

Bioassays of

Beverly Beach Wastewater Treatment Facility

Beverly Beach, Flagler County, Florida

NPDES #FL0039756

Sampled 3/18/02

December 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

Beverly Beach Wastewater Treatment Facility (Ocean City Utilities), Highway A1A, Beverly Beach, Flagler County, Florida, NPDES #FL0039756, tests performed on 19 to 21 March 2002.

The permitted capacity of this facility is 0.215 MGD annual average daily flow (AADF) and it has an annual average flow of 0.040 MGD (January-March 2002). The facility consists of three plants. Plant Number One consists of a 0.030 MGD (AADF) design capacity extended-aeration activated-sludge domestic wastewater treatment plant, which includes influent screening, aeration and secondary clarification. Plant Number Two is a 0.035 MGD (AADF) design capacity extended-aeration activated-sludge plant. Plant Number Three is a 0.150 MGD (AADF) design capacity contact stabilization plant. The final treated effluent from all three plants is combined and sent through filtration, chlorination, and dechlorination, and thereafter gravity fed to the Intracoastal Waterway (Class III marine waters) approximately one mile north of the intersection of SR100 and A1A. The Beverly Beach outfall line is approximately 15 feet in length, and discharges at a depth of approximately 2.5 feet (facility information provided by Jessica Weatherby, 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 collected from this facility, utilizing both fresh and saltwater species. The freshwater test species used for these bioassays were the waterflea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Cyprinella leedsi*. The saltwater species were the mysid shrimp, *Americamysis bahia*, and the inland silverside, *Menidia beryllina* (Table 1). Salinity of the effluent was adjusted with artificial sea salts to ~6ppt for *A. bahia* and ~1ppt for *M. beryllina*. A saltwater control adjusted to the test salinity was also used in each of the saltwater species bioassays.

The 100% effluent sample from the Beverly Beach WWTP showed acute toxicity to three of the four bioassay test species. Mortality was seen in the freshwater species *C. leedsi* (100% mortality), and also in both the saltwater species *A. bahia* (90% mortality), and *M. beryllina* (80% mortality). Total residual chlorine was not detected in the bioassay sample in the laboratory. Total ammonia and unionized ammonia concentrations were measured at 19.70 mg/L and 1.284 mg/L respectively. Additional samples of effluent were collected from this facility and analyzed for nutrients, metals, organic compounds, herbicides, and pesticides. Several metals as well as the pesticide Atrazine were identified (Table 2).

Conclusion

The sample of effluent collected from this facility on March 18, 2002, showed acute toxicity to three of the four test species within 48 hours. Ammonia is most likely the cause of toxicity in the sample.

Table 1. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from Beverly Beach Wastewater Treatment Plant (Ocean City Utilities), Highway A1A, Beverly Beach, Flagler County, Florida, NPDES# FL0039756, performed from 19 to 21 March 2002.

Facility:	**Beverly Beach WWTP**		**NPDES #**	**FL0039756**	Facility Type:	**Wastewater**	**Analysts:** Della Parker-Hanson
Location:	Highway A1A		Contact/District:	Weatherby/NE		**Treatment Facility**	Joshua Ayres
County:	Flagler		Test type:	static acute screen			Gary Hardie
Sample Collection Date:	3/18/2002	Time: 1110	# tests:	4	Receiving Water:	Intercoastal Waterway	Marshall Faircloth
Test Beginning Date:	3/19/2002	Time: 1430	Chlorination Type:	Chlorinated		Class III Marine	Eva Pastora
Test Ending Date:	3/20/2002	Time: 1500		Sample collected after dechlorination			
						Page 1 of 2	**Reviewer:** David Whiting

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

															Conductivity Uncorrected	
	Sample/Diluent	**SURVIVAL # Alive**			pH			Temperature[A]			Dissolved Oxygen				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	-	8.1	25.0	-	24.3	8.0	-	7.4		175	190
Control B	0/20	5	5	5	8.2	-	8.1	-	-	24.2	-	-	7.3		-	185
Control C	0/20	5	5	5	8.2	-	8.1	-	-	24.2	-	-	7.3		-	180
Control D	0/20	5	5	5	8.2	-	8.1	-	-	24.0	-	-	7.3		-	200
100% A[B]	20/0	5	5	5	8.0	-	7.9	25.8	-	24.4	8.0	-	5.7		1230	1255
100% B	20/0	5	5	5	8.0	-	7.9	-	-	24.2	-	-	5.7		-	1290
100% C	20/0	5	5	5	8.0	-	7.9	-	-	24.1	-	-	5.8		-	1310
100% D	20/0	5	5	5	8.0	-	7.9	-	-	24.0	-	-	5.8		-	1370

[A] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.0-26.5 °C.
Incubator #3 temperature range for the test period was 24.5-25.5°C.

