

Bioassays of

Altamonte Springs/Sworfford Water Reclamation Facility

Altamonte Springs, Seminole County, Florida

NPDES #FL0033251

Sampled 3/5/01

August 2001

Biology Section

Division of Resource Assessment & Management

Comprehensive Quality Assurance Plan #870346G

Bioassays of

Altamonte Springs/Sworfford Water Reclamation Facility

Altamonte Springs, Seminole County, Florida

NPDES #FL0033251

Biology Section
Bureau of Laboratories
August 2001

Introduction

Altamonte Springs/Sworfford Water Reclamation Facility, 950 Keller Road, Altamonte Springs, Seminole County, Florida, NPDES #FL0033251, tests performed on 6 to 8 March 2001.

This wastewater treatment plant has a design flow of 12.5 MGD. The wastewater is treated by influent screening, grit removal, primary sedimentation, anoxic/aerobic nitrification, secondary clarification, flocculation, gentrification, filtration, chemical feed, and postaeration. The effluent is then chlorinated for disinfection and dechlorinated by the addition of sulfur dioxide. The residuals are aerobically digested, gravity thickened, and dewatered through a belt-filter press. The facility has a reuse service area with a high demand, so discharge of the effluent usually only occurs during wet weather conditions. The facility was not discharging at the time of inspection. When the facility does discharge, the effluent flows into the Class III fresh waters of the Little Wekiva River (facility summary provided by John B. Bowles, Philip N. Kane, 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. The test species used for these bioassays were the water flea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Cyprinella leedsi*. The test results indicate toxicity to both species causing 100% mortality in the 100% sample within 30 and 15 minutes for the *C. dubia* and *C. leedsi*, respectively (Table 1).

Total residual chlorine was detected at 3.95 mg/L in the field and 1.55 mg/L in the laboratory. An aliquot of the original sample was dechlorinated by the addition of 1.75mL of 0.025N sodium thiosulfate and tested along side the original sample. An additional control for each test (20% diluted mineral water for *C. dubia*, well water for *C. leedsi*) was also treated with sodium thiosulfate and tested. The purpose of the additional sodium thiosulfate controls was to test for any toxic effects of dechlorination. No toxic effects were observed in any of the controls. Toxicity was observed in the 100% sample (100% mortality for both test species), but no toxicity was observed in the dechlorinated 100% sample within 48 hours. The toxicity is attributed to the chlorine in the sample due to the lack of mortality in the dechlorinated 100% sample. However, the dechlorination process used in the lab can also remove other toxicants, so chlorine cannot be identified as the sole cause for the observed toxicity.

Ammonia was not detected in the sample. Further chemical analyses were performed on the sample, and several metals and a pesticide were identified (Table 2).

Conclusion

The sample of effluent collected from this facility on March 5, 2001, showed acute toxicity to both test species within 30 minutes. The toxicity is attributed to the chlorine in the sample, due to the lack of mortality in the dechlorinated 100% sample. However, the dechlorination process used in the lab can also remove other toxicants, so chlorine cannot be identified as the sole cause for the observed toxicity.

Table 1. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the Altamonte Springs/Sworfford Water Reclamation Facility, 950 Keller Road, Altamonte Springs, Seminole County, Florida, NPDES# FL0033251, performed on 6 to 8 March 2001.

Facility:	**Altamonte Springs**			**NPDES #**	**FL0033251**	Facility Type:	**Wastewater**
Location:	950 Keller Road			Contact/District:	P. Kane/Central		**Treatment Facility**
County:	Seminole			Test type:	static acute screen		
Sample Collection Date:	3/5/01	Time:	0900	# tests:	2	Receiving Water:	Little Wekiva River
Test Beginning Date:	3/6/01	Time:	1415	Chlorination Type:	Chlorinated		
Test Ending Date:	3/8/01	Time:	1320				**Page 1 of 2**

