

Bioassays of the City of

Altamonte Springs Wastewater Treatment Plant

Altamonte Springs, Seminole County, Florida

NPDES #FL0033251

Sampled 1/13/97

May 1997

Biology Section

Division of Administrative & Technical Services

Comprehensive Quality Assurance Plan #870346G

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NPDES #FL0033251

Biology Section
Bureau of Laboratories
May 1997

Introduction

City of Altamonte Springs WWTP, Keller Road, Altamonte Springs, Seminole County, Florida, NPDES #FL0033251, tests performed on 14 to 16 January, 1997.

This anoxic/aerobic activated-sludge wastewater treatment plant has a design flow of 12.5 MGD. Wastewater is treated by nitrification/denitrification, filtration, chlorination for disinfection, dechlorination, and carbon dioxide addition for pH-control. The mean effluent flow (12/95-9/96) was 1.38 MGD to the river and 5.48 MGD to reuse. The disinfected, reclaimed water is discharged to a reuse irrigation system (parks, greenspace, and lawns) and to the Little Wekiva river after dechlorination. The reuse system includes two 3-million gallon in-ground storage tanks (facility summary provided by Dr. Phil Kane and Ms. Karen Gottwald, FDEP, Orlando).

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 3.4 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 4.02 mg/L in the field and 3.0 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). Total ammonia was not detected in the sample. Further chemical analyses were performed on the sample and several metals and the herbicide, atrazine, 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 Altamonte Springs WWTP, Altamonte Springs, Seminole County, Florida, NPDES# FL0033251, performed on 14 to 16 January, 1997.

Facility:	City of Altamonte Springs WWTP			NPDES #	FL0033251	Facility Type:	Wastewater Treatment Plant
Location:	Keller Road, Altamonte Springs			Contact/District:	Dr. Phil Kane/Central		
County:	Seminole			Test type:	static acute screen		
Sample Collection Date:	1/13/97	Time:	0900	# tests:	2	Receiving Water:	Little Wekiva River
Test Beginning Date:	1/14/97	Time:	1525	Chlorination Type:	Chlorinated		
Test Ending Date:	1/16/97	Time:	1525				Page 1 of 1

Total Residual CL2	mg/L	Method
Field:	4.02	-
Lab: 100% sample:	3.00	DR-100
dechlorinated sample:	<0.03	DR-100

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:	<0.017	<0.017

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (fish):	125	125
20% Dilute Mineral Water (cladocerans):	75	85
100% Sample:	115	120

Salinity	(ppt)
Control Water:	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	8.3	-	8.2	22.9	-	23.5	7.9	-	7.9	165	195
Control B	0/20	5	5	5	-	-	8.2	-	-	23.5	-	-	7.9	-	190
Control C	0/20	5	5	5	-	-	8.3	-	-	23.4	-	-	8.0	-	190
Control D	0/20	5	5	4	-	-	8.3	-	-	23.3	-	-	8.1	-	200
100% A	20/0	5	0	-	7.3	8.3	-	23.2	24.8	-	8.2	7.6	-	445	520[C]
100% B	20/0	5	0	-	-	8.3	-	-	24.7	-	-	7.6	-	-	515[C]
100% C	20/0	5	0	-	-	8.3	-	-	24.5	-	-	7.7	-	-	515[C]
100% D	20/0	5	0	-	-	8.3	-	-	24.3	-	-	7.8	-	-	515[C]
Decl100% A	20/0	5	5	5	7.6	-	8.2	23.6	-	23.5	8.0	-	7.9	490	525
Decl100% B	20/0	5	5	5	-	-	8.2	-	-	23.5	-	-	7.9	-	555
Decl100% C	20/0	5	5	5	-	-	8.2	-	-	23.5	-	-	7.9	-	565
Decl100% D	20/0	5	5	5	-	-	8.2	-	-	23.4	-	-	7.9	-	570

