

Bioassays of

Beverly Beach Wastewater Treatment Facility

Bunnell, Flagler County, Florida

NPDES #FL0039759

Sampled 3/20/00

January 2001

Biology Section

Division of Resource Assessment & Management

Comprehensive Quality Assurance Plan #870346G

Bioassays of

Beverly Beach Wastewater Treatment Facility

Bunnell, Flagler County, Florida

NPDES #FL0039759

Biology Section
Bureau of Laboratories
January 20001

Introduction

Beverly Beach WWTF, Highway A1A, Bunnell, Flagler County, Florida, NPDES # FL0039759, tests performed on 21 to 23 March 2000.

This wastewater treatment facility has a permitted flow of 0.215 MGD and an average flow of 0.037 MGD. This facility consists of three plants that operate in parallel. Plant Number One is a 0.03 MGD design flow extended-aeration/activated-sludge wastewater treatment plant. Treatment at this plant includes screening, aeration, and secondary clarification. Plant Number Two is a 0.035 MGD design capacity extended-aeration/activated-sludge wastewater treatment plant. Plant Number Three is a 0.150 MGD design capacity contact-stabilization plant. Final effluents from all three plants are combined and then treated by filtration, chlorination for disinfection, dechlorination, and aeration before discharge into the Intracoastal Waterway approximately one mile North of the intersection of SR100 and A1A.

Previous inspections by the FDEP have noted numerous effluent violations as well as operational problems at this facility. These problems were thought to be the result of the release of formaldehyde or antifreeze from RV camper holding tanks into the influent streams of the treatment plants. The facility also receives reject brine from a reverse-osmosis water plant. The owner and operator are currently finalizing a proposed pretreatment process to deal permanently with the plant upsets and effluent violations (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 two 48-hour static acute definitive toxicity bioassays on a sample of effluent collected from the point of discharge of this facility into the Intracoastal Waterway. The test organisms used for these bioassays were the waterflea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Cyprinella leedsi*. At the request of Northeast District personnel, four additional bioassays were performed on salinity-adjusted aliquots of the effluent sample. The saltwater test species, the mysid shrimp, *Americamysis bahia*, and the fish, the inland silverside minnow, *Menidia beryllina*, were the test organisms used for the salinity-adjusted bioassays. Two of the bioassays were performed using aliquots of sample having the salinity adjusted to the minimum salinity tolerance of the test species (1 ppt for *M. beryllina* and 6 ppt for *A. bahia*). The other two bioassays were performed at a salinity of 20 ppt.

The salinity adjustment of the sample aliquots used for the saltwater tests was accomplished by the addition of Forty Fathoms® artificial seasalts. Two sets of controls were used with each saltwater test. One set of controls was prepared by diluting natural seawater (NSW) with well water to the appropriate test salinity. The "salt controls" were prepared by diluting NSW with well water to match the apparent salinity of the effluent (1.2 ppt) and then adding Forty Fathoms® artificial seasalts to match the salinity of each particular test. The purpose of the "salt control"

was to test for possible toxic effects of adding artificial seasalts to the sample. No mortality was observed in any of the freshwater or saltwater bioassay controls.

The test results indicated that the sample was toxic to all four of the test species, producing 100% mortality in the 100% sample concentrations of all tests within 15 minutes of test initiation in the *Cyprinella leedsi* test (Table 1), 24 hours in each of the saltwater bioassays (Table 2 and Table 3), and 48-hours in the *Ceriodaphnia dubia* test (Table 1).

Total residual chlorine of the 100% whole-effluent sample was 0.68 mg/L in the field and was 0.11 mg/L in the laboratory. The respective total and unionized ammonia concentrations in the bioassay sample were 44.9 mg/L and 2.81 mg/L. The total ammonia in the sample submitted for chemical analyses was 42 mg/L. Unionized ammonia levels as low as 0.08 mg/L and 0.5 mg/L have been found to be acutely toxic to some freshwater fish and invertebrates, respectively (EPA *Quality Criteria for Water 1986*, EPA 44015-86-001, 1986). The unionized ammonia concentration substantially exceeded the concentrations reported to have produced 48-hour LC_{50}'s in *Americamysis bahia* (~1.0 mg/L) and *Menidia beryllina* (~0.9 mg/L) (D.C. Miller *et al.* 1990, The *Acute and Chronic Toxicity of Ammonia to Marine Fish and Invertebrates*, Archives of Environmental Contamination and Toxicology 19: 40–48).

Further chemical analyses were performed on the sample and several metals and the herbicide, Atrazine, were identified (Table 4). The copper (10 µg/L) concentration in the sample exceeded the State of Florida Class III marine surface water criterion for copper of ≤2.9 µg/L (FAC 62-302.530).

