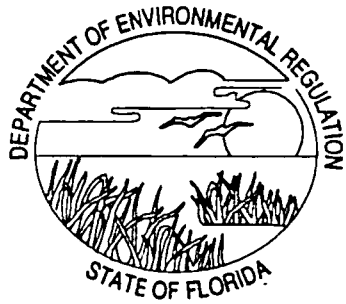


Bioassays of

Monroe County Public Service Building Wastewater Treatment Plant

Key West, Monroe County, Florida

NPDES #FL0030562

Sampled 3/2/92

March 1992

Biology Section
Division of Technical Services

Bioassays of

Monroe County Public Service Building Wastewater Treatment Plant

Key West, Monroe County, Florida

NPDES #FL0030562

Biology Section
Bureau of Laboratories
March 1992

Introduction

Monroe County Public Service Building WWTP, Key West, Monroe County, Florida, NPDES #FL0030562 on 3 to 5 March, 1992.

This facility is located on Junior College Road on Stock Island. It has a design capacity of 12,000 GPD and is an extended aeration wastewater treatment plant. Chlorination is used for disinfection and dechlorination is accomplished by the addition of sodium sulfite tablets. The average daily flow of 3,000 GPD is discharged to Cow Key Channel. The effluent from this facility was very turbid. Upon inspection, the operator log showed a clogged sludge return line and influent airlift. The problem was corrected during the weekend prior to the sampling date (3/2/92). The pH of the effluent sample was 4.3 s.u. when received in the laboratory. The effluent pH at the facility was again checked on 3/11/92, and was approximately 4.0 s.u, which is in violation of the facility's NPDES permit limitations for pH (range 6.0–8.5 s.u.) and State water quality standards. The cause of these violations has not been determined (personal communication Gus Rios, FDER–Marathon).

The toxicity tests discussed in this report were performed in accordance with methods described by Weber, 1991, *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, 4th Edition (EPA/600/4-90/027).

Results and Discussion

The Biology Section performed four static acute screening toxicity bioassays on a sample of effluent from this facility. The test organisms used for these bioassays were the waterflea, *Ceriodaphnia dubia*, and the fish, *Notropis leedsi*.

Since the pH (4.3 s.u.) of the sample was considered to be less than the pH tolerance level of the test organisms, a portion of the sample was pH-adjusted to 7.0 with sodium hydroxide. Bioassays were performed with this pH-adjusted aliquot using *C. dubia* and *N. leedsi*.

The bioassay results indicated that the original sample was toxic to both test species, producing LC_{50}'s of < 100%. The pH-adjusted sample proved toxic to *C. dubia* but was not toxic to *N. leedsi*. Total residual chlorine was not detected in the sample. The total ammonia and unionized ammonia concentrations in the sample were 2.76 mg/L (Hach) and 0 mg/L, respectively. The calculated unionized ammonia concentration in the pH-adjusted sample was 0.02 mg/L. No further chemical analyses were performed on the sample. The cause of toxicity in this sample was not determined. We suggest that the low pH of the sample was detrimental to the survival of the test organisms and that an undetermined agent also contributed to the observed mortality.

Conclusion

The sample of effluent from this facility was toxic on 2 March, 1992. The cause of toxicity, aside from low pH, was not determined.

Table 1. Concentration Series and Volumes Used for the Static Acute Screening Bioassays of the Monroe County Public Service Building WWTP on 3 to 5 March, 1992.

Ceriodaphnia dubia (water flea)

Concentration	Dilution Water	Sample	Total Volume
Control	20 mL	0 mL	20 mL
100%	0 mL	20 mL	20 mL

Notropis leedsi (bannerfin shiner)

Concentration	Dilution Water	Sample	Total Volume
Control	500 mL	0 mL	500 mL
100%	0 mL	500 mL	500 mL

Table 2. LC_{50} Data for the Bioassay of the Monroe County Public Service Building WWTP, Monroe County, Florida, on 5 March, 1992.