Organism:	*Ceriodaphnia dubia*	Life stage:	< 24 hours old											Conductivity Uncorrected	
	Sample/Diluent	SURVIVAL # Alive			pH			Temperature [C]			Dissolved Oxygen				
Concentrations	Volume(mL)	0 hr	24 hr [B]	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	8.0	-	8.3	24.0	-	23.5	7.7	-	8.3	165	185
Control B	0/20	5	5	5	-	-	8.3	-	-	23.5	-	-	8.3	-	185
Control C	0/20	5	5	5	-	-	8.3	-	-	23.5	-	-	8.4	-	185
Control D	0/20	5	5	5	-	-	8.3	-	-	23.6	-	-	8.2	-	195
Control A [A]	0/20	5	5	5	8.1	-	8.3	24.2	-	23.4	- 7.9	-	8.3	190	210
Control B [A]	0/20	5	5	5	-	-	8.3	-	-	23.5	- -	-	8.3	-	200
Control C [A]	0/20	5	5	5	-	-	8.3	-	-	23.7	- -	-	8.3	-	200
Control D [A]	0/20	5	5	5	-	-	8.3	-	-	23.7	- -	-	8.2	-	215
100% A [A]	20/0	5	5	5	7.8	-	8.3	24.3	-	23.7	- 7.7	-	8.3	520	575
100% B [A]	20/0	5	5	5	-	-	8.4	-	-	23.7	- -	-	8.3	-	590
100% C [A]	20/0	5	5	5	-	-	8.4	-	-	23.8	- -	-	8.2	-	600
100% D [A]	20/0	5	5	5	-	-	8.4	-	-	23.9	- -	-	8.2	-	600
100% A	20/0	5	-	-	7.6	-	-	24.4	-	-	7.8	-	-	525	-
100% B	20/0	5	-	-	-	-	-	-	-	-	-	-	-	-	-
100% C	20/0	5	-	-	-	-	-	-	-	-	-	-	-	-	-
100% D	20/0	5	-	-	-	-	-	-	-	-	-	-	-	-	-

[A] These replicates are treated with sodium thiosulfate.

[B] The orginal sample showed 100% mortality in 30 minutes.

[C] Temperatures of room and test incubator were continuously recorded on a strip chart recorder. Room Temperature range for the test period was 24.0-26.0°C. Incubator #2 temperature range for the test period was 23.9-25.5°C.

Total Residual CL2	mg/L	Method
Field:	3.95	-
Lab:	1.55	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:	<0.017	<0.017

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (fish):	149	141
20% Dilute Mineral Water (cladocerans):	78	76
100% Sample:	114	122

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

[D] Salinity based on conductivity and temperature measurements.

continued

Table 1. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the Altamonte Springs/Sworfford Water Reclamation Facility, 950 concluded Keller Road, Altamonte Springs, Seminole County, Florida, NPDES# FL0033251, performed on 6 to 8 March 2001.

Facility:	Altamonte Springs			NPDES #	FL0033251	Facility Type:	Wastewater Treatment Facility
Location:	950 Keller Road			Contact/District:	P. Kane/Central		
County:	Seminole			Test type:	static acute screen		
Sample Collection Date:	3/5/01	Time:	0900	# tests:	2	Receiving Water:	Little Wekiva River
Test Beginning Date:	3/6/01	Time:	1415	Chlorination Type:	Chlorinated		
Test Ending Date:	3/8/01	Time:	1320				Page 2 of 2

Total Residual CL2	mg/L	Method
Field:	3.95	-
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Control Water (fish):	149	141
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100% Sample:	114	122

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

[D] Salinity based on conductivity and temperature measurements.