Conclusion

The sample of effluent collected from this facility on 20 March 2000, was acutely toxic to both the freshwater and saltwater test species. We primarily attribute the toxicity of the sample to the unionized ammonia concentration in the sample and secondarily to possible unidentified constituents in the sample. The copper concentration in the sample exceeded the State of Florida Class III marine surface water criterion for copper.

Table 1. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the Beverly Beach WWTF, Bunnell, Flagler County, Florida, NPDES Permit #FL0039759, performed on 21 to 23 March 2000.

FRESHWATER TESTS

Facility:	Beverly Beach WWTP	NPDES #	FL0039759	Facility Type:	Wastewater
Location:	Highway A1A, Bunnell	Contact/District:	Jeff Martin/Northeast District		Treatment Facility
County:	Flagler	Test type:	static acute screen	Receiving Water:	Intracoastal Waterway
Sample Collection Date:	3/20/00 Time: 1110	# tests:	2		east shore, one mile North of the
Test Beginning Date:	3/21/00 Time: 1335	Chlorination Type:	chlorinated		intersection of SR 100 and A1A.
Test Ending Date:	3/23/00 Time: 1400		Sample collected after plant dechlorination unit		Page 1 of 1

Total Residual CL2	mg/L	Method
100% sample Field:	0.68	-
100% sample Lab:	0.11	DR-100

Ammonia	Total (mg/L)	Unionized (mg/L)
Control Water (fish):	<0.017	<0.017
Control Water (20% DMW) (cladocerans):	<0.017	<0.017
100% Sample:	44.9	2.28

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (fish):	145	133
Control Water (20% DMW) (cladocerans):	79	76
100% Sample:	357	315

Salinity[C]	(ppt) estimated
Control Water (fish):	0
Control Water (20% DMW) (cladocerans):	0
100% Sample:	1.2

[C]Salinity based on conductivity and temperature measurements.

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

Concentrations	Sample/Diluent Volume(mL)	SURVIVAL # Alive 0 hr	24 hr	48 hr	pH 0 hour	24 hour	48 hour	Temperature[A] 0 hour	24 hour	48 hour	Dissolved Oxygen 0 hour	24 hour	48 hour	Conductivity umhos/cm 0 hour	48 hour
Control A	0/20	5	5	5	8.4	-	7.7	25.2	-	23.9	8.9	-	8.1	175	205
Control B	0/20	5	5	5	-	-	7.8	-	-	23.9	-	-	8.0	-	200
Control C	0/20	5	5	5	-	-	7.9	-	-	23.9	-	-	7.9	-	200
Control D	0/20	5	5	5	-	-	8.0	-	-	23.9	-	-	7.9	-	200
100% A	20/0	5	1	0	8.0	-	8.4	25.1	-	23.9	7.4	-	7.8	2410	2810
100% B	20/0	5	3	0	-	-	8.4	-	-	23.8	-	-	7.9	-	3050
100% C	20/0	5	1	0	-	-	8.5	-	-	23.8	-	-	8.0	-	2980
100% D	20/0	5	2	0	-	-	8.4	-	-	23.8	-	-	8.0	-	3080

[A] Temperature of test incubator #2 and test room were continuously recorded on strip chart recorders.
Incubator #2 temperature range for the test period was 25.5-26.0°C.
Test room temperature range for the test period was 24.5-26.0°C.

Organism: *Cyprinella leedsi* Age: 11 days

Concentrations	Sample/Diluent Volume(mL)	SURVIVAL # Alive 0 hr	0 hr 15 Min	48 hr	pH 0 hour	24 hour	48 hour	Temperature[B] 0 hour	24 hour	48 hour	Dissolved Oxygen 0 hour	24 hour	48 hour	Conductivity umhos/cm 0 hour	48 hour
Control A	0/500	5	5	-	7.7	-	-	25.5	-	-	7.5	-	-	300	-
Control B	0/500	5	5	-	7.7	-	-	24.9	-	-	7.8	-	-	265	-
Control C	0/500	5	5	-	7.8	-	-	24.6	-	-	8.0	-	-	260	-
Control D	0/500	5	5	-	7.8	-	-	24.4	-	-	8.1	-	-	260	-
100% A	500/0	5	0*	-	7.9	-	-	25.0	-	-	6.8	-	-	2230	-
100% B	500/0	5	0*	-	7.9	-	-	24.9	-	-	6.9	-	-	2440	-
100% C	500/0	5	0*	-	8.0	-	-	24.7	-	-	6.7	-	-	2370	-
100% D	500/0	5	0*	-	8.0	-	-	24.5	-	-	6.8	-	-	2440	-

*Test organisms dead within 15 minutes of loading into sample.

[B] Temperature of test incubator #3 and test room were continuously recorded on strip chart recorders.
Incubator #3 temperature range for the test period was 24.5-26.5°C.
Test room temperature range for the test period was 24.5-26.0°C.

