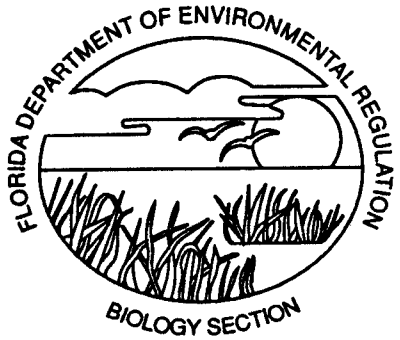


Bioassays of

Fiesta Village Sewage Treatment Plant

Fort Myers, Lee County, Florida

NPDES #FL0039829

Sampled 4/10/89

October 6, 1989

Biology Section
Division of Administrative and Technical Services

Bioassays of

Fiesta Village Sewage Treatment Plant

Fort Myers, Lee County, Florida

NPDES #FL0039829

Biology Section
Bureau of Laboratories
October 6, 1989

Introduction

Fiesta Village STP, Ft. Myers, Lee County, Florida, NPDES #FL0039829, on April 11 to 13, 1989.

This facility is located at 1366 San Sousi Drive, Ft. Myers. The facility is a 2.5 MGD design flow advanced wastewater treatment plant. Filtered recovered water goes to a dechlorination facility consisting of a sulfur dioxide-feed system. Dechlorinated recovered water is disposed of by a combination of spray irrigation and surface water discharge to the Caloosahatchee River. The population served by the facility is 18,100 (1987). The average daily flow is 1.52 MGD.

The toxicity tests discussed in this report were performed in accordance with methods described by Peltier and Weber, 1985, *Methods for Measuring the Acute Toxicity of Effluents to Aquatic Organisms*, 3rd Edition and by the FDER Biology Section, 1989, *Quality Assurance Manual for Performing Acute Toxicity Tests*, 2nd Edition.

Results and Discussion

The sample of discharge from this facility was taken upstream from the dechlorination facility. The sample was dechlorinated in the laboratory prior to being tested. The dechlorinated sample produced some mortality in the *Ceriodaphnia dubia* tests but an LC_{50} could not be calculated. The sample adversely affected the Microtox® assay test organism, *Photobacterium phosphoreum,* producing an EC_{50} of 107.8%. The sample was not toxic to the bioassay test organisms, *Daphnia pulex* and *Notropis leedsi*. Chemical analyses were not performed on the sample.

Conclusion

Some toxicity was evident in the sample of discharge from the Fiesta Village STP. The cause of toxicity in the sample was not determined. This sample showed a probable violation, since the LC_{50} for *C. dubia* test, though not calculable with this set of data, is likely between 100% and 200%. However, since the sample was taken before in-plant dechlorination, these results may not be representative of the facility's actual discharge. We recommend retesting with final effluent.

Table 1. Concentration Series and Volumes Used for These Static Bioassays.

Ceriodaphnia dubia (water flea)

Concentration	Dilution Water	Sample	Total Volume
Control	15.0 ml	0.0 ml	15 ml
10.0%	13.5 ml	1.5 ml	15 ml
30.0%	10.5 ml	4.5 ml	15 ml
50.0%	7.5 ml	7.5 ml	15 ml
70.0%	4.5 ml	10.5 ml	15 ml
85.0%	2.25 ml	12.75 ml	15 ml
100.0%	0.0 ml	15.0 ml	15 ml

Daphnia pulex (water flea)

Concentration	Dilution Water	Sample	Total Volume
Control	15.0 ml	0.0ml	15 ml
100.0%	0.0 ml	15.0 ml	15 ml

Notropis leedsi (bannerfin shiner)

Concentration	Dilution Water	Sample	Total Volume
Control	500 ml	0 ml	500 ml
10.0%	450 ml	50 ml	500 ml
30.0%	350 ml	150 ml	500 ml
50.0%	250 ml	250 ml	500 ml
70.0%	150 ml	350 ml	500 ml
85.0%	75 ml	425 ml	500 ml
100.0%	0 ml	500 ml	500 ml

Table 2. Data recorded during the 48 hour static definitive bioassay of a sample of discharge from the Fiesta Village STP, Ft. Myers, Lee County, Florida, NPDES #FL0039829, on 11 to 13 April, 1989.