Organism: *Cyprinella leedsi* Life stage: 12 days

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature [C]			Dissolved Oxygen			Conductivity Uncorrected µmhos/cm	
Concentrations	Volume(mL)	0 hr	24 hr [B]	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	23.7	24.2	23.1	7.8	7.4	8.0	250	265
Control B	0/500	5	5	5	8.0	8.2	8.3	23.5	24.2	22.8	7.8	7.4	8.0	255	260
Control C	0/500	5	5	5	8.0	8.2	8.3	23.4	24.8	22.9	7.9	7.3	8.1	250	260
Control D	0/500	5	4	4	8.0	8.2	8.3	23.5	24.2	23.7	8.1	7.1	7.7	255	265
Control A [A]	0/500	5	5	5	8.0	8.2	8.3	23.5	24.4	23.1	8.9	7.1	7.9	270	275
Control B [A]	0/500	5	5	5	8.0	8.2	8.3	23.6	23.8	23.4	8.0	7.0	7.7	270	285
Control C [A]	0/500	5	5	5	8.0	8.2	8.3	23.7	23.9	23.1	7.8	7.2	7.7	270	280
Control D [A]	0/500	5	5	5	8.0	8.2	8.3	23.7	23.9	23.1	7.9	7.2	7.9	270	280
100% A [A]	500/0	5	5	5	7.6	8.1	8.2	23.7	24.9	23.2	7.9	7.1	7.7	510	520
100% B [A]	500/0	5	5	5	7.5	8.1	8.2	23.8	24.7	22.9	8.1	7.0	8.0	525	540
100% C [A]	500/0	5	5	5	7.5	8.1	8.2	23.8	24.2	22.9	7.9	7.1	7.9	525	540
100% D [A]	500/0	5	5	5	7.5	8.1	8.2	23.9	24.1	23.6	7.9	7.3	7.7	525	545
100% A	500/0	5	-	-	7.5	-	-	23.9	-	-	7.9	-	-	500	-
100% B	500/0	5	-	-	7.4	-	-	23.9	-	-	7.8	-	-	520	-
100% C	500/0	5	-	-	7.4	-	-	23.9	-	-	7.9	-	-	520	-
100% D	500/0	5	-	-	7.4	-	-	23.9	-	-	7.9	-	-	520	-

[A] These replicates are treated with sodium thiosulfate.

[B] The orginal sample showed 100% mortality in 15 minutes.

[C] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 24.0-26.0°C.
Incubator #3 temperature range for the test period was 24.2-25.0°C.

Table 2. Results of chemical analyses on the effluent from Altamonte Springs/Sworfford Water Reclamation Facility sampled on March 5, 2001.

Metals		
Cadmium	0.025	µg/L [1]
Calcium	33.8	mg/L
Copper	2.1	µg/L
Magnesium	9.2	mg/L
Zinc	40	µg/L
Pesticides and Herbicides		
Atrazine	0.2	µg/L
Base, Neutral, & Acid Extractable Organics		
None detected		

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

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Atlas (Altamonte Springs / Swofford water Recl)
County: Seminole
Contact / District: P. Kane / Cen-Dist
NPDES Permit #: FL00 33251
LIMS Sample #: 5/2065 LIMS Job #: TLH-2001-03-06-37
sample log 3/6/01 mf
Test Type: Screening | Definitive
Static | Static Renewal | Flow-through
Test Number: 1 of 2

Sample Collection: Date 3/5/01 Time 0900
Test Beginning: Date 3/6/01 Time 1415
Test Ending: Date 3/8/01 Time 1320
Organism Batch #: 12 Diluent Batch #: DMW #4
Organism Age: <24 hrs SRT toxicant batch #: —
Test organism: C dubia

Remarks: all organisms in the 100% sample were dead within 30 minutes of loading. mf 3/6/01