Table 2. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the Beverly Beach WWTF, Bunnell, Flagler County, Florida, NPDES Permit #FL0039759, performed on 21 to 22 March 2000.

SALTWATER TESTS

Facility:	Beverly Beach WWTP	NPDES #	FL0039759	Facility Type:	Wastewater Treatment Facility
Location:	Highway A1A, Bunnell	Contact/District:	Jeff Martin/Northeast District		
County:	Flagler	Test type:	static acute screen	Receiving Water:	Intracoastal Waterway
Sample Collection Date:	3/20/00 Time: 1110	# tests:	2		east shore, one mile North of the
Test Beginning Date:	3/21/00 Time: 1335	Chlornation Type:	chlorinated		intersection of SR 100 and A1A.
Test Ending Date:	3/22/00 Time: 1330		Sample collected after plant dechlorination unit		Page 1 of 1

Total Residual CL2	mg/L	Method
100% sample Field:	0.68	-
100% sample Lab:	0.11	DR-100

Ammonia	Total (mg/L)	Unionized (mg/L)
Control Water (7 ppt):	<0.017	<0.017
Control Water (20 ppt):	<0.034	<0.034
Salted sample(7 ppt):	44.9	2.72
Salted sample(20 ppt):	44.9	2.48
100% Sample (1.2 ppt):	44.9	2.81

Organism: *Americamysis bahia* Life stage: 3 days

7 ppt	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[A]			Dissolved Oxygen			Conductivity 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	-	7.5	8.2	-	24.3	25.9	-	8.2	7.9	-	10.8	10.0
Control B	0/500	5	5	-	7.7	8.3	-	24.1	25.9	-	8.2	7.8	-	11.8	10.7
Control C	0/500	5	5	-	7.8	8.3	-	24.0	25.8	-	8.2	7.8	-	12.4	10.8
Control D	0/500	5	5	-	7.8	8.3	-	23.9	24.5	-	8.3	7.6	-	12.5	10.4
Control A[B]	0/500	5	5	-	8.3	8.4	-	24.5	24.1	-	7.5	7.9	-	10.8	11.5
Control B[B]	0/500	5	5	-	8.3	8.3	-	24.8	24.0	-	7.8	8.0	-	10.6	12.1
Control C[B]	0/500	5	5	-	8.3	8.3	-	24.8	24.6	-	7.9	8.0	-	10.5	12.4
Control D[B]	0/500	5	5	-	8.3	8.3	-	24.8	24.5	-	7.9	7.7	-	10.6	12.4
100% A[C]	500/0	5	0	-	8.0	8.2	-	24.2	25.1	-	8.4	7.2	-	11.9	12.1
100% B[C]	500/0	5	0	-	8.0	8.2	-	24.4	25.3	-	7.9	7.0	-	11.7	11.7
100% C[C]	500/0	5	0	-	8.0	8.2	-	24.4	25.3	-	7.8	6.6	-	11.6	11.7
100% D[C]	500/0	5	0	-	8.0	8.2	-	24.5	24.3	-	7.8	6.7	-	11.6	11.7

[B] Salt added control.

[C] Salt added sample.

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (7 ppt):	-	-
Control Water (20 ppt):	-	-
Salted sample(7 ppt):	-	-
Salted sample(20 ppt):	-	-
100% Sample (1.2 ppt):	357	315

Salinity[D]	(ppt) estimated
Control Water (7 ppt):	7
Control Water (20 ppt):	17.8
Salted sample(7 ppt):	7
Salted sample(20 ppt):	18.8
100% Sample (1.2 ppt):	1

[D] Salinity based on conductivity and temperature measurements.

Organism: *Americamysis bahia* Age: 3 days

20 ppt	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[A]			Dissolved Oxygen			Conductivity 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	-	7.5	8.1	-	24.6	24.4	-	7.7	7.2	-	28.3	29.2
Control B	0/500	5	5	-	7.7	8.2	-	24.7	24.6	-	7.7	7.5	-	29.2	30.2
Control C	0/500	5	5	-	7.8	8.1	-	24.6	24.8	-	7.6	7.2	-	28.9	30.8
Control D	0/500	5	4	-	7.8	8.1	-	24.4	24.8	-	7.6	7.3	-	28.9	30.6
Control A[B]	0/500	5	5	-	8.5	8.4	-	24.8	24.8	-	7.6	7.6	-	27.2	30.0
Control B[B]	0/500	5	4	-	8.5	8.4	-	24.8	24.8	-	7.6	7.6	-	27.8	29.2
Control C[B]	0/500	5	5	-	8.5	8.5	-	24.7	24.5	-	7.6	7.6	-	27.9	28.9
Control D[B]	0/500	5	5	-	8.5	8.4	-	24.6	24.3	-	7.5	7.9	-	27.4	29.1
100% A[C]	500/0	5	0	-	8.1	8.1	-	24.8	24.5	-	7.3	6.6	-	30.2	32.4
100% B[C]	500/0	5	0	-	8.1	8.2	-	24.8	24.4	-	7.0	6.1	-	31.0	32.0
100% C[C]	500/0	5	0	-	8.1	8.2	-	24.6	24.4	-	7.0	6.2	-	29.9	31.9
100% D[C]	500/0	5	0	-	8.1	8.2	-	24.5	24.7	-	7.0	6.2	-	30.5	32.6

[B] Salt added control.

