Bioassays of the Town of

Belleair Wastewater Treatment Plant

Belleair, Pinellas County, Florida

NPDES #FL0020184

Sampled 1/13/97

May 1997

Biology Section

Division of Administrative & Technical Services

Comprehensive Quality Assurance Plan #870346G

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Biology Section
Bureau of Laboratories
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Introduction

Town of Belleair WWTP, 106 Belleair Avenue, Belleair, Pinellas County, Florida, NPDES #FL00200184, tests performed on 14 to 16 January, 1997.

This two-stage aeration wastewater treatment plant with final filters has a design flow of 0.9 MGD and an annual average flow of 0.6 MGD. Chlorination is used for disinfection. Effluent is not dechlorinated. Discharge from the facility is intermittent and occurs approximately 60–90 days per year. Effluent which is not reused as part of the golf course reuse systems (Belleview Mid Country Club 0.6 MGD and Belleair Country Club 1.1 MGD) is discharged to Clearwater Harbor via an outfall 1,300 feet from shore at a depth of 6 feet. The facility was not discharging at the time of sample collection, so the sample for the bioassay tests was collected from treated wastewater designated for reuse (facility summary provided by Brent Johnson, FDEP, Tampa).

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. Two additional 48-hour screening bioassays were performed on aliquots of the sample that were dechlorinated in the laboratory by the addition of 2.8 mL of 0.025N sodium thiosulfate per liter of sample. The test species used for these bioassays were the water flea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Cyprinella leedsi*. The chlorinated test results showed toxicity, producing 100% mortality in both test species within 24-hours. The dechlorinated tests did not show toxicity (Table 1).

Total residual chlorine of the 100% whole effluent sample was 12.0 mg/L in the field and 2.5 mg/L in the laboratory. Total residual chlorine (TRC) of the dechlorinated aliquot of sample was measured at <0.03 mg/L. Total residual chlorine levels as low as 0.028 mg/L have been found to be acutely toxic to some freshwater fish and invertebrates (EPA *Quality Criteria for Water* 1986, EPA 44015-86-001, 1986). The total and unionized ammonia concentrations were 3.80 mg/L and 0. 17 mg/L, respectively. Further chemical analyses were performed on the sample and several metals were identified (Table 2).

Conclusion

The sample of effluent collected from this facility on January 13, 1997, showed toxicity to both test species. We attribute the toxicity to the total residual chlorine concentration in the sample.

Table 1. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the City of Belleair WWTP, Belleair, Pinellas County, Florida, NPDES# FL0020184, performed on 14 to 16 January, 1997.

Facility:	**Town of Belleair WWTP**		**NPDES #**	**FL0020184**	Facility Type: Wastewater Treatment Plant
Location:	106 Belleair Road, Belleair		Contact/District:	Kent Edwards/Southwest	
County:	Pinellas		Test type:	static acute screen	
Sample Collection Date:	1/13/97	Time: 1245	# tests:	2	Receiving Water: Clearwater Harbor
Test Beginning Date:	1/14/97	Time: 1515	Chlorination Type:	Chlorinated	
Test Ending Date:	1/16/97	Time: 1515			Page 1 of 1

Total Residual CL2	mg/L	Method
Field:	12.00	-
Lab: 100% sample:	2.50	DR-100
dechlorinated sample:	<0.03	DR-100

Ammonia	Total (mg/L)	Unionized (mg/L)
Control Water (fish):	<0.017	0.00
Control Water (20% DMW) (cladocerans):	<0.017	0.00
100% Sample:	3.80	0.14

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (fish):	125	125
Control Water (20% DMW) (cladocerans):	75	85
100% Sample:	170	215

Salinity	(ppt)
Control Water (fish):	0
Control Water (20% DMW) (cladocerans):	0
100% Sample:	0

