Bioassays of

Fishermen's Hospital, Inc. Sewage Treatment Plant

Marathon, Monroe County, Florida

NPDES #FL0028479

Biology Section
Bureau of Laboratories
April 20, 1990

Introduction

Fishermen's Hospital, Inc. STP, NPDES #FL0028479, Marathon, Monroe County, Florida, on 19 to 21 December, 1989.

This facility is located at 3301 Overseas Highway. It is a privately-owned general hospital and has a 0.021 MGD extended aeration process facility which treats wastewater from the hospital. Chlorine is used as a disinfecting agent. The reclaimed water from the STP goes to a retention pond and then into Boot Key Harbor and the Atlantic Ocean.

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, 1985, *Quality Assurance Manual for Performing Acute Toxicity Tests*, 2nd Edition. The toxicity values were obtained from the US EPA *Quality Criteria for Water*, 1976.

Results and Discussion

Bioassays using the waterflea, *Ceriodaphnia dubia*, and the fish, *Notropis leedsi*, were performed on a sample of chlorinated discharge from this facility. A portion of the sample was dechlorinated (sodium thiosulfate method) in the laboratory and also tested. Both the chlorinated and dechlorinated samples proved toxic to the bioassay test organisms. The chlorinated screening tests produced LC_{50}'s of < 100% for both *C. dubia* and *N. leedsi*. The dechlorinated tests produced LC_{50}'s of 40.8% for the *C. dubia* test and 59.2% for the *N. leedsi* test. The chlorinated and dechlorinated samples also proved toxic to the Microtox® assay test organism, producing EC_{50}'s of < 12.4% and 68.0%, respectively. The total residual chlorine concentration in the sample was 1.0 mg/l (Hach). The total ammonia concentration was 7.88 mg/l.

Additional chemical analyses detected the metals, cadmium (0.2 µg/l), copper (37 µg/l), silver (18 µg/l), and zinc (54 µg/l). Phenol (3.7), several alkyl substituted phenols (~ 19 µg/l), numerous unidentified chlorinated hydrocarbons (~ 30 µg/l), a petroleum hydrocarbon pattern similar to diesel (~ 7.5 mg/l), and a few small alkyl alcohols (~ 40 µg/l) were also detected in the sample.

The total residual chlorine concentration (1.0 mg/l Hach) in the sample was sufficient to have caused the observed mortality in the tests, however, the dechlorinated test results indicated the presence of toxic components other than chlorine. Of the components found by chemical analysis, we attribute the toxicity noted in the dechlorinated tests to the metals, copper (37 µg/l) and silver (18 µg/l), and to the petroleum hydrocarbon similar to diesel fuel (7.5 mg/l) which was detected in the sample. Copper concentrations as low as 7 µg/l have caused mortality in the cladoceran, *Daphnia magna*. Silver concentrations as low as 30 µg/l have also been shown to cause mortality in *Daphnia magna* and silver concentrations as low as 4.3 µg/l have caused mortality in fish (guppies). Diesel oil has caused mortality in finfish at concentrations as low as 204 µg/l.

Conclusion

We feel that the combined concentrations of the metals and organic compounds in the sample were sufficient to have been the primary cause of toxicity in the dechlorinated tests. The total residual chlorine contributed to the toxicity in the chlorinated tests.

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

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 screening bioassay of a sample of chlorinated discharge from Fishermen's Hospital STP, NPDES #FL0028479, Marathon, Monroe County, Florida, on 19 to 21 December, 1989.

Facility: **Fishermen Hospital** NPDES # **FL0028479** Facility Type: **sewage treatment**
Location: 3301 Overseas Hwy., Marathon Contact/District: G. Rios / South
County: Monroe Test type: Static Screen
Sample Collection Date: **12/18/89** Time: 0840 # tests: 2 Receiving Water: Atlantic Ocean
Test Beginning Date: 12/19/89 Time: 1400 Chlorination Type: **chlorinated**
Test Ending Date: 12/21/89 Time: 1400 **Page 1 of 1**

Chemistry performed before sample manipulation		
Total Residual Cl2	mg/l	Method
Field:	~2.0	Hach
Lab:	1.1	Hach
Lab:	1.0	Iodometric

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control Water (daphnids):	0.40	0.02
100% Sample:	7.88	0.00

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	120	123
Cond. Control Water (daphnids):	118	122
100% Sample:	0	122