[C] Salt added sample.

[A] Temperature of test incubator #3 and test room were continuously recorded on strip chart recorders.
Incubator #3 temperature range for the test period was 24.5-26.5°C.
Test room temperature range for the test period was 24.5-26.0°C.

Table 3. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the Beverly Beach WWTF, Bunnell, Flagler County, Florida, NPDES Permit #FL0039759, performed on 21 to 22 March 2000.

SALTWATER TESTS

Facility:	Beverly Beach WWTP			NPDES #	FL0039759	Facility Type:	Wastewater
Location:	Highway A1A, Bunnell			Contact/District:	Jeff Martin/Northeast District		Treatment Facility
County:	Flagler			Test type:	static acute screen	Receiving Water:	Intracoastal Waterway
Sample Collection Date:	3/20/00	Time:	1110	# tests:	2		east shore, one mile North of the intersection
Test Beginning Date:	3/21/00	Time:	1335	Chlorination Type:	chlorinated		of SR 100 and A1A
Test Ending Date:	3/22/00	Time:	1500		Sample collected after plant dechlorination unit		Page 1 of 1

Total Residual CL2	mg/L	Method
100% sample Field:	0.68	-
100% sample Lab:	0.11	DR-100

Ammonia	Total (mg/L)	Unionized (mg/L)
Control Water (2 ppt):	<0.017	<0.017
Control Water (20 ppt):	<0.034	<0.034
Salted sample(2 ppt):	44.9	2.72
Salted sample(20 ppt):	44.9	2.48
100% Sample (1.2 ppt):	44.9	2.81

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (2 ppt):	-	-
Control Water (20 ppt):	-	-
Salted sample(2 ppt):	-	-
Salted sample(20 ppt):	-	-
100% Sample (1.2 ppt):	357	315

Salinity[D]	(ppt) estimated
Control Water (2 ppt):	2
Control Water (20 ppt):	17.7
Salted sample(2 ppt):	2
Salted sample(20 ppt):	18.8
100% Sample (1.2 ppt):	1

[D] Salinity based on conductivity and temperature measurements.

Organism: *Menidia beryllina* Life stage: 12 days

2 ppt	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[A]			Dissolved Oxygen			Conductivity 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	-	8.0	8.0	-	24.6	25.0	-	8.4	8.4	-	3.03	2.74
Control B	0/500	5	5	-	8.0	8.2	-	24.2	25.5	-	8.2	8.4	-	2.88	2.91
Control C	0/500	5	5	-	8.0	8.2	-	24.0	25.5	-	8.3	8.4	-	2.91	2.90
Control D	0/500	5	5	-	8.0	8.2	-	23.9	25.5	-	8.3	8.4	-	2.88	2.95
Control A[B]	0/500	5	5	-	8.1	8.2	-	24.8	24.0	-	8.2	8.1	-	3.32	4.57
Control B[B]	0/500	5	5	-	8.1	8.2	-	24.7	23.8	-	8.1	8.0	-	3.20	3.88
Control C[B]	0/500	5	5	-	8.1	8.2	-	24.7	23.7	-	8.1	7.5	-	3.68	3.91
Control D[B]	0/500	5	5	-	8.1	8.2	-	24.7	23.9	-	8.1	7.5	-	3.66	3.79
100% A[C]	500/0	5	0	-	7.9	8.3	-	24.2	24.9	-	8.4	8.4	-	3.56	3.66
100% B[C]	500/0	5	0	-	7.9	8.2	-	24.5	25.1	-	8.0	8.3	-	3.58	3.62
100% C[C]	500/0	5	0	-	7.9	8.2	-	24.6	25.2	-	7.8	7.5	-	3.59	3.58
100% D[C]	500/0	5	0	-	7.9	8.2	-	24.7	24.2	-	7.7	7.5	-	3.63	3.57

[B] Salt added control.

[C] Salt added sample.

