%	20	5	5	5	7.6	8.1	8.2	23.0	23.2	22.5	5.9	6.9	7.5	725	725	730
100%	1	5	5	5	7.6	8.1	8.2				5.9	7.0	7.5	735	725	730
Measured/Loaded by:		TM	TM	TM	TR	TM	TM	TR	TM	TM	TR	TM	TM	TR	TM	TM
Recorded by:		TR	TR	TM	EAM	TR	TR	EAM	TR	TR	EAM	TR	TR	EAM	TR	TR

Investigators' Signatures

Marbell Faircloth
Tobin Rader
Tina Mitchell

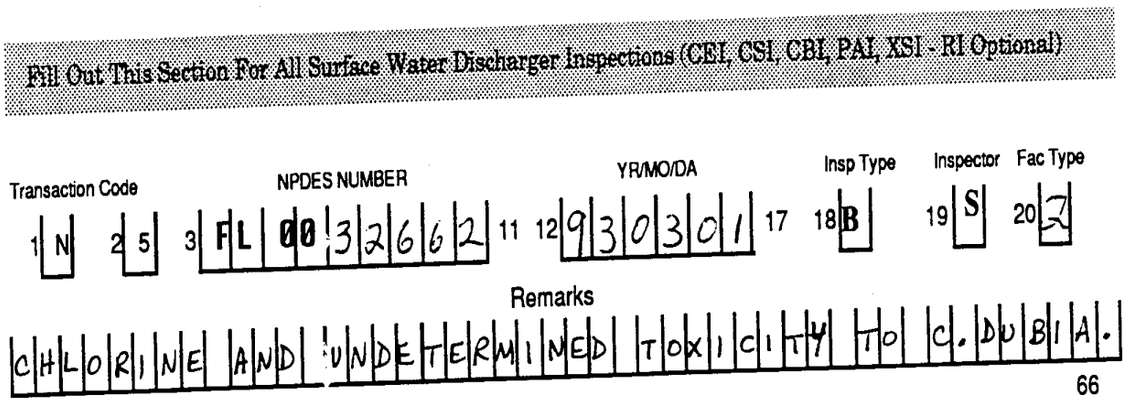
Reviewer

Water Quality Parameters	Salt Water/ Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			0.7		KK
Lab Total Residual Cl2:	0.02	0.02	0.02	DR100	TM
Alkalinity:	120	65	225	Hach	TR
Hardness:	125	70	215	Hach	TR
Total Ammonia:	<0.017	<0.017	0.655	orion	MF

Cl_2 Blank: 0.02 Ammonia Meter Slope: -57.9 Ammonia Blank: <0.017 Sample Salinity: ____ ppt

form updated 10/20/92

The Bioassay of the Goodbread Mobile Home Park STP effluent sampled on March 1, 1993, NPDES# FL0032662.



The Priority Pollutants Analysis for the Bioassay of the Goodbread Mobile Home Park STP effluent sampled on March 1, 1993, NPDES# FL0032662.