Facility: **Fiesta Village STP** NPDES # **FL0039829** Facility Type: **Sewage Treatment**
Location: 1366 San Sousi Dr., Ft. Myers Contact/District: A. Walton /S
County: Lee Test type: static definitive
Sample Collection Date: **4/10/89** Time: 1120 # tests: 3 Receiving Water: Caloosahatchee River
Test Beginning Date: 4/11/89 Time: 1130 Chlorination Type: **dechlorinated**
Test Ending Date: 4/13/89 Time: 1230 Dechlor Method: lab, sodium thiosulfate **Page 1 of 2**

Organism: ***Ceriodaphnia dubia*** Life stage: neonate
LC50: - Binomial: - Moving Average: - Probit: -

Concentrations	SURVIVAL # at 0 hr	Live at 24 hr	Live at 48 hr	Dissolved Oxygen 0 hour	24 hour	48 hour	pH 0 hour	24 hour	48 hour	Temperature 0 hour	24 hour	48 hour	Conductivity 0 hour	48 hour
Control	5	5	5	8.6	-	8.6	8.3	-	8.3	19.2	-	21.9	-	-
Control	5	5	5	8.7	-	8.6	8.3	-	8.4	-	-	-	-	-
Control	5	5	5	8.7	-	8.7	8.3	-	8.4	-	-	-	-	-
Control	5	5	5	8.7	-	8.8	8.3	-	8.4	-	-	-	235	285
10%	5	5	5	8.6	-	8.8	8.2	-	8.4	19.2	-	21.9	-	-
10%	5	4	4	8.6	-	8.8	8.2	-	8.4	-	-	-	-	-
10%	5	5	5	8.7	-	8.9	8.2	-	8.4	-	-	-	-	-
10%	5	5	5	8.7	-	8.9	8.2	-	8.4	-	-	-	305	360
30%	5	5	5	8.7	-	8.6	8.0	-	8.3	19.3	-	21.9	-	-
30%	5	5	5	8.7	-	8.7	8.0	-	8.3	-	-	-	-	-
30%	5	5	5	8.7	-	9.0	8.0	-	8.3	-	-	-	-	-
30%	5	5	5	8.7	-	9.0	8.0	-	8.3	-	-	-	445	525
50%	5	5	5	8.7	-	8.4	7.9	-	8.2	19.3	-	21.8	-	-
50%	5	5	5	8.7	-	8.4	7.9	-	8.2	-	-	-	-	-
50%	5	5	5	8.7	-	8.4	7.9	-	8.2	-	-	-	-	-
50%	5	5	5	8.7	-	8.4	7.9	-	8.2	-	-	-	590	695
70%	5	5	5	8.7	-	8.2	7.8	-	8.1	19.3	-	21.3	-	-
70%	5	5	5	8.7	-	8.2	7.8	-	8.1	-	-	-	-	-
70%	5	5	5	8.7	-	8.2	7.8	-	8.1	-	-	-	-	-
70%	5	5	5	8.7	-	8.2	7.8	-	8.1	-	-	-	730	870
85%	5	5	5	8.7	-	8.2	7.7	-	8.1	19.3	-	21.3	-	-
85%	5	5	5	8.7	-	8.2	7.7	-	8.1	-	-	-	-	-
85%	5	5	4	8.7	-	8.2	7.7	-	8.1	-	-	-	-	-
85%	5	5	5	8.7	-	8.2	7.7	-	8.1	-	-	-	845	995
100%	5	5	3	8.8	-	8.2	7.5	-	8.0	19.3	-	21.3	-	-
100%	5	5	2	8.8	-	8.2	7.5	-	8.0	-	-	-	-	-
100%	5	5	2	8.8	-	8.2	7.5	-	8.0	-	-	-	-	-
100%	5	5	5	8.8	-	8.2	7.5	-	8.0	-	-	-	945	1125

Total Residual Cl2	mg/l	Method
Field:	0.5	Hach
Lab:	0.8	Hach
Lab:	-	-

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

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	112	118
Cond. Control Water (daphnids):	115	125
100% Sample:	50	185

Salinity (ppt)	
Control Water:	0
100% Sample:	0

Table 2. Continued.