Organism	Method of Data Analysis	LC_{50}
Dechlorinated discharge		
Ceriodaphnia dubia	not calculated	< 100% [a*]
Notropis leedsi	not calculated	< 100% [a**]
pH adjusted effluent [b]		
Ceriodaphnia dubia	not calculated	< 100% [a*]

a The LC_{50} is < 100% since all the organisms died in the lowest test concentration (100%). *48 hour LC_{50}. **24 hour LC_{50}.

b Since the pH of the effluent upon arrival in the laboratory was pH 4.3, the pH was adjusted to pH 7 as per EPA/600/4-90/027.

Table 3. Data recorded during the static acute screening bioassay of a sample of effluent from the Monroe County Public Service Building Wastewater Treatment Plant, Key West, Monroe County, Florida, NPDES# FL0030562, on 3 to 5 March, 1992.

Facility:	Monroe Co. Public Service Building WWTP		NPDES #	FL0030562	Facility Type: Wastewater Treatment
Location:	Junior College Rd., Key West		Contact/District:	G. Rios / South	
County:	Monroe		Test type:	static screening	
Sample Collection Date:	3/2/92	Time: 1045	# tests:	2	Receiving Water:
Test Beginning Date:	3/3/92	Time: 1400	Chlorination Type:	dechlorinated	
Test Ending Date:	3/5/92	Time: 1400	Dechlor Method:	sodium sulfite	Page 1 of 1

Total Residual Cl2	mg/l	Method
Field:	0.0	Hach
Lab:	0.0	Hach

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control Water (daphnids):	0.00	0.00
100% Sample:	2.76	0.00

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	135	130
Cond. Control Water (daphnids):	60	90
100% Sample:	0	325

Organism: *Ceriodaphnia dubia* Life stage: < 24 hours
LC50: < 100%

	SURVIVAL			pH			Temperature			Dissolved Oxygen			Conductivity	
Concentrations	# at 0 hr	Live at 24 hr	Live at 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	5	5	5	8.3	-	8.1	22.3	-	24.2	8.6	-	8.4	149	184
Control	5	5	5	-	-	8.1	-	-	-	-	-	8.4	-	-
Control	5	5	5	-	-	8.1	-	-	-	-	-	8.4	-	-
Control	5	5	5	-	-	8.1	-	-	-	-	-	8.4	-	-
100%	5	3	0	4.6	-	5.0	22.3	-	24.8	7.9	-	8.4	1511	1698
100%	5	4	0	-	-	4.9	-	-	-	-	-	8.4	-	-
100%	5	2	0	-	-	4.8	-	-	-	-	-	8.4	-	-
100%	5	1	0	-	-	4.8	-	-	-	-	-	8.4	-	-

Organism: *Notropis leedsi* Age: 22 days
LC50: < 100%

	SURVIVAL			pH			Temperature			Dissolved Oxygen			Conductivity	
Concentrations	# at 0 hr	Live at 24 hr	Live at 48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour
Control	5	5	-	7.9	8.0	-	22.1	22.4	-	8.9	8.5	-	-	-
Control	5	5	-	7.9	8.0	-	-	-	-	8.9	8.5	-	236	239
100%	5	0	-	4.3	4.6	-	23.9	22.3	-	7.6	8.7	-	-	-
100%	5	0	-	4.4	4.6	-	-	-	-	7.7	8.7	-	1697	1669

Table 4. Data recorded during the static acute screening bioassay of a sample of pH adjusted* effluent from the Monroe County Public Service Building Wastewater Treatment Plant, Key West, Monroe County, Florida, NPDES# FL0030562, on 3 to 5 March, 1992.