[B] The sample was filtered due to the presence of organisms.

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

															Conductivity Uncorrected	
	Sample/Diluent	**SURVIVAL # Alive**			pH			Temperature[C]			Dissolved Oxygen				µmhos/cm	
Concentrations	Volume(mL)	0 hr	24 hr	48 hr [E]	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	-	8.0	8.3	-	26.0	25.7	-	7.8	7.2	-		270	290
Control B	0/500	5	5	-	8.0	8.3	-	26.3	25.5	-	7.6	7.0	-		270	290
Control C	0/500	5	4	-	8.0	8.3	-	26.2	25.1	-	7.6	7.1	-		275	280
Control D	0/500	5	5	-	8.0	8.3	-	25.9	25.0	-	7.7	7.5	-		270	280
100% A[D]	500/0	5	0	-	8.0	7.9	-	25.1	25.0	-	8.0	4.5	-		1240	1235
100% B	500/0	5	0	-	8.0	7.9	-	25.0	25.0	-	8.0	4.5	-		1270	1290
100 % C	500/0	5	0	-	8.0	7.9	-	25.0	24.8	-	7.7	4.5	-		1230	1280
100% D	500/0	5	0	-	8.0	8.0	-	24.9	24.7	-	7.9	4.8	-		1210	1300

[C] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.0-26.5°C.
Incubator #3 temperature range for the test period was 24.5-25.5°C.

[D] The sample was filtered due to the presence of organisms.

[E] Test terminated at 24 hr due to 100% mortality in the 100% effluent exposure treatment.

LIMS	
Job number:	TLH-2002-03-19-25
sample number:	582782

Data Transcription Verification	
date:	9/25/2002
by:	Joshua Ayres
	Christa Pierini

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:	19.70	1.284

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control water (fish):	144	134
Control water (water flea):	90	80
100% Sample:	235	149

Table 1. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from Beverly Beach Waste Water Treatment Plant (Ocean City Utilities), Highway A1A, Beverly Beach, Flagler County, Florida, NPDES# FL0039756, performed from 19 to 21 March 2002.

Facility:	**Beverly Beach WWTP**		**NPDES #**	**FL0039756**	Facility Type:	**Wastewater**	**Analysts:** Della Parker-Hanson
Location:	Highway A1A		Contact/District:	Weatherby/NE		**Treatment Facility**	Joshua Ayres
County:	Flagler		Test type:	static acute screen			Gary Hardie
Sample Collection Date:	3/18/2002	Time: 1110	# tests:	4	Receiving Water:	Intercoastal Waterway	Marshall Faircloth
Test Beginning Date:	3/19/2002	Time: 1600	Chlorination Type:	Chlorinated		Class III Marine	
Test Ending Date:	3/20/2002	Time: 1540		Sample collected after dechlorination			
						Page 2 of 2	**Reviewer:** David Whiting

Organism: ***Americamysis bahia*** Life stage: 3 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	7.8	8.0	8.4	24.4	24.8	24.1	7.4	6.3	7.3	10	11
Control B	0/500	5	5	5	7.8	8.0	8.4	24.4	24.8	24.4	7.3	6.3	7.4	10	11
Control C	0/500	5	5	5	7.8	8.0	8.4	24.4	24.7	25.4	7.4	6.4	7.1	10	11
Control D	0/500	5	5	5	7.8	8.0	8.4	24.3	24.6	25.3	7.3	6.4	7.1	10	11
Salt Control A	0/500	5	5	5	8.1	8.1	8.4	24.2	24.6	25.0	7.4	6.4	7.2	10	11
Salt Control B	0/500	5	5	5	8.1	8.1	8.4	24.1	24.7	24.7	7.4	6.4	7.2	10	11
Salt Control C	0/500	5	5	5	8.1	8.1	8.4	24.0	24.6	25.9	7.4	6.4	6.9	10	12
Salt Control D	0/500	5	5	5	8.1	8.1	8.3	24.0	24.6	26.1	7.4	6.4	6.9	10	12
100% A [B,C]	500/0	5	2	1	8.0	8.0	8.4	24.9	24.7	24.6	7.4	4.2	7.0	10	11
100% B	500/0	5	2	0	8.0	8.0	8.4	25.0	24.8	24.8	7.4	4.4	7.1	10	11
100% C	500/0	5	2	1	8.0	8.0	8.2	25.1	24.9	25.8	7.3	4.4	6.2	10	11
100% D	500/0	5	0	-	8.0	8.0	-	25.1	24.9	-	7.5	4.5	-	10	-

[A] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.0-26.5 °C.
Incubator #3 temperature range for the test period was 24.5-25.5°C.