Facility: **Fiesta Village STP** NPDES # **FL0039829** Facility Type: **Sewage Treatment**
Location: 1366 San Sousi Dr., Ft. Myers Contact/District: A. Walton/S
County: Lee Test type: static definitive
Sample Collection Date: **4/10/89** Time: 1120 # tests: 3 Receiving Water: Caloosahatchee River
Test Beginning Date: 4/11/89 Time: 1130 Chlorination Type: **dechlorinated**
Test Ending Date: 4/13/89 Time: 1230 Declor Method: lab, sodium thiosulfate **Page 2 of 2**

Total Residual Cl2	mg/l	Method
Field:	0.5	Hach
Lab:	0.8	Hach
Lab:	-	-

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

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	112	118
Cond. Control Water (daphnids):	115	125
100% Sample:	50	185

Salinity (ppt)	
Control Water:	0
100% Sample:	0

Organism: ***Daphnia pulex*** Life stage: neonate
LC50: - Binomial: - Moving Average: - Probit: -

Concentrations	SURVIVAL # at 0 hr	Live at 24 hr	Live at 48 hr	Dissolved Oxygen 0 hour	24 hour	48 hour	pH 0 hour	24 hour	48 hour	Temperature 0 hour	24 hour	48 hour	Conductivity 0 hour	48 hour
Control	5	5	5	8.7	-	8.2	8.3	-	8.3	19.2	-	21.3	-	-
Control	5	5	5	8.7	-	8.2	8.3	-	8.3	-	-	-	-	-
Control	5	5	5	8.7	-	8.2	8.3	-	8.3	-	-	-	-	-
Control	5	5	5	8.7	-	8.2	8.3	-	8.3	-	-	-	230	280
100.0%	5	5	5	8.7	-	8.2	7.6	-	8.0	19.3	-	21.3	-	-
100.0%	5	5	5	8.7	-	8.2	7.6	-	8.0	-	-	-	-	-
100.0%	5	5	5	8.7	-	8.2	7.6	-	8.0	-	-	-	-	-
100.0%	5	5	5	8.7	-	8.2	7.6	-	8.0	-	-	-	935	1110

Organism: ***Notropis leedsi*** Age: 23 days
LC50: - Binomial: - Moving Average: - Probit: -

Concentrations	SURVIVAL # at 0 hr	Live at 24 hr	Live at 48 hr	Dissolved Oxygen 0 hour	24 hour	48 hour	pH 0 hour	24 hour	48 hour	Temperature 0 hour	24 hour	48 hour	Conductivity 0 hour	48 hour
Control	5	5	5	8.5	8.5	7.4	7.8	8.0	8.0	21.1	20.5	21.1	-	-
Control	5	5	5	8.6	8.5	7.4	7.8	8.0	8.0	-	-	-	225	235
10%	5	5	5	8.5	8.6	7.2	7.8	8.1	8.0	21.0	20.2	20.9	-	-
10%	5	5	5	8.5	8.4	7.2	7.8	8.0	8.1	-	-	-	300	310
30%	5	5	5	8.6	8.3	7.3	7.7	8.0	8.0	20.9	20.1	20.8	-	-
30%	5	5	5	8.5	8.5	7.3	7.7	8.0	8.0	-	-	-	465	475
50%	5	5	5	8.5	8.2	7.4	7.6	7.9	7.9	20.8	20.1	20.8	-	-
50%	5	5	5	8.5	8.3	7.3	7.6	7.9	7.9	-	-	-	620	630
70%	5	5	5	8.5	8.0	7.2	7.5	7.8	7.8	20.7	20.1	20.8	-	-
70%	5	5	5	8.5	8.0	7.2	7.5	7.8	7.8	-	-	-	775	790
85%	5	5	5	8.4	8.1	7.2	7.4	7.7	7.7	20.6	20.1	20.8	-	-
85%	5	5	5	8.4	8.1	7.2	7.4	7.7	7.7	-	-	-	890	905
100%	5	5	5	8.3	8.0	7.2	7.3	7.6	7.6	20.6	20.2	20.9	-	-
100%	5	5	5	8.3	8.0	7.2	7.3	7.6	7.6	-	-	-	1000	1015