Organism: *Menidia beryllina* Age: 12 days

20 ppt	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[A]			Dissolved Oxygen			Conductivity 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	-	8.1	8.2	-	24.5	25.0	-	7.6	7.2	-	28.5	31.2
Control B	0/500	5	5	-	8.1	8.2	-	24.5	24.5	-	7.8	7.2	-	28.8	30.2
Control C	0/500	5	5	-	8.1	8.2	-	24.3	24.3	-	7.9	7.1	-	28.7	30.3
Control D	0/500	5	5	-	8.1	8.2	-	24.2	24.4	-	8.0	7.0	-	28.8	30.3
Control A[B]	0/500	5	5	-	8.5	8.5	-	24.2	24.6	-	7.8	6.0	-	26.5	28.2
Control B[B]	0/500	5	5	-	8.5	8.5	-	24.3	24.5	-	7.9	6.5	-	26.7	28.0
Control C[B]	0/500	5	5	-	8.5	8.5	-	24.0	24.3	-	7.9	6.6	-	26.6	28.0
Control D[B]	0/500	5	5	-	8.5	8.5	-	23.9	24.2	-	7.9	6.7	-	26.8	28.0
100% A[C]	500/0	5	0	-	8.1	8.2	-	24.8	24.4	-	7.3	6.7	-	30.2	31.4
100% B[C]	500/0	5	0	-	8.1	8.2	-	24.8	24.3	-	7.4	6.5	-	30.3	31.2
100% C[C]	500/0	5	0	-	8.1	8.2	-	24.6	24.2	-	7.4	6.3	-	30.4	31.8
100% D[C]	500/0	5	0	-	8.1	8.2	-	24.4	24.5	-	7.4	6.0	-	30.2	31.6

[B] Salt added control.

[C] Salt added sample.

[A] Temperature of test incubator #3 and test room were continuously recorded on strip chart recorders.

Incubator #3 temperature range for the test period was 24.5-26.5°C.

Test room temperature range for the test period was 24.5-26.0°C.

Table 4. Results of chemical analyses on the sample of effluent from the Beverly Beach WWTF sampled on March 20, 2000.

Metals

Aluminum	170	µg/L[I]
Calcium	83.0	mg/L[A]
Chromium	11.8	µg/L[AJ]
Copper	10	µg/L
Iron	139	µg/L[A]
Lead	0.51	µg/L[I]
Magnesium	28.4	mg/L[A]
Nickel	2.8	µg/L[I]
Selenium	1.3	µg/L[I]
Zinc	26	µg/L[I]

Base, Neutral, and Acid Extractable Organics

None detected

Nutrients

Ammonia-N	42	mg/L
Nitrite-Nitrate-N	0.24	mg/L[J]
Total Kjeldahl-N	51	mg/L
Total Phosphorus	8.5	mg/L

Herbicides/Pesticides

Atrazine	0.28	µg/L

[A] Value reported is the mean of two or more determinations.

[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: Beverly WWTP
County: Flagler
Contact / District: Lee Banks / Jeff Martin / NE-D1ST
NPDES Permit #: FL0039759
LIMS Sample #: 44258 LIMS Job #: TLH2000-03-21-16-07
sample log 4/2/00
Test Type: ~~Screening~~ / Definitive
(Static) / Static Renewal / Flow-through
Test Number: 1 of 4

Remarks:

Sample Collection: Date 3/20/00 Time 1110
Test Beginning: Date 3/21/00 Time 1335
Test Ending: Date 3/23/00 Time 1400
Organism Batch #: 13 Diluent Batch #: 8
Organism Age: 24hrs. SRT toxicant batch #: —
Test organism: C. dubia

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
control	A	5	5	5	8.4	—	7.7	25.2	—	23.9	8.9	—	8.1	175	—	205
	B	5	5	5	—	—	7.8	—	—	23.9	—	—	8.0	—	—	200
	C	5	5	5	—	—	7.9	—	—	23.9	—	—	7.9	—	—	200
	D	5	5	5	—	—	8.0	—	—	23.9	—	—	7.9	—	—	200
100%	A	5	1 4D	0	8.0	—	8.4	25.1	—	23.9	7.4	—	7.8	2410	—	2810
	B	5	3 2D	0	—	—	8.4	—	—	23.8	—	—	7.9	—	—	3050
	C	5	1 4D	0	—	—	8.5	—	—	23.8	—	—	8.0	—	—	2980
	D	5	2 3D	0	—	—	8.4	—	—	23.8	—	—	8.0	—	—	3080
measured by:		SG	SG	SG	SG	—	DPH	SG	—	DPH	SG	—	DPH	SG	—	DPH
recorded by:		DPH	SG	SG	SG	—	SG	SG	—	SG	SG	—	SG	SG	—	SG

