

Bioassays of

Anastasia Island Wastewater Treatment Plant

St. Augustine, St. Johns County, Florida

NPDES #FL0038831

2/25/02

July 2002

Biology Section

Division of Resource Assessment & Management

Comprehensive Quality Assurance Plan #870346G

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Biology Section
Bureau of Laboratories
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Introduction

Anastasia Island Wastewater Treatment Facility, 860 West 16th Street, St Augustine, St. John's County, Florida, NPDES #FL0038831, tests performed on 26 to 28 February 2002.

This wastewater treatment plant has a design flow of 4.0 MGD and annual average flows (April, 2001-March, 2002) of 1.398 MGD to surface water and 0.336 MGD to a reuse system. The wastewater treatment system consists of a complete mix activated-sludge facility. Effluent treatment also includes chlorination with sodium hypochlorite for disinfection, dechlorination with sulfur dioxide gas, and aeration prior to the effluent being discharged into the Class III marine waters of the Matanzas River. Treated effluent routed into the reuse system is filtered through tertiary filters and then injected with chlorine to meet the high-level disinfection requirement for the reclaimed water. Effluent from the reuse system is discharged to a pond at the Marsh Creek Country Club Golf Course where it is then used for spray irrigation at the golf course (facility summary provided by Kathleen Gerard, 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 four 48-hour static acute screening toxicity bioassays on a sample of effluent from the Anastasia Island Wastewater Treatment Facility. Two freshwater bioassays were performed on the original sample of effluent and two saltwater bioassays were performed on a salinity-adjusted aliquot of the effluent sample. The test species used for the freshwater bioassays were the water flea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Cyprinella leedsi*. The test species used for the salinity-adjusted bioassays were the mysid shrimp, *Americamysis bahia*, and the inland silverside, *Menidia beryllina.* The aliquot of the sample used for the saltwater bioassays was adjusted with artificial sea salts to a salinity of 20 ppt. The control water for the saltwater tests was aged artificial seawater (ASW) having a salinity of 20 ppt. A salt control (well water adjusted with artificial sea salts to the salinity of the salinity-adjusted sample aliquot) was also tested to ensure that the sample preparation (salinity adjustment) did not have a detrimental effect on the saltwater test species. Neither the freshwater nor the saltwater test results indicated toxicity to the test species within 48 hours of test initiation (Table 1).

Total residual chlorine was not detected in the bioassay sample in the laboratory. The total and unionized ammonia concentrations in the bioassay sample were 0.745 mg/L and 0.013 mg/L, respectively. Total ammonia in the sample collected for chemical analyses was 0.82 mg/L. Further chemical analyses were performed on the sample, and several metals, pesticides, and volatile organic compounds were identified (Table 2).

Conclusion

The sample of effluent collected from this facility on February 25, 2002, did not show acute toxicity to either the freshwater or the saltwater test species within 48 hours of test initiation.

Table 1. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the Anastasia Island Wastewater Treatment Plant, 860 West 16th Street, St. Augustine, St. Johns County, Florida, NPDES# FL0038831, performed from 26 to 28 February 2002.

Freshwater Tests

Facility:	**Anastasia Island WWTP**		**NPDES #**	**FL0038831**	Facility Type:	**Wastewater**	**Analysts:** Della Parker-Hanson
Location:	860 West 16th Street, St. Augustine		Contact/District:	P. O'Connor/Northeast		**Treatment Plant**	Joshua Ayres
County:	St. Johns		Test type:	static acute screen			Gary Hardie
Sample Collection Date:	2/25/02	Time: 1000	# tests:	2	Receiving Water:	Matanzas River	Marshall Faircloth
Test Beginning Date:	2/26/02	Time: 1500	Chlorination Type:	Chlorinated			
Test Ending Date:	2/28/02	Time: 1430		sample collected after dechlorination		**Page 1 of 1**	**Reviewer:** David Whiting

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

	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	-	8.4	24.8	-	23.3	8.0	-	7.8	175	240
Control B	0/20	5	5	5	-	-	8.4	-	-	23.2	-	-	7.8	-	250
Control C	0/20	5	5	5	-	-	8.4	-	-	23.2	-	-	7.8	-	230
Control D	0/20	5	5	5	-	-	8.4	-	-	23.1	-	-	7.8	-	215
100% A	20/0	5	5	5	7.5	-	8.4	24.7	-	23.2	8.0	-	7.8	1180	1370
100% B	20/0	5	5	5	-	-	8.4	-	-	23.3	-	-	7.8	-	1445
100% C	20/0	5	5	5	-	-	8.5	-	-	23.3	-	-	7.7	-	1510
100% D	20/0	5	5	5	-	-	8.5	-	-	23.2	-	-	7.7	-	1475

[A] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.0-25.5 °C.
Incubator #3 temperature range for the test period was 24.5-25.5°C.