Table 3. Microtox test results, Fiesta Village, Lee County, NPDES #FL0039829, on April 11, 1989.

Microtox Test — Culture Lot # no lot number

% Sample	Final Reclaimed Water nonchlorinated	
	5-min	15-min
0	54	22
0	50	20
0	52	22
12.38	50	20
12.38	50	20
12.38	52	22
24.75	48	19
24.75	50	20
24.75	49	20
49.5	42	15
49.5	42	16
49.5	45	18
99	33	11
99	35	12
99	36	12

EC_{50} dechlorinated (15 minute, 15 °C) = 107.8% sample

EC_{50} (15 minute, 15 °C) is calculated using the Data Reduction Computer Program developed by Microbics Corporation for the Sharp Model EL-5100 calculator. *Microbics Systems Operating Manual, 1982.*

Table 4. LC_{50} Data for bioassay of Fiesta Village STP, Ft. Myers, Lee County, NPDES # FL0039829 on 11-13 April , 1989.

Organism	Method of Data Analysis	48 Hour LC_{50} (95% Confidence Intervals)
Dechlorinated discharge		
Ceriodaphnia dubia	Binomial	noncalculable [a]
	Moving Average	noncalculable [a]
	Probit	noncalculable [a]
Daphnia pulex		not toxic
Notropis leedsi		not toxic

a Due to an insufficient number of dead organisms, or to the irregular distribution of mortality, an LC_{50} value cannot be calculated using this method of statistical analysis.

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: FIESTA VILLAGE STP
Address/City: 1366 SAN SOUCI DR, FT MYERS 33919
County: LEE
Contact/District: ALBERT S. WALTON, JR.
NPDES Permit #: FL0039829 Outfall #: 0

Sample Collection: Date 4/10/89 Time 1120
Test Beginning: Date 4/11/89 Time 1130
Test Ending: Date 4/13/89 Time 1230
Test Organism: C. dubia
Life Stage/Age: neonate

Test Number: 1 of 3 Test Type: Screening (Definitive)
(Static) | Static Renewal | Flow-through

Remarks: dec 1-2 - sample taken above dechlor point. - no test of Cl2 sample performed

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr	7.0 7.9	8.8 @ 22°C	1320 @ 21.6 @ 1413	21.6-21.3
24 hr	6.7 7.9	8.8 @ 22°C	1?	20.4 @ 20.5
48 hr	7.0 7.9	8.25 @ 22.5	1520 @ 23 @ 1381	21.0 @ 20.9