[B] The sample was salt adjusted to ~6ppt with fourty fathoms artificial sea salts.
[C] The sample was filtered due to the presence of organisms.

Organism: ***Menidia beryllina*** Life stage: 13 days

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[D]			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	8.1	8.2	24.4	25.0	24.2	7.5	6.8	6.8	2	2
Control B	0/500	5	5	5	7.9	8.1	8.2	24.5	25.0	24.0	7.5	6.8	7.0	2	2
Control C	0/500	5	5	5	7.9	8.1	8.3	24.5	25.0	24.0	7.6	6.8	6.9	2	2
Control D	0/500	5	5	5	7.9	8.1	8.3	24.5	24.8	24.2	7.5	6.7	7.0	2	2
Salt Control A	0/500	5	5	5	8.0	8.2	8.3	24.5	24.8	24.3	7.7	6.9	6.9	2	2
Salt Control B	0/500	5	5	5	8.0	8.2	8.3	24.6	24.9	24.2	7.7	6.9	6.9	2	2
Salt Control C	0/500	5	5	5	8.0	8.2	8.3	24.5	24.8	24.2	7.8	6.9	7.0	2	2
Salt Control D	0/500	5	5	5	8.0	8.2	8.3	24.4	24.9	24.1	7.6	6.9	6.9	2	2
100% A [E,F]	500/0	5	2	1	7.9	8.1	7.8	24.6	24.9	23.9	7.7	5.5	4.8	2	3
100% B	500/0	5	2	1	7.9	8.1	7.8	25.0	24.9	24.1	7.7	5.6	4.5	2	3
100 % C	500/0	5	2	2	7.9	8.1	7.8	25.0	24.9	24.1	7.7	5.5	4.4	2	3
100% D	500/0	5	1	0	7.9	8.1	7.8	25.0	24.9	24.1	7.6	5.4	4.5	2	3

[D] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.0-26.5°C.
Incubator #3 temperature range for the test period was 24.5-25.5°C.

[E] The sample was salt adjusted to ~1ppt with fourty fathoms artificial sea salts.
[F] The sample was filtered due to the presence of organisms.

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date:	9/25/2002
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	Christa Pierini

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

Ammonia	Total (mg/L)	Unionized (mg/L)
Control water :	<0.051	<0.051
100% Sample:	19.70	1.234

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control water:	159	-
100% Sample:	235	-

Salinity [G]	ppt
Mysid control:	6
Menidia control:	1
Mysid 100% sample:	6
Menidia 100% sample:	1
unadjusted 100% sample:	<1

[G] Salinity based on conductivity and temperature.

Table 2. Results of chemical analyses on the effluent from Beverly Beach Waste Water Treatment Plant (Ocean City Utilities) sampled on March 18, 2002.

Metals

Aluminum_308	75	ug/L	[I]
Calcium	0.1	mg/L	[A]
Copper	0.75	ug/L	[I]
Iron_271	35	ug/L	[I]
Lead	0.3	ug/L	[I]
Magnesium	0.025	mg/L	[A]
Zinc	2	ug/L	[A]

Pesticides and Herbicides

Atrazine	0.12	ug/L	[I]

Base, Neutral, & Acid Extractable Organics

None detected

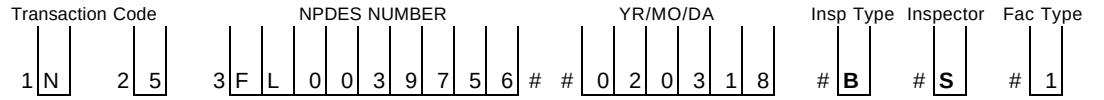
Nutrients

Total Kjeldahl Nitrogen	25	mg N/L	[A]
Total Phosphorous	8	mg P/L	[A]
Ammonia as Nitrogen	20	mg N/L	
Nitrates and Nitrites	4.1	mg N/L	
Ortho-phosphate	7.6	mg P/L	

[I] The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
[A] The reported value is an average of two values.

The Bioassay of Beverly Beach Wastewater Treatment Plant (Ocean City Utilities) effluent sampled on March 18, 2002, NPDES #FL0039756.

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



Remarks

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The Priority Pollutants Analysis for Bioassay of Beverly Beach Wastewater Treatment Plant (Ocean City Utilities) effluent sampled on March 18, 2002, NPDES #FL0039756.

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



Remarks

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