Facility:	Monroe Co. Public Service Building WWTP	NPDES #	FL0030562	Facility Type:	Wastewater Treatment
Location:	Junior College Rd., Key West	Contact/District:	G. Rios / South		
County:	Monroe	Test type:	static screening		
Sample Collection Date:	3/2/92 Time: 1045	# tests:	2	Receiving Water:	
Test Beginning Date:	3/3/92 Time: 1400	Chlorination Type:	dechlorinated		
Test Ending Date:	3/5/92 Time: 1400	Dechlor Method:	sodium sulfite		Page 1 of 1

Total Residual Cl2	mg/l	Method
Field:	0.0	Hach
Lab:	0.0	Hach

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control Water (daphnids):	0.00	0.00
100% Sample:	2.76	0.02

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	135	130
Cond. Control Water (daphnids):	60	90
100% Sample:	0	325

Organism: *Ceriodaphnia dubia* Life stage: < 24 hours
LC50: < 100%

	SURVIVAL			pH			Temperature			Dissolved Oxygen			Conductivity	
Concentrations	# at 0 hr	Live at 24 hr	Live at 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	5	5	5	8.3	-	8.1	22.3	-	24.2	8.6	-	8.4	149	184
Control	5	5	5	-	-	8.1	-	-	-	-	-	8.4	-	-
Control	5	5	5	-	-	8.1	-	-	-	-	-	8.4	-	-
Control	5	5	5	-	-	8.1	-	-	-	-	-	8.4	-	-
100%	5	1	0	7.0	-	7.2	24.0	-	24.4	7.8	-	8.4	1675	1718
100%	5	1	0	-	-	7.2	-	-	-	-	-	8.4	-	-
100%	5	2	0	-	-	7.2	-	-	-	-	-	8.4	-	-
100%	5	1	0	-	-	7.2	-	-	-	-	-	8.4	-	-

Organism: *Notropis leedsi* Age: 22 days
LC50: -

	SURVIVAL			pH			Temperature			Dissolved Oxygen			Conductivity	
Concentrations	# at 0 hr	Live at 24 hr	Live at 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	5	5	5	7.9	8.0	8.1	22.1	22.4	23.2	8.9	8.5	8.2	-	-
Control	5	5	5	7.9	8.0	8.1	-	-	-	8.9	8.5	8.2	236	245
100%	5	5	5	7.0	7.1	7.1	24.0	22.2	23.0	7.9	8.0	7.6	-	-
100%	5	5	5	7.0	7.1	7.1	-	-	-	7.9	8.0	7.5	1750	1747

* The pH of the sample was adjusted to pH 7 as per (EPA/600/4-90/027) since the pH of the sample was pH 4.3 upon arrival in the laboratory.

Section — Acute Bioassay Bench Sheet

Sample Source: Monroe County Public Service Rdgs WWTP
Address/City:
County: Monroe
Contact/District: Gus Rios / S
NPDES Permit #: FL0030562 Outfall #:

Sample Collection: Date 3/2/92 Time 1045
Test Beginning: Date 3/3/92 Time 1400
Test Ending: Date 3/5/92 Time 1400
Test Organism: Ceriodaphnia dubia
Life Stage/Age: < 24 hours

92-MAR-03-04 29893

Test Number: 1 of 2 Test Type: Screening | Definitive
Static | Static Renewal | Flow-through

Remarks: very turbid sample.
Sub set ph adjusted to 7.0
with sodium hydroxide
Floc formed when ~~acid~~ mf sodium Hydroxide added to raise pH - [3/3/92 mf]

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7.7 9	8.5 @ 24°C	23.2 @ 23.2	1363 @ 1360 1366
24 hr	7 @ 7; 10 @ 10	8.6 @ 23.5°C	23.2 @ 23.5	1366 @ 1370 1373
48 hr	7 @ 7; 10 @ 10	8.5 @ 24°C	23.7 @ 23.7°C	1373 @ 1390 1372