Conc.	Chamber #	Number Live 0	24	48	DO (mg/l) 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	Cond. (umhos/cm) 0	24	48
CONTROL	1	5	5	5	8.6		8.6	8.3		8.3	19.2		21.7			
"	2	5	5	5	8.7		8.6	8.3		8.4						
"	3	5	5	5	8.7		8.7	8.3		8.4						
"	4	5	5	5	8.7		8.8	8.3		8.4				1235		1285
10%	5	5	5	5	8.6		8.8	8.2		8.4	19.2		21.9			
"	6	5	4*	4	8.6		8.8	8.2		8.4						
"	7	5	5	5	8.7		8.9	8.2		8.4						
"	8	5	5	5	8.7		8.9	8.2		8.4				1305		1360
30%	9	5	5	5	8.7		8.6	8.0		8.3	19.3		21.9			
"	10	5	5	5	8.7		8.7	8.0		8.3						
"	11	5	5	5	8.7		9.0	8.0		8.3						
"	12	5	5	5	8.7		9.0	8.0		8.3	[illegible]			1445		1525
50%	13	5	5	5	8.7		8.4	7.9		8.2	19.3		21.8			
"	14	5	5	5	8.7		8.4	7.9		8.2						
"	15	5	5	5	8.7		8.4	7.9		8.2						
"	16	5	5	5	8.7		8.4	7.9		8.2				1590		1675
70%	17	5	5	5	8.7		8.2	7.8		8.1	19.3		21.3			
"	18	5	5	5	8.7		8.2	7.8		8.1						
"	19	5	5	5	8.7		8.2	7.8		8.1						
"	20	5	5	5	8.7		8.2	7.9		8.1				1730		1810
85%	21	5	5	5	8.7		8.7	7.7		8.1	19.3		21.3			
"	22	5	5	5	8.7		8.2	7.7		8.1						
"	23	5	5	4	8.7		8.2	7.7		8.1						
"	24	5	5	5	8.7		8.2	7.7		8.1				1845		1995
100%	25	5	5	3	8.8		8.2	7.5		8.0	19.3		21.3			
"	26	5	5	2	8.8		8.2	7.5		8.0						
"	27	5	5	2	8.8		8.2	7.5		8.0						
"	28	5	5	5	8.8		8.2	7.5		8.0				1945		2125
Measured by:		SHW	MF	MF	SHW		SHW	SHW		SHW	SHW		SHW	SHW		SHW
Recorded by:		MF	MF	MF KML	MF		MF	KML		KML	KML		MF	KML		MF

* No body.

Investigators' Signatures

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			0.5	Hach	A Walton
Lab Tot. Resid. Cl2:			0.75	Hach *	SHW
Alkalinity:	112	115	50	Hach	MF
Hardness:	118	125	185	Hach	MF
Total Ammonia:	2.0	0.0	0.0	Orion	MF

* Iodometric No color change - MF

Reviewer

50

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: Fiesta Village STP

Address/City:

County:

Contact/District:

NPDES Permit #: Outfall #:

Sample Collection: Date 4/10/89 Time 1120

Test Beginning: Date 4/11/89 Time 1130

Test Ending: Date 4/13/89 Time 1230

Test Organism: Daphnia pulex

Life Stage/Age: neonate

Test Number: 2 of 3

Test Type: (Screening) | Definitive

(Static) | Static Renewal | Flow-through

Remarks: deCl2

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr				
24 hr				
48 hr				

		Number Live			DO (mg/l)			pH			Temp. (°C)			Cond. (µmhos/cm)		
Conc.	Chamber #	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Cont.	29	5	5	5	8.7		8.2	8.3		8.3	19.2		21.3			
"	30	5	5	5	8.7		8.2	8.3		8.3						
"	31	5	5	5	8.7		8.2	8.3		8.3						
"	32	5	5	5	8.7		8.2	8.3		8.3				230		280
100%	33	5	5	5	8.7		8.2	7.6		8.0	19.3		21.3			
"	34	5	5	5	8.7		8.2	7.6		8.0						
"	35	5	5	5	8.7		8.2	7.6		8.0						
"	36	5	5	5	8.7		8.2	7.6		8.0				435		1110
	Measured by:	MF	MF	MF	SHW		SHW	SHW		MF	SHW		MF	SHW		MF
	Recorded by:	MF	MF	MF	KML		MF	KML		MF	KML		MF	KML		MF

Investigators' Signatures

[illegible]

[illegible]

[illegible]

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl_2:					
Lab Tot. Resid. Cl_2:					
Alkalinity:					
Hardness:					
Total Ammonia:					

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: Fiesta Village STP
Address/City: _____
County: _____
Contact/District: _____
NPDES Permit #: _____ Outfall #: _____