Decl = Dechlorinated sample

[A] Temperature of test incubator was continously recorded on a strip chart recorde [C] 24-hour conductivity readings.
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	8.0	8.2	8.3	23.9	23.6	23.2	8.0	7.9	7.8	250	245
Control B	0/500	5	5	5	8.0	8.2	8.3	23.8	23.5	23.1	8.0	7.9	7.9	250	245
Control C	0/500	5	5	5	8.0	8.2	8.3	23.7	23.6	23.1	7.9	8.0	7.9	250	245
Control D	0/500	5	5	5	8.0	8.2	8.3	23.8	23.8	23.2	8.0	7.9	8.0	250	245
100% A	500/0	5	0	-	7.3	7.8	-	23.8	23.4	-	8.4	8.0	-	510	505[D]
100% B	500/0	5	0	-	7.2	7.8	-	23.6	23.4	-	8.3	8.0	-	505	505[D]
100% C	500/0	5	0	-	7.2	7.7	-	23.5	23.4	-	8.3	8.2	-	505	510[D]
100% D	500/0	5	0	-	7.2	7.7	-	23.5	23.7	-	8.3	8.2	-	500	510[D]
Decl100% A	500/0	5	5	5	7.4	7.9	8.0	23.9	23.4	23.1	8.2	7.9	7.8	530	530
Decl100% B	500/0	5	5	5	7.4	7.9	8.0	23.8	23.4	23.1	8.2	7.9	7.7	530	530
Decl100% C	500/0	5	5	5	7.4	7.9	8.0	23.8	23.4	23.1	8.2	8.1	7.7	530	530
Decl100% D	500/0	5	5	5	7.4	7.9	8.0	23.9	23.4	23.1	8.2	8.2	7.7	530	530

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 City of Altamonte Springs Wastewater Treatment Plant sampled on January 13, 1997.

Metals

Calcium	33.9	mg/L
Copper	2.4	µg/L[J]
Iron	51	µg/L
Magnesium	8.56	mg/L
Zinc	19	µg/L

Pesticides and Herbicides

Atrazine	0.098	µg/L[I]

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: Altamonte Springs WWTP
County: Seminole
Contact / District: Phil Kane / CD
NPDES Permit #: FL0033251
LIMS Sample #: 165185 LIMS Job #: 97 JAN -14-13
sample log: 1-17-97

Sample Collection: Date 1/13/97 Time 09:00
Test Beginning: Date 1/14/97 Time 1525
Test Ending: Date 1-16-97 Time 1525
Organism Batch #: 2 Diluent Batch #: 1
Organism Age: < 24 hr
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

Instrument Calibrations: pH — meter # 7851; Temperature °C — 90H018262; D.O. mg/L — 90H018262; Conductivity µmhos/cm — G9005749

0 hr 7.0 @ 7.0 / 9.0 @ 9.0 — 21.6 @ 21.6 — 8.3 @ 24.9 °C — 1028 @ 100.1 / 1000 @ 1001 @ 24.9 °C
24 hr 7.0 @ 7.0 / 9.0 @ 9.0 — 23.1 @ 23.1 — 8.2 @ 25.2 °C — 96700 @ 99781 / 1040 @ 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 — 1031 @ 100.1 / 990 @ 1001 @ 24.4 °C

Remarks: D = dead, M = missing
An aliquot of sample was dechlorinated by the addition of 3.4 ml of 0.025 N Sodium thiosulfate per liter of sample. TRC of dechlorinated aliquot was <0.03 mg/L.
Test organisms started dying within 10 minutes of being placed into test solution (100% sample)

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	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 24 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 48 h
Ctl	A	5	5	5	8.3		8.2	22.9		23.5	7.9		7.9	165		195
Ctl	B	5	5	5			8.2			23.6			7.9			190
Ctl	C	5	5	5			8.3			23.4			8.0			190
Ctl	D	5	4 ID	4			8.3			23.3			8.1			200
100%	A	5	0 SD	—	7.3	8.3	—	23.2	24.8	—	8.2	7.6	—	445	520	—
100%	B	5	0 SD	—		8.3	—		24.7	—		7.6	—		515	—
100%	C	5	0 SD	—		8.3	—		24.5	—		7.7	—		515	—
100%	D	5	0 SD	—		8.3	—		24.3	—		7.8	—		525	—
100% Dech A	A	5	5	5	7.6		8.2	23.3		23.5	8.0		7.9	490		525
100% Dech B	B	5	5	5			8.2			23.5			7.9			555
100% Dech C	C	5	5	5			8.2			23.5			7.9			565
100% Dech D	D	5	5	5			8.2			23.4			7.9			570
Measured/Loaded by:		MF	ND	MF	JS	MF	MF	JS	MF	MF	JS	MF	MF	JS	MF	MF
Recorded by:		JS	ND	MK	OW	MF	MF	OW	ND	JS	OW	ND	JS	OW	ND	JS

Investigators' Signatures
Julie Sharpe
Marshall Fawcett
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):			4.02	—	Phil Kane
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03	3.00	DR100	ND
Alkalinity (mg/L as $CaCO_3$):	—	75	115	Hach	JF
Hardness (mg/L as $CaCO_3$):	—	85	120	Hach	JF
Total ammonia (mg/L as N):	<0.017	<0.017	<0.017	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: Altamonte Springs WWTP
County: Seminole
Contact / District: Phil Kane / CD
NPDES Permit #: FL0033251
LIMS Sample #: 165185 LIMS Job #: 97-JAN-14-13
sample log: 1-17-97

Sample Collection: Date 1/13/97 Time 09:00
Test Beginning: Date 1/14/97 Time 1530
Test Ending: Date 1-16-97 Time 1530
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.