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

Organism: ***Ceriodaphnia dubia*** Life stage: neonate
LC50: <100%

	SURVIVAL			Dissolved Oxygen			pH			Temperature			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	**	8.5	***	-	8.1	***	-	20.7	19.2	-	-	***
Control	5	5	-	8.5	-	-	8.2	-	-	-	-	-	-	-
Control	5	5	-	8.5	-	-	8.1	-	-	-	-	-	-	-
Control	5	5	-	8.5	-	-	8.1	-	-	-	-	-	230	-
100%	5	0	-	8.4	8.9	-	4.6	4.9	-	21.0	20.3	-	-	-
100%	5	0	-	8.4	8.9	-	4.6	5.5	-	-	-	-	-	-
100%	5	0	-	8.4	9.0	-	4.6	5.0	-	-	-	-	-	-
100%	5	0	-	8.4	9.0	-	4.6	5.0	-	-	-	-	560	585

* shared dechlorinated test control
** test terminated at 24 hours
***not measured at 24 hours due to possible damage to live organisms

Organism: ***Notropis leedsi*** Age: 16days days
LC50: <100%

	SURVIVAL			Dissolved Oxygen			pH			Temperature			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	**	8.0	8.9	-	7.5	7.9	-	20.7	19.7	-	-	-
Control	5	5	-	8.0	9.0	-	7.5	7.9	-	-	-	-	225	225
100%	5	0	-	7.8	9.1	-	4.6	4.7	-	21.3	19.5	-	-	-
100%	5	0	-	7.8	9.1	-	4.7	4.9	-	-	-	-	615	595

* shared dechlorinated test control
** test terminated at 24 hours

Table 3. Data recorded during the 48 hour static definitive bioassay of a chlorinated sample of discharge from the Fishermen's Hospital STP, NPDES #FL0028479, Marathon, Monroe County, Florida, on 19 to 21 December, 1989.

Facility: **Fishermen Hospital** NPDES # **FL0028479** Facility Type: **sewage treatment**
Location: 3301 Overseas Hwy. Marathon Contact/District: G. Rios / South
County: Monroe Test type: static definitive
Sample Collection Date: **12/18/89** Time: 0840 # tests: 2 Receiving Water: Atlantic Ocean
Test Beginning Date: 12/19/89 Time: 1400 Chlorination Type: **dechlorinated**
Test Ending Date: 12/21/89 Time: 1400 Dechlor method: lab, sodium thiosulfate **Page 1 of 2**

Organism: ***Ceriodaphnia dubia*** Life stage: neonate
LC50: 40.79% Binomial: 41.85% Moving Average: 40.79% Probit: -

	SURVIVAL			Dissolved Oxygen			pH			Temperature			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	8.5	-	8.8	8.1	-	8.2	20.7	-	20.5	-	-
Control	5	5	5	8.5	-	8.8	8.2	-	8.2	-	-	-	-	-
Control	5	5	5	8.5	-	8.9	8.1	-	8.2	-	-	-	-	-
Control	5	5	5	8.5	-	8.9	8.1	-	8.2	-	-	-	230	245
10%	5	5	5	8.4	-	8.7	8.0	-	8.1	21.0	-	20.3	-	-
10%	5	5	5	8.4	-	8.8	8.0	-	8.1	-	-	-	-	-
10%	5	5	5	8.4	-	8.8	8.0	-	8.1	-	-	-	-	-
10%	5	5	5	8.4	-	8.8	8.0	-	8.1	-	-	-	270	285
30%	5	5	5	8.4	-	8.8	7.9	-	8.0	21.0	-	20.3	-	-
30%	5	5	5	8.4	-	8.8	7.9	-	8.0	-	-	-	-	-
30%	5	5	2	8.4	-	8.9	7.9	-	8.0	-	-	-	-	-
30%	5	5	5	8.4	-	8.8	7.9	-	8.0	-	-	-	320	350
50%	5	5	2	8.4	-	8.8	7.6	-	7.9	20.8	-	20.4	-	-
50%	5	5	1	8.4	-	8.8	7.6	-	7.9	-	-	-	-	-
50%	5	5	1	8.4	-	8.8	7.6	-	7.9	-	-	-	-	-
50%	5	5	2	8.4	-	8.8	7.6	-	7.9	-	-	-	385	415
70%	5	5	2	8.4	-	8.8	7.4	-	7.7	20.6	-	20.2	-	-
70%	5	5	3	8.1	-	8.8	7.4	-	7.7	-	-	-	-	-
70%	5	5	0	8.1	-	8.9	7.4	-	7.7	-	-	-	-	-
70%	5	5	2	8.1	-	8.9	7.4	-	7.7	-	-	-	445	500
85%	5	5	1	8.3	-	8.9	7.0	-	7.4	20.6	-	20.5	-	-
85%	5	5	0	8.4	-	8.9	7.0	-	7.4	-	-	-	-	-
85%	5	5	0	8.4	-	8.9	7.0	-	7.4	-	-	-	-	-
85%	5	5	2	8.4	-	9.0	7.0	-	7.4	-	-	-	490	545
100%	5	0	-	8.4	9.0	-	5.6	6.1	-	20.9	20.0	-	-	-
100%	5	0	-	8.4	9.0	-	5.4	5.8	-	-	-	-	-	-
100%	5	0	-	8.4	9.0	-	5.4	5.8	-	-	-	-	-	-
100%	5	0	-	8.4	9.1	-	5.4	5.7	-	-	-	-	-	-