4.0 @ 4.0 4.0 @ 4.0

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	DO (mg/L) 0	24	48	Cond. (µmhos/cm) 0	24	48
Control	A	5	5	5	8.3		8.1	22.3		24.2	8.6		8.4	194		184
Control	B	5	5	5			8.1						8.4			
Control	C	5	5	5			8.1						8.4			
Control	D	5	5	5			8.1						8.4			
100%	A	5	3	0	4.6		5.0	22.3		24.8	7.9		8.4	1511		1698
100%	B	5	4	0			4.9						8.4			
100%	C	5	2	0			4.8						8.4			
100%	D	5	1	0			4.8						8.4			
100%	A	5	1	0	7.0		7.2	24.0		24.4	7.8		8.4	1675		1718
100%	B	5	1	0			7.2						8.4			
100%	C	5	2	0			7.2						8.4			
100%	D	5	1	0			7.2						8.4			

pH adjusted to 7.0

3/4/92 mf. Sample which was pH-adjusted cleared up & solids settled on bottom. Non-pH adjusted sample still very turbid. mf

Measured/Loaded by:		mf	mf	mf	AJ		mf	AJ		mf	AJ		mf	AJ		mf
Recorded by:		mf	mf	mf	AJ		AJ	AJ		AJ	AJ		AJ	AJ		AJ

Investigators' Signatures

Marshall Faircloth
Alvaro Jose
Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			0.0		GR
Lab Tot. Resid. Cl2:	0.0	0.0	0.0	Hach	mf
Alkalinity:	135	60	0	Hach	AJ
Hardness:	130	90	325	Hach	AJ
Total Ammonia:	0.0	0.0	2.0	Hach	AJ

Ammonia Meter Slope: _____
Ammonia Blank: 0.0
Salinity Sample: _____ ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Monroe County WWTP
Address/City: —
County: Monroe
Contact/District: GUS RIOS / S
NPDES Permit #: FL00 30562 Outfall #: —

Sample Collection: Date 3/2/92 Time 1045
Test Beginning: Date 3/3/92 Time 1400
Test Ending: Date 3/5/92 Time 1400
Test Organism: Mysidopsis bahia
Life Stage/Age: 22 days

92-MAR-03-04 29893

Test Number: 2 of 2 Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through

Remarks:

subset pH adjusted to pH 7.0 ± NaOH

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7@7.9@9	8.5@24°C	23.0@23.2	1363@2360@1368
4.0@4.0 24 hr	7@7.10@10	8.6@23.5°C	23.2@23.5	1378@23.7@1372
4@4 48 hr	7@7.10@10	8.5@24°C	23.9@23.7°C	1373@23.9@1375

	Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	DO (mg/L) 0	24	48	Cond. (µmhos/cm) 0	24	48
	Control	31	5	5	5	7.9	8.0	8.1	22.1	22.9	23.2	8.9	8.5	8.2			
	Control	4	5	5	5	7.9	8.0	8.1				8.9	8.5	8.2	236	239	245
	100%	62	5	0	—	4.3	4.6	—	23.9	22.3	-	7.6	8.7	—			
	100%	74	5	0	—	4.4	4.6	-			-	7.7	8.7	-	1697	1669	—
pH only	100%	75	5	5	5	7.0	7.1	7.1	24.0	22.2	23.0	7.9	8.0	7.6			
pH only	100%	16	5	5	5	7.0	7.1	7.1				7.9	8.0	7.5	1750	1710	1745
	Measured/Loaded by:		MF	AJ	MF	AJ	MF	MF	AJ	MF	MF	AJ	MF	MF	AJ	MF	MF
	Recorded by		~~MF~~	AJ	MF	AJ	AJ	AJ	AJ	AJ	AJ	AJ	AJ	AJ	AJ	AJ	AJ

Investigators' Signatures

Marshall Faircloth

Alison Jordan

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			0.0		GR
Lab Tot. Resid. Cl2:	0.0	0.0	0.0	Hach	MF
Alkalinity:	135	60	0	Hach	AJ
Hardness:	130	90	325	Hach	AJ
Total Ammonia:	0.0	0.0	2.76	Hach	AJ

Ammonia Meter Slope: —

Ammonia Blank: 0.0

Salinity Sample:

The Bioassay of the Monroe County Public Service Building WWTP, NPDES# FL0030562, effluent sampled on March 2, 1992.