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	5	5	8.2	-	8.2	23.1	-	23.4	8.1	-	7.9	155	175
Control B	0/20	5	5	5	-	-	8.2	-	-	23.4	-	-	7.9	-	185
Control C	0/20	5	5	5	-	-	8.2	-	-	23.4	-	-	7.9	-	185
Control D	0/20	5	5	5	-	-	8.2	-	-	23.4	-	-	7.9	-	190
100% A	20/0	5	0	-	7.8	8.5	-	23.1	25.2	-	8.2	7.5	-	885	980[C]
100% B	20/0	5	0	-	-	8.5	-	-	25.2	-	-	7.5	-	-	1020[C]
100% C	20/0	5	0	-	-	8.5	-	-	25.0	-	-	7.6	-	-	1025[C]
100% D	20/0	5	0	-	-	8.5	-	-	24.7	-	-	7.7	-	-	1025[C]
Decl100% A	20/0	5	5	5	7.9	-	8.5	23.6	-	23.4	8.0	-	7.9	945	965
Decl100% B	20/0	5	5	5	-	-	8.5	-	-	23.5	-	-	7.9	-	1000
Decl100% C	20/0	5	5	5	-	-	8.5	-	-	23.5	-	-	7.8	-	1005
Decl100% D	20/0	5	5	5	-	-	8.5	-	-	23.5	-	-	7.8	-	995

Decl = Dechlorinated sample

[A] Temperature of test incubator was continously recorded on a strip chart recorde [C] 24-hour
Incubator temperature range for the test period was 24.4-25.6°C.

Organism: ***Cyprinella leedsi*** Age: 12 days

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[B]			Dissolved Oxygen			Conductivity Uncorrected mmhos/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	7.9	8.2	8.3	24.0	23.7	23.4	7.9	7.9	7.9	250	245
Control B	0/500	5	5	5	8.0	8.2	8.3	23.8	23.7	23.2	7.9	8.0	7.9	250	245
Control C	0/500	5	5	5	8.0	8.2	8.3	23.8	23.7	23.2	8.0	7.9	7.9	250	245
Control D	0/500	5	5	5	8.0	8.2	8.3	23.9	23.9	23.3	8.0	7.9	7.9	250	245
100% A	500/0	5	0	-	7.5	8.0	-	23.8	23.8	-	7.7	7.9	-	1010	1005[D]
100% B	500/0	5	0	-	7.5	7.9	-	23.7	23.7	-	7.7	7.9	-	1010	1015[D]
100% C	500/0	5	0	-	7.5	7.9	-	23.6	23.7	-	7.7	8.0	-	1010	1015[D]
100% D	500/0	5	0	-	7.5	7.9	-	23.7	23.9	-	7.7	7.9	-	1015	1020[D]
Decl100% A	500/0	5	5	5	7.8	8.1	8.3	24.0	23.7	23.2	8.0	7.7	7.7	1025	1005
Decl100% B	500/0	5	5	5	7.8	8.1	8.3	23.9	23.7	23.1	8.0	7.7	7.7	1030	1010
Decl100% C	500/0	5	5	5	7.8	8.1	8.3	23.9	23.7	23.1	8.0	7.7	7.7	1030	1015
Decl100% D	500/0	5	5	5	7.9	8.1	8.3	24.0	23.9	23.2	8.0	7.7	7.7	1030	1015

Decl = Dechlorinated sample

[B] Temperature of test room was continously recorded on a strip chart recorder. [D] 24-hour conductivity readings.
Room temperature range for the test period was 23.5-24.0°C.

Table 2. Results of chemical analyses on the effluent from the Town of Belleair Wastewater Treatment Plant sampled on January 13, 1997.

Metals

Calcium	75.1	mg/L
Copper	1.7	µg/L[J]
Iron	27	µg/L
Magnesium	9.12	mg/L
Selenium	30	µg/L[I]
Zinc	16	µg/L

Pesticides and Herbicides

none detected

Base, Neutral, & Acid Extractable Organics

none detected

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

[J] Estimated value.

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Town of Belleair
County: Pinellas
Contact / District: Kent Edwards / SWD
NPDES Permit #: FL0020184
LIMS Sample #: 165154 **LIMS Job #:** 97-JAN-14-18
sample log: 1-17-97

Sample Collection: Date 1/13/97 Time 12:45
Test Beginning: Date 1/14/97 Time 1515
Test Ending: Date 1-16-97 Time 1515
Organism Batch #: 2 **Diluent Batch #:** 1
Organism Age: <24hr
Test Organism: Ceriodaphnia dubia

Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through
Temperature range: room NA
incubator 24.4-25.6
Test Number: 1 of 2

Remarks: D = dead, M = missing
An aliquot of sample was dechlorinated by the addition of 2.8 mL of 0.025 N Sodium thiosulfate per liter of sample. TRC of dechlorinated sample was <0.03 mg/L.