Organism: ***Cyprinella leedsi*** Life stage: 13 days

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[B]			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	0/500	5	5	5	7.9	8.4	8.4	24.3	27.0	24.5	8.0	6.8	7.1	300	275
Control B	0/500	5	5	5	7.9	8.3	8.4	24.3	25.3	24.4	8.0	6.7	7.1	280	275
Control C	0/500	5	5	5	7.9	8.3	8.4	24.3	24.7	24.1	8.0	6.9	7.2	275	270
Cotnrol D	0/500	5	5	5	7.9	8.3	8.4	24.3	24.3	24.0	8.0	7.1	7.3	270	270
100% A	500/0	5	5	5	7.4	8.0	8.2	24.8	26.3	24.0	8.7	6.6	7.1	1175	1230
100% B	500/0	5	5	5	7.4	8.0	8.2	24.8	25.7	23.9	8.7	6.4	6.9	1250	1260
100 % C	500/0	5	5	5	7.4	8.0	8.2	24.8	24.8	23.7	8.7	6.6	7.0	1270	1285
100% D	500/0	5	5	5	7.4	8.0	8.2	24.8	24.5	24.1	8.7	6.7	7.1	1245	1225

[B] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.0-25.5°C.
Incubator #3 temperature range for the test period was 24.5-25.5°C.

LIMS	
Job number:	TLH-2002-02-26-26
sample number:	579439

Data Transcription Verification	
date:	4/12/02
by:	Gary Hardie
	Joshua Ayres

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

Ammonia	Total (mg/L)	Unionized (mg/L)
Control water (fish):	<0.017	<0.017
Control water (water flea):	<0.017	<0.017
100% Sample:	0.745	0.016

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control water (fish):	134	134
Control water (water flea):	75	76
100% Sample:	129	215

continued

Table 1. **Continued**. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the Anastasia Island Wastewater Treatment Plant, 860 West 16th Street, St. Augustine, St. Johns County, Florida, NPDES# FL0038831, performed from 26 to 28 February 2002.

Saltwater Tests

Facility:	**Anastasia Island WWTP**		**NPDES #**	**FL0038831**	Facility Type:	**Wastewater**	**Analysts:** Della Parker-Hanson
Location:	860 West 16th Street, St. Augustine		Contact/District:	P. O'Connor/Northeast		**Treatment Plant**	Joshua Ayres
County:	St. Johns		Test type:	static acute screen			Gary Hardie
Sample Collection Date:	2/25/02 Time: 1000		# tests:	2	Receiving Water:	Matanzas River	Marshall Faircloth
Test Beginning Date:	2/26/02 Time: 1500		Chlorination Type:	Chlorinated			
Test Ending Date:	2/28/02 Time: 1430			sample collected after dechlorination		**Page 1 of 1**	**Reviewer:** David Whiting

Organism: ***Americamysis bahia*** Life stage: 4 days

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[A]			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	7.7	8.0	8.1	24.5	23.3	23.4	6.5	6.0	6.8	30.5	32.0
Control B	0/500	5	5	5	7.7	8.0	8.1	24.5	24.3	23.3	6.5	5.8	6.7	30.9	32.3
Control C	0/500	5	5	5	7.7	8.0	8.1	24.5	24.5	23.2	6.5	5.5	6.2	31.5	28.9
Cotnrol D	0/500	5	5	5	7.7	8.0	8.1	24.6	23.4	23.2	6.5	5.6	6.3	31.4	29.1
Salt Ctrl A	0/500	5	5	5	8.4	8.3	8.2	24.6	24.3	23.2	6.6	5.6	6.3	32.2	32.7
Salt Ctrl B	0/500	5	5	5	8.4	8.3	8.2	24.7	23.8	24.2	7.0	5.6	5.5	32.1	33.4
Salt Ctrl C	0/500	5	5	5	8.4	8.3	8.2	24.7	24.9	23.5	7.1	5.5	5.5	32.2	32.2
Salt Ctrl D	0/500	5	5	5	8.4	8.3	8.2	24.8	24.0	23.2	7.2	5.3	5.9	32.2	32.5
100% A	500/0	5	5	5	8.1	8.1	8.1	24.7	25.3	23.1	7.2	4.9	5.5	32.0	32.5
100% B	500/0	5	5	5	8.1	8.1	8.1	24.6	25.8	23.1	7.2	4.8	5.6	31.7	33.0
100 % C	500/0	5	5	5	8.1	8.1	8.1	24.6	23.6	23.5	7.2	4.9	5.7	31.7	33.6
100% D	500/0	5	5	5	8.1	8.1	8.1	24.6	23.7	23.5	7.2	5.0	5.6	31.8	32.9

[A] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.0-25.5°C.
Incubator #3 temperature range for the test period was 24.5-25.5°C.