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 @ 24.5 °C	102.8 @ 100.1 1000 @ 1001 @ 24.5 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.1 @ 23.1	8.2 @ 25.2 °C	54700 @ 99781 1040 @ 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

an aliquot of sample was dechlorinated by the addition of 3.4 mL of 0.025 N sodium thiosulfate per liter of sample. TRC of dechlorinated sample was < 0.03 mg/L.

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
Ctr A	B1	5	5	5	8.0	8.2	8.3	23.9	23.6	23.2	8.0	7.9	7.8	250	245	245
Ctr B	B2	5	5	5	8.0	8.2	8.3	23.8	23.5	23.1	8.0	7.9	7.9	250	245	245
Ctr C	B3	5	5	5	8.0	8.2	8.3	23.7	23.6	23.1	7.9	8.0	7.9	250	245	245
Ctr D	B4	5	5	5	8.0	8.2	8.3	23.8	23.8	23.2	8.0	7.9	8.0	250	250	245
100% A	B5	5	0 SD	—	7.3	7.8	—	23.8	23.4	—	8.4	8.0	—	510	505	—
100% B	B6	5	0 SD	—	7.2	7.8	—	23.6	23.4	—	8.3	8.0	—	505	505	—
100% C	B7	5	0 SD	—	7.2	7.7	—	23.5	23.4	—	8.3	8.2	—	505	510	—
100% D	B8	5	0 SD	—	7.2	7.7	—	23.5	23.7	—	8.3	8.2	—	500	510	—
100% DeCl A	B9	5	5	5	7.4	7.9	8.0	23.9	23.4	23.1	8.2	7.9	7.8	530	530	530
100% DeCl B	B10	5	5	5	7.4	7.9	8.0	23.8	23.4	23.1	8.2	7.9	7.7	530	530	530
100% DeCl C	B11	5	5	5	7.4	7.9	8.0	23.8	23.4	23.1	8.2	8.1	7.7	530	530	530
100% DeCl D	B12	5	5	5	7.4	7.9	8.0	23.9	23.6	23.1	8.2	8.0	7.7	530	530	530
Measured/Loaded by:		DW	MF	MF	JS	MF	MF	JS	MF	MF	JS	MF	MF	JS	MF	MF
Recorded by:		JF	MF	MF	DW	ND	JS	DW	ND	JS	DW	ND	JS	DW	ND	JS

Investigators' Signatures

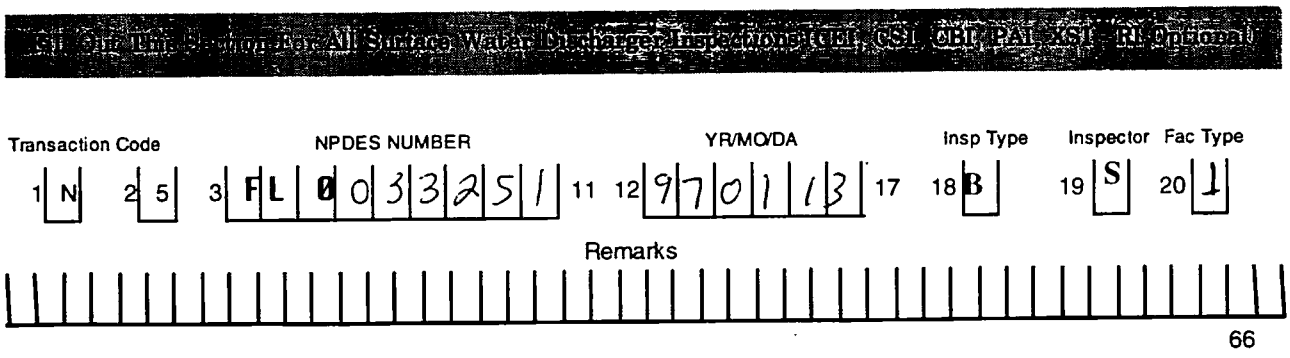
Julie Sharp
Marshall Faircloth
Tim Smith
M Wolfe
reviewer

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):			4.02	—	Phil Kane
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03	3.00	DR100	ND
Alkalinity (mg/L as $CaCO_3$):	125	—	115	Hach	JF
Hardness (mg/L as $CaCO_3$):	125	—	120	Hach	JF
Total ammonia (mg/L as N):	<0.017	<0.017	<0.017	Orion	MF

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

The Bioassay of the City of Altamonte Springs WWTP effluent sampled on January 13, 1997, NPDES #FL0033251.



The Priority Pollutants Analysis for the City of Altamonte Springs WWTP effluent sampled on January 13, 1997, NPDES #FL0033251.