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	21.6 @ 21.6	8.3 @ 24.9 °C	102.8 @ 102.1 1000 @ 1001 @ 24.9 °C 98700 @ 99751
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.1 @ 23.1	8.2 @ 25.2 °C	104.0 @ 102.1 1001 @ 1001 @ 24.8 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	22.0 @ 22.0	8.6 @ 22.7 °C	103.1 @ 100.1 990 @ 1001 @ 24.4 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 hr	pH 48 hr	Temperature (°C) 0 hr	Temperature (°C) 24 hr	Temperature (°C) 48 hr	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 hr	D.O. (mg/L) 48 hr	UNCORRECTED Cond. (mmhos/cm) ~~Cond. (µmhos/cm)~~ 0 hr	UNCORRECTED Cond. (mmhos/cm) ~~Cond. (µmhos/cm)~~ 24 hr	UNCORRECTED Cond. (mmhos/cm) ~~Cond. (µmhos/cm)~~ 48 hr
ctl	A	5	5	5	8.2		8.2	23.1		23.4	8.1		7.9	155		175
ctl	B	5	5	5			8.2			23.4			7.9			185
ctl	C	5	5	5			8.2			23.4			7.9			185
ctl	D	5	5	5			8.2			23.4			7.9			190
100%	A	5	0 SD	—	7.8	8.5	—	23.1	25.2	—	8.2	7.5	—	885	980	—
100%	B	5	0 SD	—		8.5	—		25.2	—		7.5	—		1020	—
100%	C	5	0 SD	—		8.5	—		25.0	—		7.6	—		1025	—
100%	D	5	0 SD	—		8.5	—		24.7	—		7.7	—		1025	—
100% DCA	A	5	5	5	7.9		8.5	23.6		23.4	8.0		7.9	945		965
100% DCA	B	5	5	5			8.5			23.5			7.9			1000
100% DCA	C	5	5	5			8.5			23.5			7.8			1005
100% DCA	D	5	5	5			8.5			23.5			7.8			995
Measured/Loaded by:		MF	ND	MF	JS	MF	MF	JS	MF	MF	JS	MF	MF	JS	MF	MF
Recorded by:		JS	ND	MF	OW	MF	MF	OW	MF	JS	OW	MF	JS	OW	ND	JS

Investigators' Signatures

D. O. Wolf
Julie Shapiro
Marshall Faircloth
Rich Leigh
A. H. Wolfe
reviewer

form updated 4/01/96

Water Quality Parameters

Salt Water / Well Water / (20% Min Water)

		Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):		12.0	—	Brent Johnson
Lab Total Residual Cl2 (mg/L):	<0.03 <0.03	2.50	DR100	ND
Alkalinity (mg/L as $CaCO_3$):	— 75	170	Hach	JF
Hardness (mg/L as $CaCO_3$):	— 85	215	Hach	JF
Total ammonia (mg/L as N):	<0.017 <0.017	380	Orion	MF

Ammonia Meter #98136 Ammonia Meter Slope: -55.9 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Town of Bellaire
County: Pinellas
Contact / District: Kent Edwards / SWD
NPDES Permit #: FL0020184
LIMS Sample #: 165154 LIMS Job #: 97-JAN-14-18
sample log: 1-17-97

Sample Collection: Date 1/13/97 Time 12:45
Test Beginning: Date 1/14/97 Time 1520
Test Ending: Date 1-16-97 Time 1520
Organism Batch #: 101 Diluent Batch #: Well
Organism Age: 12 days
Test Organism: Cyprinella leedsi

Test Type: (Screening) | Definitive
(Static) Static Renewal | Flow-through
Temperature range: room 23.5-24.0°C
incubator NA
Test Number: 2 of 2

Remarks: D = dead, M = missing

Fish started dying within 10 minutes of loading into the 100% sample.

48 hour total Ammonia 3.20 mg/L. An aliquot of sample was dechlorinated by the addition of 2.8 ml of 0.025N Sodium Thiosulfate per liter of sample.