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. (umhos/cm) 0 hr	24 h	48 h
CNTL.	A	5	5	5	8.0	—	8.3	24.0	—	23.5	7.7	—	8.3	165	—	185
	B	5	5	5	—	—	8.3	—	—	23.5	—	—	8.3	—	—	185
	C	5	5	5	—	—	8.3	—	—	23.5	—	—	8.4	—	—	185
	D	5	5	5	—	—	8.3	—	—	23.6	—	—	8.2	—	—	195
CNTL. + Sodium Thiosulfate	A	5	5	5	8.1	—	8.3	24.2	—	23.4	7.9	—	8.5	190	—	210
	B	5	5	5	—	—	8.3	—	—	23.5	—	—	8.3	—	—	200
	C	5	5	5	—	—	8.3	—	—	23.7	—	—	8.3	—	—	200
	D	5	5	5	—	—	8.3	—	—	23.7	—	—	8.2	—	—	215
100% + Sodium Thiosulfate	A	5	5	5	7.8	—	8.3	24.3	—	23.3	7.7	—	8.3	520	—	575
	B	5	5	5	—	—	8.4	—	—	23.7	—	—	8.3	—	—	590
	C	5	5	5	—	—	8.4	—	—	23.8	—	—	8.2	—	—	600
	D	5	5	5	—	—	8.4	—	—	23.0	—	—	8.2	—	—	600
100%	A	5	—	—	7.6	—	—	24.4	—	—	7.6	—	—	525	—	—
	B	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	C	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	D	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—
measured by:		SG	SG	SG	JA	—	SG	JA	—	SG	JA	—	SG	JA	—	SG
recorded by:		JA	JC	SG	DrH	—	JH	DrH	—	JH	DrH	—	JH	DrH	—	JH

An Aliquot of sample was dechlorinated with 1.75mL of 0.025 N Sodium Thiosulfate per Liter of Sample in control using the same ratio of Sodium Thiosulfate x listed A.M. DrH 3/6/01

Investigators' Signatures
Shannon Girard
Della Parker Stinger
Joshua Singer
Marshall Fairchild
Kasser Kattan

AH Wolfe
reviewer

form updated 3/3/99

Temperature Range °C
Incubator # 2 23.9 → 25.5°C
Room B246 24.0° – 26.6°C

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):			3.95	NA	Kane, Judy	SG
Lab Total Residual Cl2 (mg/L):	/	<0.03	1.55	DR/OC	JMK	SG
Alkalinity (mg/L as $CaCO_3$):	/	7	114	Hach	JA	SG
Hardness (mg/L as $CaCO_3$):	/	76	122	Hach	JA	SG
Total ammonia (mg/L as N):	/	<0.07	<0.07	Denver	DrH/SG	SG
Salinity:		<1	<1	Ysi	JA	SG

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Atlas (Altamonte Springs / Sanford water tech)
County: Seminole
Contact / District: P. Kane / Cen-Dist
NPDES Permit #: FL0033251
LIMS Sample #: 512065 LIMS Job #: TLH-2001-03-06-07
sample log: 3/7/01 mt
Test Type: ~~Screening~~ | Definitive
~~Static~~ | Static Renewal | Flow-through
Test Number: 2 of 2

Sample Collection: Date 3-5-01 Time 0900
Test Beginning: Date 3-6-01 Time 1420
Test Ending: Date 3/8/01 Time 1320
Organism Batch #: 14 Diluent Batch #: Well
Organism Age: 14 days SRT toxicant batch #: —
Test organism: C. dubia

Remarks: all organisms dead in the 100% sample 15 minutes after loading mf.