Organism: ***Menidia beryllina*** Life stage: 7 days

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[C]			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	7.6	8.1	8.1	24.6	24.5	23.5	6.4	6.2	6.9	30.0	31.2
Control B	0/500	5	5	5	7.6	8.1	8.1	24.6	24.4	23.2	6.4	6.3	6.9	31.3	31.3
Control C	0/500	5	5	5	7.6	8.1	8.1	24.6	26.3	23.4	6.5	6.0	6.9	31.4	31.4
Cotnrol D	0/500	5	5	5	7.6	8.1	8.1	24.6	23.6	23.4	6.5	5.9	6.8	31.7	31.5
Salt Ctrl A	0/500	5	5	5	8.4	8.3	8.3	24.7	23.6	23.1	6.5	6.1	6.8	32.1	32.2
Salt Ctrl B	0/500	5	5	5	8.4	8.3	8.3	24.8	24.9	23.2	6.6	6.1	6.7	32.1	31.9
Salt Ctrl C	0/500	5	5	5	8.4	8.3	8.3	24.8	25.6	23.3	6.8	5.8	6.8	32.1	31.9
Salt Ctrl D	0/500	5	5	5	8.4	8.3	8.3	24.6	23.6	23.6	7.0	5.8	6.8	31.9	31.5
100% A	500/0	5	5	5	8.1	8.2	8.2	24.5	23.3	23.9	7.1	6.1	6.8	31.8	31.7
100% B	500/0	5	5	5	8.1	8.2	8.2	24.5	25.2	23.4	7.2	5.6	6.5	31.8	31.9
100 % C	500/0	5	5	5	8.1	8.2	8.2	24.5	23.8	23.4	7.2	5.8	6.5	31.9	31.4
100% D	500/0	5	5	5	8.1	8.2	8.2	24.5	23.6	23.5	7.2	5.8	6.5	32.0	31.9

[C] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.0-25.5°C.
Incubator #3 temperature range for the test period was 24.5-25.5°C.

LIMS	
Job number:	TLH-2002-02-26-26
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Total Residual CL2	mg/L	Method
Field:	-	-
Lab:	<0.03	Hach

Ammonia	Total (mg/L)	Unionized (mg/L)
NSW	<0.017	<0.017
100% Sample:	0.745	0.016

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
NSW	172	-
100% Sample:	129	-

Salinity[C]	ppt
Mysid control:	~20
Menidia control:	~20
Mysid 100% sample:	~20
Menidia 100% sample:	~20
unadjusted 100% Sampl	<1

[C] Salinity based on conductivity and temperature.

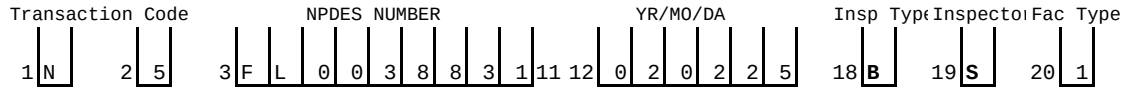
Table 2. Results of chemical analyses on the effluent from Anastasia Island Wastewater Treatment Plant sampled on February 25, 2002.

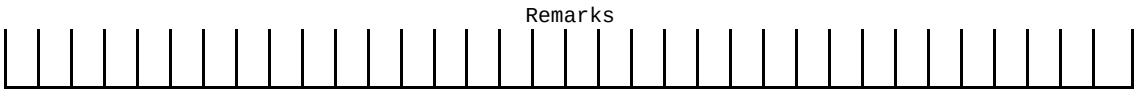
Metals			
Calcium	49.4	mg/L	
Copper	1.5	µg/L	I
Iron	81	µg/L	I
Lead	0.34	µg/L	I
Magnesium	23.3	mg/L	
Nickel	4.7	µg/L	I
Silver	0.088	µg/L	
Zinc	61.8	µg/L	
Pesticides and Herbicides			
Atrazine	0.22	µg/L	
Fonofos	0.25	µg/L	I
Base, Neutral, & Acid Extractable Organics			
None detected			
Volatile Organics			
Bromodichloromethane	3.3	µg/L	
Bromoform	0.22	µg/L	I
Chloroform	5.7	µg/L	
Dibromochloromethane	1.4	µg/L	

[I] The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

The Bioassay of the Anastasia Island Wastewater Treatment Plant effluent sampled on February 25, 2002, NPDES #FL0038831.

Fill Out This Section For All Surface Water Discharger Inspections(CEI, CSI, CBI, PAI, X

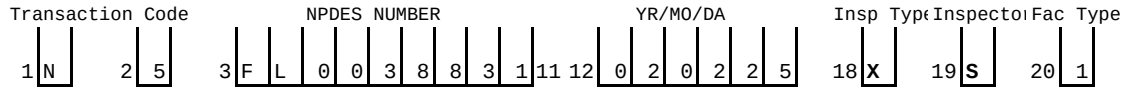


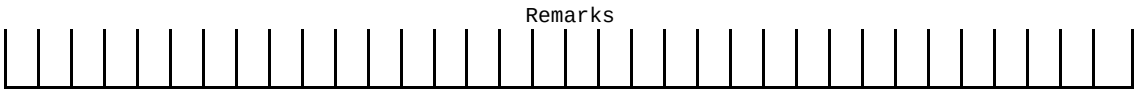


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The Priority Pollutants Analysis for the Bioassay of the Anastasia Island Wastewater Treatment Plant effluent sampled on February 25, 2002, NPDES #FL0038831.

Fill Out This Section For All Surface Water Discharger Inspections(CEI, CSI, CBI, PAI, X





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