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	21.6 @ 21.6	8.3 @ 24.9 °C	102.8 @ 100.1 1000 @ 1001 @ 24.9 °C 92700 @ 99781
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.1 @ 23.1	8.2 @ 25.2 °C	104.0 @ 100.1 1001 @ 1001 @ 24.8 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	22.0 @ 22.0	8.6 @ 22.7 °C	103.1 @ 100.1 990 @ 1001 @ 24.4 °C

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) (µmhos/cm) 0 hr	UNCORRECTED Cond. (µmhos/cm) 24 h	UNCORRECTED Cond. (µmhos/cm) 48 h
Ctl A	A13	5	5	5	7.9	8.2	8.3	24.0	23.7	23.4	7.9	7.9	7.9	250	245	245
Ctl B	A14	5	5	5	8.0	8.2	8.3	23.8	23.7	23.2	7.9	8.0	7.9	250	250	245
Ctl C	A15	5	5	5	8.0	8.2	8.3	23.8	23.7	23.2	8.0	7.9	7.9	250	250	245
Ctl D	A16	5	5	5	8.0	8.2	8.3	23.9	23.9	23.3	8.0	7.9	7.9	250	250	245
100% A	A17	5	0 SD	~	7.5	8.0	—	23.8	23.8	—	7.7	7.9	—	1010	1005	—
100% B	A18	5	0 SD	—	7.5	7.9	—	23.7	23.7	—	7.7	7.9	—	1010	1015	—
100% C	A19	5	0 SD	—	7.5	7.9	—	23.6	23.7	—	7.7	8.0	—	1010	1015	—
100% D	A20	5	0 SD	—	7.5	7.9	—	23.7	23.9	—	7.7	7.9	—	1015	1020	—
100% DeCl A	A21	5	5	5	7.8	8.1	8.3	24.0	23.7	23.2	8.0	7.7	7.7	1025	1015	1005
100% DeCl B	A22	5	5	5	7.8	8.1	8.3	23.9	23.7	23.1	8.0	7.7	7.7	1030	1020	1010
100% DeCl C	A23	5	5	5	7.8	8.1	8.3	23.9	23.7	23.1	8.0	7.7	7.7	1030	1025	1015
100% DeCl D	A24	5	5	5	7.9	8.1	8.3	24.0	23.9	23.2	8.0	7.7	7.8	1030	1030	1015
Measured/Loaded by:		OW	MF	MF	JS	MF	MF	JS	MF	MF	JS	MF	MF	JS	MF	MF
Recorded by:		JF	MF	MF	OW	ND	JS	OW	ND	JS	OW	ND	JS	OW	ND	JS

Investigators' Signatures

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Julie Shapp
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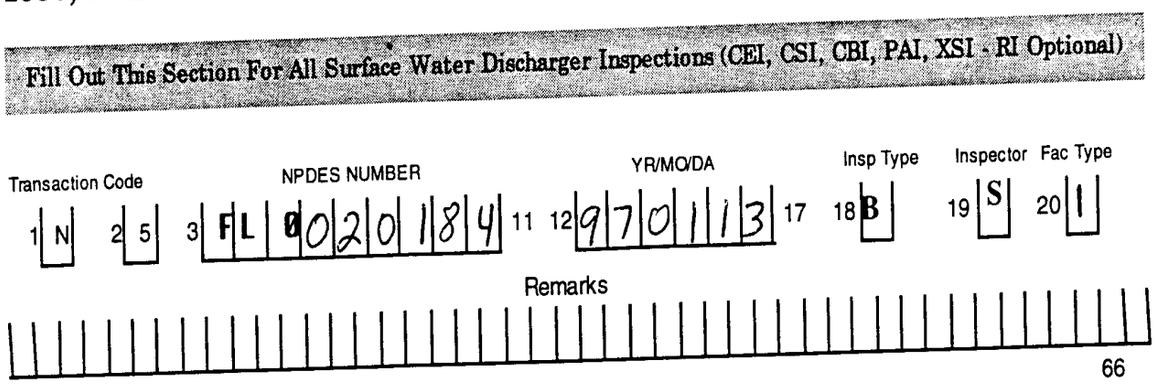
reviewer / form updated 4/01/96

Water Quality Parameters

	Salt Water (Well Water)	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			12.0	—	Brent Johnson
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03	2.50	DR100	ND
Alkalinity (mg/L as $CaCO_3$):	125	—	170	Hach	JF
Hardness (mg/L as $CaCO_3$):	125	—	215	Hach	JF
Total ammonia (mg/L as N):	<0.017	<0.017	3.80	orion	MF

Ammonia Meter #98136 Meter Slope: -55.9
Ammonia Blank: <0.017
Control Salinity: 0 ppt
Sample Salinity: 0 ppt

The Bioassay of the Town of Belleair WWTP effluent sampled on January 13, 1997, NPDES #FL0020184.



The Priority Pollutants Analysis for the Bioassay of the Town of Belleair WWTP effluent sampled on January 13, 1997, NPDES #FL0020184.