Investigators' Signatures
Shannon Gerard
Della Parker Florida

Temperature Range °C
Incubator # 2 25.5°-26.0°C
Room 3246 24.5°-26.0°C

Salt Water / Well Water / 20% Min Water

Water Quality Parameters	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):				
Lab Total Residual Cl2 (mg/L):	0.11	DR100	DPH	SG
Alkalinity (mg/L as $CaCO_3$):	357	Hach	SG	SG
Hardness (mg/L as $CaCO_3$):	315	Hach	SG	SG
Total ammonia (mg/L as N):	44.9	Denver	DPH	SG
Salinity:	~1	Ysi	DPH	SG

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form updated 3/3/99

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Beverly WWTP
County: Flagler
Contact / District: Lee Banks / Jeff Marston / NE-DIST
NPDES Permit #: FL0039759
LIMS Sample #: 442158 LIMS Job #: RH2000-03-21-1600
sample log 4/1/00
Test Type: Screening / Definitive
Static / Static Renewal / Flow-through
Test Number: 2 of 4

Sample Collection: Date 3/20/00 Time 1110
Test Beginning: Date 3/21/00 Time 1300
Test Ending: Date 3/28/00 Time 1315
Organism Batch #: 20 21 Diluent Batch #: Well
Organism Age: 11 days SRT toxicant batch #: —
Test organism: C. leedsi

Remarks: * Wrong. Also DPH 3/21/00 Sample ~~within~~ dead 3/21/00 Test Organisms in 100% Sample dead within 15minutes of Test. Test Terminated

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
CONT. A	B17	5	—	—	7.7	7.5	—	25.5	—	—	7.5	—	—	300	—	—
B	B18	5	—	—	7.7	7.8	—	24.9	—	—	7.8	—	—	265	—	—
C	B19	5	—	—	7.9	8.0	—	24.6	—	—	8.0	—	—	260	—	—
D	B20	5	—	—	7.8	8.1	—	24.4	—	—	8.1	—	—	260	—	—
100% A	B21	5	—	—	7.9	6.8	—	25.0	—	—	6.8	—	—	2230	—	—
B	B22	5	—	—	7.9	6.9	—	24.9	—	—	6.9	—	—	2440	—	—
C	B23	5	—	—	8.0	6.7	—	24.7	—	—	6.7	—	—	2370	—	—
D	B24	5	—	—	8.0	6.8	—	24.5	—	—	6.8	—	—	2440	—	—
measured by:		DPH	—	—	DPH	—	—	DPH	—	—	DPH	—	—	DPH	—	—
recorded by:		SG	—	—	DPH	—	—	DPH	—	—	DPH	—	—	DPH	—	—

Investigators' Signatures
Shannon Gerard
Della Parker-Hansen

Temperature Range °C
Incubator # B 24.5°-26.5°C
Room B246 24.5°-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):						
Lab Total Residual Cl2 (mg/L):	<0.03		0.11	DR100	DPH	SG
Alkalinity (mg/L as $CaCO_3$):	145		357	Hach	SG	SG
Hardness (mg/L as $CaCO_3$):	153		315	Hach	SG	SG
Total ammonia (mg/L as N):	<0.017		44.9	Denver	DPH	SG
Salinity:	0		~1.2	YSI	DPH	SG

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form updated 3/3/99

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Beverly WWTP 20ppt/1ppt
County: Flagler
Contact / District: Lee Banks / Jeff Martin / NE-DIST
NPDES Permit #: FL0039759
LIMS Sample #: 442158 **LIMS Job #:** TLH-2000-03-21-16-01
sample log 4/5/00
Test Type: Screening | Definitive
(Static) | Static Renewal | Flow-through
Test Number: 3 of 4

Sample Collection: Date 3/20/00 Time 1110
Test Beginning: Date 3/21/00 Time 1530
Test Ending: Date 3/23/00 Time 1330
Organism Batch #: 78 **Diluent Batch #:** NSW/ASW #13
Organism Age: 3 days SRT toxicant batch #: —
Test organism: A. bahia

Remarks:
* Test terminated @ 24 hrs. 100% mortality.

		Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm)		
Conc.	Chamber #	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h
CONT. A	B1	5	5	-	7.5	8.1		24.6	24.4		7.7	7.2		28.3	29.2	
B	B2	5	5	-	7.7	8.2		24.7	24.6		7.7	7.5		29.2	32.2	
C	B3	5	5	-	7.8	8.4		24.6	24.8		7.6	7.2		28.9	30.8	
D	B4	5	4/M	-	7.8	8.1		24.4	24.8		7.6	7.3		28.9	30.62	
100% A	B5	5	0 SD	-	~~7.8~~ 8.1	8.1		24.8	24.5		7.3	6.6		30.2	32.4	
B	B6	5	0 SD	-	8.1	8.2		24.8	24.4		7.0	6.1		31.0	32.0	
C	B7	5	0 SD	-	8.1	8.2		24.6	24.4		7.0	6.2		29.9	31.9	
D	B8	5	0 SD	-	8.1	8.2		24.5	24.7		7.0	6.2		30.5	32.6	
CONT. A	C9	5	5	-	7.5	8.2		24.3	25.9		8.2	7.9		10.8	10.02	
B	C10	5	5	-	7.7	8.3		24.1	25.9		8.2	7.8		11.8	10.73	
C	C11	5	5	-	7.8	8.3		24.0	25.8		8.2	7.8		12.4	10.75	
D	C12	5	5	-	7.8	8.3		23.9	24.5		8.3	7.6		12.5	10.35	
100% A	C13	5	0 SD	-	8.0	8.2		24.2	25.1		8.4	7.2		11.9	12.10	
B	C14	5	0 SD	-	8.0	8.2		24.4	25.3		7.9	7.0		11.7	11.71	
C	C15	5	0 SD	-	8.0	8.2		24.4	25.3		7.8	6.6		11.4	11.66	
D	C16	5	0 SD	-	8.0	8.2		24.5	24.3		7.8	6.7		11.6	11.73	
SALT CTRL A	E1	5	5	-	8.5	8.4		24.8	24.8		7.6	7.6		27.2	30.0	
B	E2	5	4/M	-	8.5	8.4		24.8	24.8		7.6	7.6		27.8	29.2	
C	E3	5	5	-	8.5	8.5		24.7	24.5		7.6	7.6		27.9	28.9	
D	E4	5	5	-	8.5	8.4		24.6	24.3		7.5	7.9		27.4	29.1	
SALT CTRL A	C21	5	5	-	8.3	8.4		24.5	24.1		7.5	7.9		10.8	11.46	
B	C22	5	5	-	8.3	8.3		24.8	24.0		7.8	8.0		10.4	12.12	
C	C23	5	5	-	8.3	8.3		24.8	24.6		7.9	8.0		10.5	12.38	
D	C24	5	5	-	8.3	8.3		24.8	24.5		7.9	7.7		10.6	12.40	
measured by:		SG/MF	SG		SG	DPH		SG	DPH		SG	DPH		SG	DPH	
recorded by:		SG/DPH	SG		SG	DPH		SG	DPH		SG	DPH		SG	DPH	

Investigators' Signatures
Shannon Berard
Debbie Parker Flynn
Marshall Faircloth

Temperature Range °C
Incubator # 3 24.5°-26.5°C
Room 6346 24.5°-26.0°C

ASW #13 Salt Water

Water Quality Parameters	Well Water	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):						
Lab Total Residual Cl2 (mg/L):	<0.03		1.11	DR100	DPH	SG
Alkalinity (mg/L as $CaCO_3$):	200		357	Hach	SG	SG
Hardness (mg/L as $CaCO_3$):	—		315	Hach	SG	SG
Total ammonia (mg/L as N):	<0.017		44.9	Denver	DPH	SG
Salinity:	20		~1.2	YSI	DPH	SG

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form updated 3/3/99

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Beverly WWTP 20ppt / 1ppt
County: Flagler
Contact / District: Lee Banks / Jeff Martin / NE-DIST
NPDES Permit #: FL0039795
LIMS Sample #: 442158 LIMS Job #: TLH2000-03-21-16-01
sample log 4/7/00
Test Type: Screening / Definitive
Static / Static Renewal / Flow-through
Test Number: 4 of 4

Sample Collection: Date 3/20/00 Time 11 10
Test Beginning: Date 3/21/00 Time 1530
Test Ending: Date 3/22/00 Time 1500
Organism Batch #: 10 Diluent Batch #: ASW / ASW #13
Organism Age: 12 days SRT toxicant batch #: —
Test organism: M. beryllina

Remarks:
* Test terminated @ 24 hrs. 100% motality.