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
CNTL A	E9	5	5	5	8.0	8.2	8.3	23.7	24.2	23.1	7.6	7.4	8.0	270	260	265
B	E10	5	5	5	8.0	8.2	8.3	23.5	24.2	22.8	7.8	7.7	8.0	260	245	260
C	E11	5	5	5	8.0	8.2	8.3	23.4	24.8	22.9	7.6	7.3	8.1	255	265	260
D	E12	5	4[1D]	4	8.0	8.2	8.3	23.5	24.2	23.7	7.8	7.6	7.7	255	260	265
CNTL A	E13	5	5	5	8.0	8.2	8.3	23.5	24.4	23.1	7.8	7.6	7.9	270	275	275
B	E14	5	5	5	8.0	8.2	8.3	23.6	23.5	23.4	8.0	7.6	7.7	270	250	265
C	E15	5	5	5	8.0	8.2	8.3	23.7	23.9	23.1	7.8	7.6	7.7	270	280	280
D	E16	5	5	5	8.0	8.2	8.3	23.7	23.9	23.1	7.9	7.6	7.9	270	280	280
100% A	E17	5	5	5	7.6	8.1	8.2	23.7	24.9	23.2	7.9	7.1	8.7	510	520	520
B	E18	5	5	5	7.5	8.1	8.2	23.8	24.7	22.9	8	7.6	8.0	525	540	540
C	E19	5	5	5	7.5	8.1	8.2	23.8	24.2	22.9	7.9	7.1	7.9	525	535	540
D	E20	5	5	5	7.5	8.1	8.2	23.9	24.1	23.6	7.9	7.3	7.7	525	530	545
100% A	E21	5	—	—	7.5	—	—	23.9	—	—	7.9	—	—	520	—	—
B	E22	5	—	—	7.4	—	—	23.9	—	—	7.8	—	—	520	—	—
C	E23	5	—	—	7.4	—	—	23.9	—	—	7.9	—	—	520	—	—
D	E24	5	—	—	7.4	—	—	23.9	—	—	7.9	—	—	520	—	—
	~~E25~~															
measured by:		YMK	JG	JA	JH	DPH	SG	JA	DPH	SG	JA	DPH	SG	JH	DPH	SG
recorded by:		JG	JG	JA	DPH	JG	JA	DPH	JG	JA	DPH	SG	JA	DPH	JG	JA

an aliquot of sample was dechlorinated with Sodium Thiosulfate at the rate of 175ml/0.025N per liter of sample. A control was tested treated ~~tested~~ using the same ratio of sodium thiosulfate

Investigators' Signatures

Reviewer

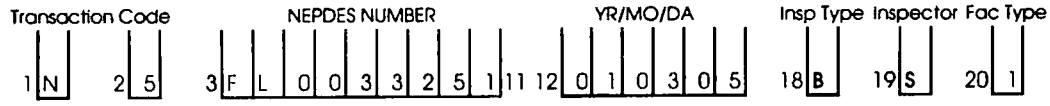
Temperature Range °C
Incubator # 3 24.2 → 25.0
Room B246 24.0 - 26.0°C

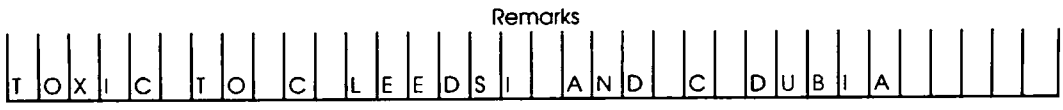
Water Quality Parameters	Salt Water Well Water	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):			3.95	NA	Kane, Judy	SG
Lab Total Residual Cl2 (mg/L):	<0.03		1.55	DR100	YMK	JG
Alkalinity (mg/L as $CaCO_3$):	149		114	Hach	JA	JG
Hardness (mg/L as $CaCO_3$):	141		122	Hach	JA	JG
Total ammonia (mg/L as N):	<0.017		<0.017	Denver	DPH/JG	SG
Salinity:	<1		<1	YSI	JA	SG

reviewer form updated 3/3/99

The Bioassay of Altamonte Springs/Sworfford Water Reclamation Facility effluent sampled on March 5, 2001, NPDES #FL0033251.

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

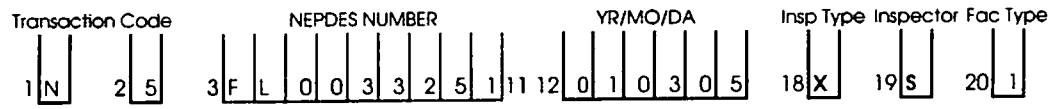


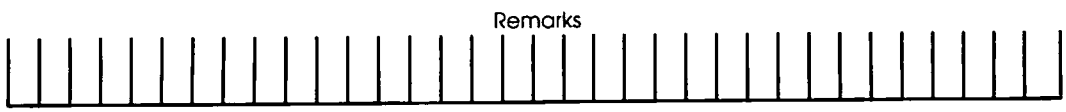


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The Priority Pollutants Analysis for Bioassay of Altamonte Springs/Sworfford Water Reclamation Facility effluent sampled on March 5, 2001, NPDES #FL0033251.

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





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