Chemistry performed before sample manipulation		
Total Residual Cl2	mg/l	Method
Field:	~2.0	Hach
Lab:	1.1	Hach
Lab:	1.0	Iodometric

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control Water (daphnids):	0.40	0.02
100% Sample:	7.88	0.00

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	120	123
Cond. Control Water (daphnids):	118	122
100% Sample:	0	122

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

Table 3. Continued.

Facility: **Fishermen Hospital** NPDES # **FL0028479** Facility Type: **sewage treatment**
Location: 3301 Overseas Hwy., Marathon Contact/District: G. Rios / South
County: Monroe Test type: static definitive
Sample Collection Date: **12/18/89** Time: 0840 # tests: 2 Receiving Water: Atlantic Ocean
Test Beginning Date: 12/19/89 Time: 1400 Chlorination Type: **dechlorinated**
Test Ending Date: 12/21/89 Time: 1400 Dechlor method: lab, sodium thiosulfate **Page 2 of 2**

Organism: ***Notropis leedsi*** Age: 16days days
LC50: 59.16% Binomial: 59.16% Moving Average: - Probit: -

	SURVIVAL			Dissolved Oxygen			pH			Temperature			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	8.0	8.9	9.1	7.5	7.9	8.2	20.7	19.7	19.7	-	-
Control	5	5	5	8.0	9.0	9.1	7.5	7.9	8.2	-	-	-	225	230
10%	5	4	4	8.0	9.0	8.6	7.4	7.8	8.1	20.5	19.2	19.0	-	-
10%	5	5	5	8.0	9.0	9.0	7.4	7.8	8.1	-	-	-	255	255
30%	5	5	5	8.0	9.0	8.6	7.4	7.7	8.0	20.5	19.0	19.0	-	-
30%	5	5	5	8.1	9.0	8.5	7.4	7.7	8.0	-	-	-	325	325
50%	5	5	5	8.1	9.1	8.7	7.2	7.6	8.0	20.6	19.1	19.0	-	-
50%	5	5	5	8.1	9.1	8.6	7.2	7.6	7.7	-	-	-	390	390
70%	5	2	0	8.0	9.0	8.5	6.9	7.3	7.5	20.8	19.2	19.0	-	-
70%	5	1	0	8.0	9.0	8.5	6.9	7.3	7.5	-	-	-	460	460
85%	5	0	-	8.0	9.0	-	6.7	7.0	-	20.9	19.2	-	-	-
85%	5	0	-	8.0	9.0	-	6.7	7.0	-	-	-	-	510	500**
100%	5	0	-	7.9	9.1	-	4.8	4.9	-	21.0	19.3	-	-	-
100%	5	0	-	7.9	9.1	-	4.8	5.0	-	-	-	-	575	560**

** 24 hour measurement

Chemistry performed before sample manipulation		
Total Residual Cl2	mg/l	Method
Field:	~2.0	Hach
Lab:	1.1	Hach
Lab:	1.0	Iodometric

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control Water (daphnids):	0.40	0.02
100% Sample:	7.88	0.00

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	120	123
Cond. Control Water (daphnids):	118	122
100% Sample:	0	122

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

Table 4. Microtox test results, Fishermen Hospital, Monroe County, NPDES #FL0028479, on 19 December, 1990.

	Final Reclaimed Water			
% Sample	Chlorinated		Dechlorinated	
	5-min	15-min	5-min	15-min
0	45	27	42	31
0	43	26	40	30
0	44	28	32	23
12.38	4	8	42	28
12.38	9	8	39	29
12.38	1	5	39	30
24.75	2	0	37	26
24.75	0	0	33	24
24.75	0	0	35	24
49.5	0	0	28	18
49.5	0	0	27	17
49.5	0	0	27	19
99	0	0	15	10
99	0	0	13	8
99	0	0	16	10

EC_{50} Chlorinated (15 minute, 15 °C) = <12.38% sample
EC_{50} Dechlorinated (15 minute, 15 °C) = 68.03% 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, Microbics Corporation, Carlsbad, CA).

Table 5. LC_{50} Data for Bioassay of Fishermen Hospital, NPDES # Fl0028479, Monroe County, Florida.

Organism	Method of Data Analysis	48 Hour LC_{50} (95% Confidence Intervals)
Chlorinated discharge		
Ceriodaphnia dubia	noncalculated	<100% [a]
Notropis leedsi	noncalculated	<100% [a]
Dechlorinated discharge		
Ceriodaphnia dubia	Binomial	41.85% (30.00%, 85.00%)
	Moving Average	40.79% (31.34%, 72.52%) [b]
	Probit	c
Notropis leedsi	Binomial	59.16%(50.00%,70.00%)
	Moving Average	c
	Probit	c

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

b This LC_{50} is reported in the text since it is the most statistically conservative value of the data set.

c 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.

Table 6. Results of chemical analyses on the sample of discharge from the Fishermen Hospital STP, Monroe County, Florida.

Organics

Acid Extractables	Phenol 3.7 µg/l Tentative identification of several alkyl substituted phenols. Est. conc. (18.0 µg/l).
Base Neutral Extractables	Petroleum hydrocarbon pattern similar to diesel fuel. Est. conc. (7.5 mg/l). A few small alkyl alcohols (<10C)* with total conc. approximately 40 µg/l.
Pesticide Extractables	Numerous unidentified chlorinated hydrocarbons. Est. conc. 30µg/l.

Metals

Cadmium	0.2 µg/l
Copper	37.0 µg/l
Silver	18.0 µg/l
Zinc	54.0 µg/l

*< 10 Carbon atoms.

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: Fisherman Hospital - Domestic wastewater Plant
Address/City: Fisherman Hospital Marathon
County: MONROE
Contact/District: G Rios / South
NPDES Permit #: FL0028479 Outfall #: W4

Sample Collection: Date 12-18 Time 0840
Test Beginning: Date 12-19 Time 0900
Test Ending: Date 12-21 Time 1400
Test Organism: Ceriodaphnia dubia
Life Stage/Age: 0/24 hrs

Test Number: 1 of 4 Test Type: Screening | (Definitive)
(Static) | Static Renewal | Flow-through

Remarks: @ 7°C
decl

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr	7@7.9 9	8.8@22°C	1322 @21.9 @1323	21.3@21.3
24 hr	7@7.9 9	9.0@21.5°	1340@22.2@1382	21.4@21.4
48 hr	7@7.9 9	9.0@21.2°	1350@22.6@1314	21.2@21.3

		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
Control		5	5	5	8.5		8.8	8.1		8.2	20.7	19.2	19.5			
Control		5	5	5	8.5		8.8	8.2		8.2						
Control		5	5	5	8.5		8.9	8.1		8.2						
Control		5	5	5	8.5		8.9	8.1		8.2				230		245
10 %		5	5	5	8.4		8.7	8.0		8.1	21.0		20.3			
10 %		5	5	5	8.4		8.8	8.0		8.1						
10 %		5	5	5	8.4		8.8	8.0		8.1						
10 %		5	5	5	8.4		8.8	8.0		8.1				270		285
30 %		5	5	5	8.4		8.8	7.9		8.0	21.0		20.3			
30 %		5	5	5	8.4		8.8	7.9		8.0						
30 %		5	5	2	8.4		8.9	7.9		8.0						
30 %		5	5	5	8.4		8.8	7.9		8.0			20.4	320		350
50 %		5	5	2	8.4		8.8	7.6		7.9	20.8					
50 %		5	5	1	8.4		8.8	7.6		7.9						
50 %		5	5	1	8.4		8.8	7.6		7.9						
50 %		5	5	2	8.4		8.8	7.6		7.9				385		415
70 %		5	5	2	8.4		8.8	7.4		7.7	20.6		20.2			
70 %		5	5	3	8.4		8.8	7.4		7.7						
70 %		5	5	0	8.4		8.9	7.4		7.7						
70 %		5	5	2	8.4		8.9	7.4		7.7				445		500
85 %		5	5	1	8.3		8.9	7.0		7.4	20.6		20.5			
85 %		5	5	0	8.4		8.9	7.0		7.4						
85 %		5	5	0	8.4		8.9	7.0		7.4						
85 %		5	5	2	8.4		9.0	7.0		7.4				490		545
100 %		5	0	~~0~~	8.4	9.0	–	5.6	6.1	–	20.9	20.0	–			
100 %		5	0	~~0~~	8.4	9.0	–	5.4	5.8	–						
100 %		5	0	–	8.4	9.0	–	5.4	5.8	–						
100 %		5	0	–	8.4	9.1	–	5.4	5.7	–				535	565	–
Measured by:		JME	mf	mf	SHW	MF	SHW	SHW	MF	SHW	SHW	MF	SHW	SHW		SHW
Recorded by:		SHW	MF	MF	MF	SW	MF	MF	SW	MF	MF	SW	MF	MF		MF

Investigators' Signatures

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			~2.0	Hach	~G Rios
Lab Tot. Resid. Cl2:			1.1/1.0	Hach/DO	MF
Alkalinity:	120	123	0	Hach	SHW
Hardness:	118	122	122	Hach	SHW
Total Ammonia:	0.0	0.399	7.88	orion	MF

slope -600

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: Fishermen Hospital
Address/City:
County:
Contact/District:
NPDES Permit #: _____ **Outfall #:** _____

Sample Collection: Date 12-18 Time 0840
Test Beginning: Date 12/19 Time 1400
Test Ending: Date 12-21 Time 1400
Test Organism: Notuges feedai
Life Stage/Age: 16 days

Test Number: 2 of 4 **Test Type:** Screening | (Definitive) (Static) | Static Renewal | Flow-through

Remarks:
* manufacturer provided Dechlor

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
Control	50	5	5	5	8.0	8.9	9.1	7.5	7.9	8.2	20.7	19.7	19.7			
Control	142	5	5	5	8.0	9.0	9.1	7.5	7.9	8.2				225	225	230
10%	12	5	4	4	8.0	9.0	8.6	7.4	7.8	8.1	20.5	19.2	18.0			
10%	234	5	5	5	8.0	9.0	9.0	7.4	7.8	8.1				255		255
30%	19	5	5	5	8.0	9.0	8.6	7.4	7.7	8.0	20.5	19.0	18.0			
30%	83	5	5	5	8.1	9.0	8.5	7.4	7.7	8.0				325		325
50%	19	5	~~3~~ 5	5	8.1	9.1	8.7	7.2	7.6	7.7	20.6	19.1	19.0			
50%	39	5	5	5	8.1	9.1	8.6	7.2	7.6	7.7				390		390
70%	10	5	2	0	8.0	9.0	8.5	6.9	7.3	7.5	20.8	19.2	19.0			
70%	119	5	1	0	8.0	9.0	8.5	6.9	7.3	7.5				460		460
85%	4~~8~~	5	0	–	8.0	9.0	–	6.7	7.0	–	20.9	19.2	–			
85%	43	5	0	–	8.0	9.0	–	6.7	7.0	–				510	500	–
100%	13	5	0	–	7.9	9.1	–	4.8	4.9	–	21.0	19.3	–			
100%	62	5	0	–	7.9	9.1	–	4.8	5.0	–				575	560	–
Measured by:		JMF	MF	MF	SHW	MF	SHW	SHW	MF	SHW	SHW	MF	SHW	SHW	MF	SHW
Recorded by:		JMF	MF	MF	MF	SW	MF	MF	SW	MF	MF	SW	MF	MF	SW	MF

Investigators' Signatures

Marshall Faircloth
Steven H Wolf

Reviewer

Water-quality Parameters

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

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: Fisherman's Hospital
Address/City: _____
County: _____
Contact/District: _____
NPDES Permit #: _____ Outfall #: _____

Sample Collection: Date 12/18 Time 0840
Test Beginning: Date 12/19 Time 1400
Test Ending: Date 12/21 Time 1400
Test Organism: Ceriodaphnia dubia
Life Stage/Age: Neonate

Test Number: 3 of 4 Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through

Remarks: Cl_2

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
Control	A	5	AM	E	A	5	C.	Dubia			21.0					
Control																
100%		5	0	—	8.4	8.9	—	4.6	4.9	—	21.0	20.3	—			
100%		5	0	—	8.4	8.9	—	4.6	5.5	—						
100%		5	0	—	8.4	9.0	—	4.6	5.0	—						
100%		5	0	—	8.4	9.0	—	4.6	5.2	—				560	585	—
Measured by:		JHF	MF		BMF	MF		SHW	MF		MF			BW	MF	
Recorded by:		SHW	MF		MF	SW		MS	SW		MF			BF	SW	

Investigators' Signatures

Marshall Faircloth
Steven H Wolf

Reviewer

Water-quality Parameters

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

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: Fishermans Hospital
Address/City:
County:
Contact/District:
NPDES Permit #: Outfall #:

Sample Collection: Date 12/18 Time 0840
Test Beginning: Date 12/19 Time 1400
Test Ending: Date 12/21 Time 1400
Test Organism: Nitrocra Leedsi
Life Stage/Age: 16 days

Test Number: 4 of 4
Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through

Remarks: Cl2

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
Control	50	SAME	AS	DAY	1											
Control	142															
100%	287	5	0	–	7.8	9.1	–	4.6	4.7	–	21.3	19.5	–			
100%	113	5	0	–	7.8	9.1	–	4.7	4.9	–				585	595	–
Measured by:		JHF	MF		SHW	MF		KHW	MF		SHW	MF		SHW	MF	
Recorded by:		JHF	MF		MF	SW		MF	SW		MF	SW		MF	SW	

Investigators' Signatures

Marshall Faircloth
Steven H Wolfe

Reviewer

Water-quality Parameters

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

cl

MICROTOX™ Data Reduction Sheet

SOURCE: Fisherman Hosp STD

GRAPH CALC EC 50 (15 MIN, 15 °C) = < 12.38 (%SAMPLE) mg/L

SAMPLE DATA:

SAMPLE TYPE (EFFLUENT, LEACHATE, ETC.):

DATE ASSAYED: 12/19/89 TIME: 2:30 PM

VISUAL COLOR: Clear 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: MS Campos REAGENT VIAL LOT NO. M-

REMARKS:

MICROTOX™ TEST

SAMPLE CUVETTE	% SAMPLE	READINGS 5 MIN	READINGS 15 MIN	Γ5	Γ15	NOTES
A1	0	45	27	X	X	
B1		43	26			
C1		44	28			
A2	12.38	04	08		2.86	
B2		09	08			
C2		01	05			
A3	24.75	02	0		0	
B3		0	0			
C3		0	0			
A4	49.5	0	0		0	
B4		0	0			
C4		0	0			
A5	99	0	0		0	
B5		0	0			
C5		0	0			
EC_{50} (15 MIN, 15 °C)				<	12.38	%

REVIEWED BY:
DATE: 5/8/90

de cl

MICROTOX™ Data Reduction Sheet

SOURCE: Fisherman Hospital STO EFF

GRAPH CALC EC 50 (15 MIN, 15 °C) = 68.03 (%SAMPLE) mg/L

SAMPLE DATA:

SAMPLE TYPE (EFFLUENT, LEACHATE, ETC.):

DATE ASSAYED: 12/19/89 TIME: 2:00 PM

VISUAL COLOR: clear 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: MS Canyon REAGENT VIAL LOT NO. M-

REMARKS:

MICROTOX™ TEST

SAMPLE CUVETTE	% SAMPLE	READINGS 5 MIN	READINGS 15 MIN	Γ5	Γ15	NOTES
A1	0	42	31	X	X	
B1		40	30			
C1		32	23			
A2	12.38	42	28		-.03	
B2		39	29			
C2		39	30			
A3	24.75	37	26		.14	
B3		33	24			
C3		35	24			
A4	49.5	28	18		.56	
B4		27	17			
C4		27	19			
A5	99	15	10		2.0	
B5		13	8			
C5		14	10			
EC_{50} (MIN, °C)					68.03	

REVIEWED BY:

DATE: 5/5/90