	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) 0 hr	UNCORRECTED Cond. (mmhos/cm) 24 h	UNCORRECTED Cond. (mmhos/cm) 48 h
20ppt	CONT. A	B9	5	5	—	8.1	~~7.6~~	—	24.5	25.1	—	7.16	7.2	—	28.5	31.2	—
	B	B10	5	5	—	8.1	~~7.2~~	—	24.5	24.5	—	7.8	7.2	—	28.8	30.2	—
	C	B11	5	5	—	8.1	~~8.2~~	—	24.3	24.3	—	7.9	7.1	—	28.7	30.3	—
	D	B12	5	5	—	8.1	~~8.3~~	—	24.2	24.4	—	8.0	7.0	—	28.8	30.3	—
	100% A	B13	5	0 SD	—	8.1	~~8.2~~	—	24.8	24.4	—	7.3	6.7	—	30.2	31.4	—
	B	B14	5	0 SD	—	8.1	~~8.2~~	—	24.8	24.3	—	7.4	6.5	—	30.3	31.2	—
	C	B15	5	0 SD	—	8.1	8.2	—	24.6	24.2	—	7.4	6.3	—	30.4	31.8	—
	D	B16	5	0 SD	—	8.1	8.2	—	24.4	24.5	—	7.4	6.0	—	30.2	31.6	—
1ppt	CONT. A	C1	5	5	—	8.0	8.0	—	24.6	25.0	—	8.4	8.4	—	3.03	2.74	—
	B	C2	5	5	—	8.0	8.2	—	24.2	25.5	—	8.2	8.4	—	2.88	2.91	—
	C	C3	5	5	—	8.0	8.2	—	24.0	25.5	—	8.3	8.4	—	2.91	2.90	—
	D	C4	5	5	—	8.0	8.2	—	23.9	25.5	—	8.3	8.4	—	2.88	2.95	—
	100% A	C5	5	0 SD	—	7.9	8.3	—	24.2	24.9	—	8.4	8.4	—	3.56	3.66	—
	B	C6	5	0 SD	—	7.9	8.2	—	24.5	25.1	—	8.0	8.3	—	3.58	3.62	—
	C	C7	5	0 SD	—	7.9	8.2	—	24.6	25.2	—	7.8	7.5	—	3.59	3.58	—
	D	C8	5	0 SD	—	7.9	8.2	—	24.7	24.2	—	7.7	7.5	—	3.63	3.57	—
20/30	Salt CTRL A	E5	5	5	—	8.5	~~8.3~~	—	24.2	24.4	—	7.8	6.6	—	26.5	29.2	—
	B	E6	5	5	—	8.5	~~8.2~~	—	24.3	24.5	—	7.9	6.5	—	26.7	28.0	—
	C	E7	5	5	—	8.5	8.5	—	24.0	24.3	—	7.9	6.6	—	26.6	28.0	—
	D	E8	5	5	—	8.5	8.5	—	23.9	24.2	—	7.9	6.7	—	26.8	28.0	—
1ppt	Salt CTRL A	C17 C9	5	5	—	8.1	8.2	—	24.8	24.6	—	8.2	8.1	—	3.32	4.57	—
	B	C18 C10	5	5	—	8.1	8.2	—	24.7	23.8	—	8.1	8.0	—	3.20	3.88	—
	C	C19 C11	5	5	—	8.1	8.2	—	24.7	23.7	—	8.1	7.5	—	3.68	3.91	—
	D	C20	5	5	—	8.1	8.2	—	24.7	23.9	—	8.1	7.5	—	3.66	3.79	—
	measured by:		SG/MF	SG/KH	—	SG	DPH	—	SG	DPH	—	SG	DPH	—	SG	DPH	—
	recorded by:		DPH/SG	SG/KH	—	SG	DPH	—	SG	DPH	—	SG	DPH	—	SG	DPH	—

Investigators' Signatures
Shannon Gerard
Delia Parker-Hanna

Temperature Range °C
Incubator # 3 24.5°-26.5°C
Room B246 24.5°-26.0°C

ASW #13
Salt Water / Well Water / 20% Min Water

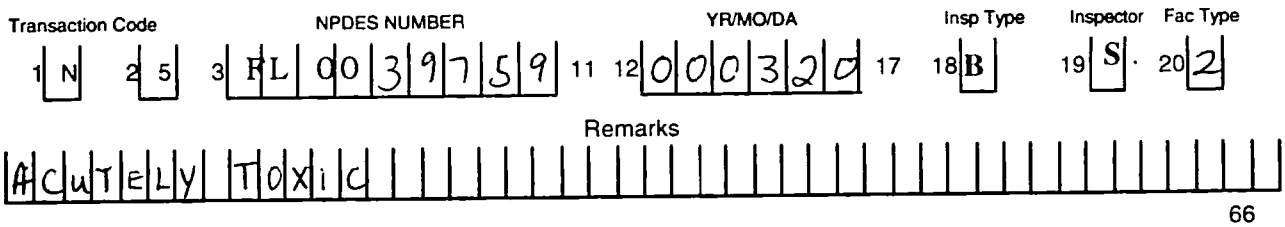
Water Quality Parameters	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):				
Lab Total Residual Cl2 (mg/L): <0.03	0.11	DR400	DPH	SG
Alkalinity (mg/L as $CaCO_3$): 200	357	Hach	SG	SG
Hardness (mg/L as $CaCO_3$): —	315	Hach	SG	SG
Total ammonia (mg/L as N): <0.017	44.9	Denver	DPH	SG
Salinity: 20	~1.2	YSI	DPH	SG

A H Wolfe
reviewer

form updated 3/3/99

The Bioassay of the Beverly Beach WWTF effluent sampled on March 20, 2000, NPDES# FL0039759.

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



The Priority Pollutants Analysis for the Bioassay of the Beverly Beach WWTF effluent sampled on March 20, 2000, NPDES# FL0039759.

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