Sample Collection: Date 4/6/89 Time 1120
Test Beginning: Date 4/11/89 Time 1130
Test Ending: Date 4/13/89 Time 1230
Test Organism: M. freeli
Life Stage/Age: 23 days

Test Number: 3 of 3 Test Type: Screening (Definitive)
(Static) | Static Renewal | Flow-through

Remarks: deCl2

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr				
24 hr				
48 hr				

Conc.	Chamber #	Number Live 0	24	48	DO (mg/l) 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	Cond. (µmhos/cm) 0	24	48
CONT.	19	5	5	5	8.5	8.5	7.4	7.8	8.0	8.0	21.1	20.5	21.1			
"	164	5	5	5	8.6	8.5	7.4	7.8	8.0	8.0				225		235
10%	5	5	5	5	8.5	8.6	7.2	7.8	8.1	8.0	21.0	20.2	20.9			
"	64	5	5	5	8.5	8.4	7.2	7.8	8.0	8.1				300		310
30%	2	5	5	5	8.6	8.3	7.3	7.7	8.0	8.0	20.9	20.1	20.8			
"	70	5	5	5	8.5	8.5	7.3	7.7	8.0	8.0				465		475
50%	87	5	5	5	8.5	8.2	7.4	7.6	7.9	7.9	20.8	20.1	20.7			
"	71	5	5	5	8.5	8.3	7.3	7.6	7.9	7.9				620		630
70%	18	5	5	5	8.5	8.6	7.2	7.5	7.8	7.8	20.7	20.1	20.8			
"	16	5	5	5	8.5	8.0	7.2	7.5	7.8	7.8				775		790
85%	54	5	5	5	8.4	8.1	7.2	7.4	7.7	7.7	20.6	20.1	20.8			
"	86	5	5	5	8.4	8.1	7.2	7.4	7.7	7.7				890		905
100%	6	5	5	5	8.3	8.0	7.2	7.3	7.6	7.6	20.6	20.2	20.9			
"	31	5	5	5	8.3	8.0	7.2	7.3	7.6	7.6				1070		1085
Measured by:		MF	MF	MF	KHW	KHW	MF	KHW	KHW	KHW	KHW	KHW	MF	KHW		
Recorded by:		MF	MF	MF	KHW	MF	MF	KHW	MF	MF	KHW	MF	MF	KHW		

Investigators' Signatures

Steven H Wolfe
Marshall Faircloth
KM Harding

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:					
Alkalinity:					
Hardness:					
Total Ammonia:					

MICROTOX™ Data Reduction Sheet

SOURCE: Fiesta Village

GRAPH / CALC: EC 50 (15 MIN, 15 °C) = 107.8 (%SAMPLE) mg/L

SAMPLE DATA:

SAMPLE TYPE (EFFLUENT, LEACHATE, ETC.): effluent de Cl_2

DATE ASSAYED: 4-11-89 TIME: 12:35

VISUAL COLOR: none CORRECTION REQUIRED: YES NO

VISUAL TURBIDITY: none SEPARATION REQUIRED: YES NO

INITIAL pH: pH ADJUSTED TO: WITH:

OSMOTICALLY ADJUSTED WITH: MOAS (DRY NaCl) OTHER

PRIMARY DILUTION OF SAMPLE:

OPERATOR: Lisa Williams REAGENT VIAL LOT NO. M-

REMARKS:

MICROTOX™ 96% TEST

SAMPLE CUVETTE	% SAMPLE	READINGS 5 MIN	READINGS 15 MIN	I5	I15	NOTES
A1	0	54	22	X	X	
B1		50	20			
C1		52	22			
A2	12.38	50	20	0.03	0.03	
B2		50	20			
C2		52	22			
A3	24.75	48	19	0.06	0.08	
B3		50	20			
C3		49	20			
A4	49.5	42	15	0.21	0.31	
B4		42	16			
C4		45	18			
A5	99	33	11	0.50	0.83	
B5		35	12			
C5		36	12			
EC50 (MIN, °C)				160.8	107.8	

REVIEWED BY:

DATE: