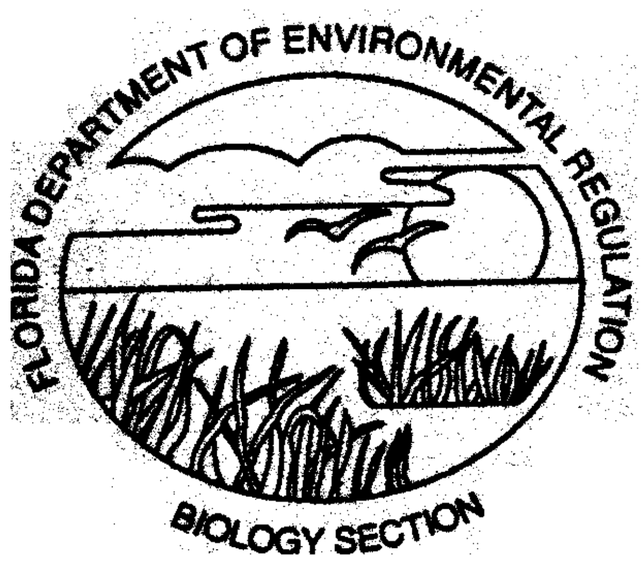


Bioassays of

Cooper City West Sewage Treatment Plant

Cooper City, Broward County, Florida

NPDES #FL0040398

Sampled 12/12/88

June 21, 1989

Biology Section
Division of Administrative and Technical Services

Bioassays of

Cooper City West Sewage Treatment Plant

Cooper City, Broward County, Florida

NPDES #FL0040398

Biology Section
Bureau of Laboratories
June 21, 1989

Introduction

Cooper City West STP, NPDES #FL0040398, Cooper City, Broward County, Florida, on 13 to 15 December, 1988.

The Cooper City West STP is located at 11791 SW 49th Street, Cooper City, Broward County, Florida. The facility serves a population of approximately 9300 in the western Cooper City area. The facility has a design flow of 2.5 MGD and in combination with the Cooper City East STP discharges an average of 1.56 MGD to the City of Hollywood's STP Atlantic Ocean outfall.

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.

Results and Discussion

The chlorinated sample of discharge from the Cooper City West STP was toxic to the bioassay test organisms, *Ceriodaphnia dubia*, *Daphnia pulex*, and *Notropis leedsi*, producing LC_{50}'s of < 100%. The chlorinated sample also adversely affected the Microtox® assay test organism, *Photobacterium phosphoreum*, producing an EC_{50} of 14%. The dechlorinated sample of discharge was toxic to the bioassay test organism, *C. dubia*, producing an LC_{50} of 66%. The dechlorinated sample also adversely affected the Microtox® assay organism, *P. phosphoreum*, producing an EC_{50} of 59%.

Chemical analyses performed on the sample detected the pesticides, diazinon and g-BHC, and the metals, silver, and zinc (Table 6). Arsenic was also found, but the measurement was invalidated due to blank contamination. The total residual chlorine concentration was 1.3 mg/l (Hach) and the total ammonia concentration was 1.07 mg/l.

The toxicity in the chlorinated sample was attributed in part to the total residual chlorine. The toxicity in the dechlorinated sample was attributed primarily to the 0.47 µg/l diazinon concentration, as the diazinon LC_{50} is known to be as low as 0.35 µg/l for the test organism, *C. dubia*.

In conclusion, the sample of discharge from the Cooper City West STP taken on 12 December, 1988, was toxic. The toxicity was attributed to total residual chlorine and the pesticide, diazinon.

Recommendations

The Biology Section recommends that this facility be required to meet State standards for chlorine. The Biology Section further recommends that they be required to undertake a Toxicity Reduction Evaluation with the goal of meeting state toxicity standards.

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

Ceriodaphnia dubia (water flea)

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 acute bioassay performed on a chlorinated sample of discharge for Coope City West STP, NPDES #FL0040398, Cooper City, Broward County, Florida, on 13 to 15 December, 1988.

Facility: **Cooper City West STP** NPDES # **FL0040398** Facility Type: **Municipal**
Location: 11791 SW 49 th St. Cooper City Contact/District: Paul Strauss / SE
County: Broward Test type: Static Screen
Sample Collection Date: **12/12/88** Time: 1140 # tests: 6 Receiving Water: Atlantic Ocean
Test Beginning Date: 12/13/88 Time: 1100 Chlorination Type: **chlorinated**
Test Ending Date: 12/15/88 Time: 1115 **Page 1 of 1**

Total Residual Cl2	mg/l	Method
Field:	1.5	Hach
Lab:	1.3	Hach
Lab:	1.0	Iodometric

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control Water (daphnids):	0.00	0.00
100% Sample:	1.07	0.02

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	120	125
Cond. Control Water (daphnids):	125	130
100% Sample:	125	120

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	-	8.8	8.8	-	7.9	8.3	-	19.2	19.4	-	-	-
Control	5	5	-	8.9	8.8	-	7.9	8.3	-	-	-	-	-	-
Control	5	5	-	8.9	8.9	-	7.9	8.3	-	-	-	-	-	-
Control	5	5	-	8.9	8.9	-	7.9	8.3	-	-	-	-	210	215
100%	5	0	-	8.3	8.9	-	7.1	8.2	-	19.7	19.3	-	-	-
100%	5	0	-	8.2	8.9	-	7.1	8.2	-	-	-	-	-	-
100%	5	0	-	8.2	9.0	-	7.1	8.2	-	-	-	-	-	-
100%	5	0	-	8.2	9.0	-	7.1	8.2	-	-	-	-	540	565

Organism: ***Daphnia pulex*** 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	-	8.9	8.9	-	7.9	8.3	-	19.5	19.4	-	-	-
Control	5	5	-	8.9	8.9	-	7.9	8.3	-	-	-	-	-	-
Control	5	5	-	8.9	8.9	-	7.9	8.3	-	-	-	-	-	-
Control	5	5	-	8.9	9.0	-	7.9	8.3	-	-	-	-	210	220
100%	5	0	-	8.3	8.9	-	7.1	8.2	-	19.7	19.4	-	-	-
100%	5	0	-	8.3	8.9	-	7.1	8.2	-	-	-	-	-	-
100%	5	0	-	8.3	8.9	-	7.1	8.2	-	-	-	-	-	-
100%	5	0	-	8.3	8.9	-	7.1	8.2	-	-	-	-	575	575

Organism: ***Notropis leedsi*** Age: 21 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	-	8.5	8.4	-	7.4	7.9	-	20.0	19.3	-	-	-
Control	5	5	-	8.6	8.4	-	7.4	7.9	-	-	-	-	220	220
100%	5	0	-	7.5	8.8	-	6.9	7.7	-	19.8	19.2	-	-	-
100%	5	0	-	7.7	8.8	-	6.9	7.7	-	-	-	-	595	590

Table 3. Data recorded during the 48 hour static acute bioassay performed on a dechlorinated sample of discharge from the Cooper City West STP, NPDES #FL0040398, Cooper City, Broward County, Florida, on 13 to 15 December, 1988.

Facility: **Cooper City West STP** NPDES # **FL0040398** Facility Type: **Municipal**
Location: 11791 SW 49 th St., Cooper City Contact/District: Paul Strauss / SE
County: Broward Test type: static definitive
Sample Collection Date: **12/12/88** Time: 1140 # tests: 6 Receiving Water: Atlantic Ocean
Test Beginning Date: 12/13/88 Time: 1100 Chlorination Type: **dechlorinated**
Test Ending Date: 12/15/88 Time: 1115

Organism: ***Ceriodaphnia dubia*** Life stage: neonate
LC50: 65.9% Binomial: 65.9% 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	9.0	-	8.4	8.1	-	8.4	19.1	-	22.1	-	-
Control	5	5	5	9.0	-	8.4	8.1	-	8.4	-	-	-	-	-
Control	5	5	5	9.0	-	8.4	8.1	-	8.5	-	-	-	-	-
Control	5	5	5	9.0	-	8.4	8.1	-	8.5	-	-	-	210	235
10%	5	5	5	8.9	-	8.3	8.1	-	8.4	19.0	-	22.2	-	-
10%	5	5	5	8.9	-	8.3	8.1	-	8.4	-	-	-	-	-
10%	5	5	5	8.9	-	8.4	8.1	-	8.4	-	-	-	-	-
10%	5	5	5	8.9	-	8.4	8.1	-	8.4	-	-	-	245	280
30%	5	5	5	8.8	-	8.4	7.9	-	8.3	19.2	-	22.2	-	-
30%	5	5	5	8.9	-	8.4	7.9	-	8.3	-	-	-	-	-
30%	5	5	5	8.9	-	8.4	7.9	-	8.3	-	-	-	-	-
30%	5	5	5	8.9	-	8.4	7.9	-	8.3	-	-	-	320	365
50%	5	5	5	8.8	-	8.3	7.8	-	8.3	19.3	-	22.3	-	-
50%	5	5	5	8.8	-	8.3	7.8	-	8.3	-	-	-	-	-
50%	5	5	5	8.8	-	8.3	7.8	-	8.3	-	-	-	-	-
50%	5	5	5	8.8	-	8.3	7.8	-	8.3	-	-	-	395	440
70%	5	5	0	8.7	-	8.3	7.7	-	8.3	19.8	-	22.3	-	-
70%	5	5	2	8.7	-	8.3	7.7	-	8.3	-	-	-	-	-
70%	5	5	2	8.7	-	8.3	7.7	-	8.3	-	-	-	-	-
70%	5	4	3	8.7	-	8.4	7.7	-	8.3	-	-	-	470	540
85%	5	4	0	8.7	-	8.3	7.6	-	8.2	19.8	-	22.3	-	-
85%	5	5	0	8.7	-	8.3	7.6	-	8.2	-	-	-	-	-
85%	5	3	0	8.7	-	8.3	7.6	-	8.2	-	-	-	-	-
85%	5	5	0	8.7	-	8.3	7.6	-	8.2	-	-	-	540	610
100%	5	1	0	8.7	-	8.5	7.5	-	8.2	19.8	-	22.5	-	-
100%	5	0	0	8.7	-	8.5	7.5	-	8.2	-	-	-	-	-
100%	5	2	0	8.7	-	8.5	7.5	-	8.2	-	-	-	-	-
100%	5	1	0	8.7	-	8.5	7.5	-	8.2	-	-	-	605	680

Total Residual Cl2	mg/l	Method
Field:	1.5	Hach
Lab:	1.3	Hach
Lab:	1.0	Iodometric

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control Water (daphnids):	0.00	0.00
100% Sample:	1.07	0.02

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	120	125
Cond. Control Water (daphnids):	125	130
100% Sample:	125	120

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

Table 3. Continued.

Facility: **Cooper City West STP** NPDES # **FL0040398** Facility Type: **Municipal**
Location: 11791 SW 49 th St. Cooper City Contact/District: Paul Strauss / SE
County: Broward Test type: static definitive
Sample Collection Date: **12/12/88** Time: 1140 # tests: 6 Receiving Water: Atlantic Ocean
Test Beginning Date: 12/13/88 Time: 1100 Chlorination Type: **dechlorinated**
Test Ending Date: 12/15/88 Time: 1115 **Page 2 of 2**

Total Residual Cl2	mg/l	Method
Field:	1.5	Hach
Lab:	1.3	Hach
Lab:	1.0	Iodometric

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control Water (daphnids):	0.00	0.00
100% Sample:	1.07	0.02

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	120	125
Cond. Control Water (daphnids):	125	130
100% Sample:	125	120

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

Organism: ***Daphnia pulex*** Life stage: neonate
LC50: - Binomial: - 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	8.9	-	8.5	8.0	-	8.4	19.2	-	22.8	-	-
Control	5	5	5	9.0	-	8.5	8.0	-	8.4	-	-	-	-	-
Control	5	4	4	9.0	-	8.5	8.0	-	8.4	-	-	-	-	-
Control	5	5	5	9.0	-	8.5	8.0	-	8.4	-	-	-	210	240
100.0%	5	5	5	8.7	-	8.3	7.5	-	8.2	19.9	-	23.0	-	-
100.0%	5	5	5	8.7	-	8.3	7.5	-	8.2	-	-	-	-	-
100.0%	5	5	5	8.7	-	8.3	7.5	-	8.2	-	-	-	-	-
100.0%	5	5	5	8.7	-	8.3	7.5	-	8.2	-	-	-	590	680

Organism: ***Notropis leedsi*** Age: 21 days
LC50: - Binomial: - 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	8.5	8.6	8.3	7.4	7.9	7.9	20.0	19.1	20.2	-	-
Control	5	5	5	8.5	8.6	8.3	7.4	7.9	7.9	-	-	-	220	225
10%	5	5	5	8.5	8.4	8.1	7.4	7.9	7.8	20.0	18.9	19.8	-	-
10%	5	5	5	8.5	8.5	8.0	7.4	7.9	7.8	-	-	-	260	265
30%	5	5	5	8.4	8.3	8.1	7.3	7.8	7.8	20.0	18.8	19.8	-	-
30%	5	5	5	8.4	8.3	8.1	7.3	7.9	7.8	-	-	-	350	355
50%	5	5	5	8.4	8.0	8.1	7.2	7.8	7.8	20.1	18.8	19.8	-	-
50%	5	5	5	8.4	7.9	8.1	7.2	7.8	7.8	-	-	-	430	440
70%	5	5	5	8.3	7.8	7.9	7.1	7.8	7.8	20.2	18.8	20.0	-	-
70%	5	5	5	8.4	7.9	8.0	7.1	7.8	7.8	-	-	-	520	525
85%	5	5	5	8.2	8.0	8.0	7.0	7.8	7.8	20.2	18.8	20.2	-	-
85%	5	5	5	8.3	8.1	7.9	7.0	7.8	7.8	-	-	-	585	595
100%	5	5	5	8.1	7.8	8.2	7.0	7.7	7.8	20.3	19.0	20.5	-	-
100%	5	5	5	8.2	7.8	8.3	7.0	7.7	7.8	-	-	-	650	665

Table 4. Microtox test results, Cooper City West STP, Broward County, NPDES #FL0040398 , on 12 December, 1988.

Microtox Test Culture Lot # M-603

% Sample	Final Reclaimed Water			
	Chlorinated		Dechlorinated	
	5-min	15-min	5-min	15-min
0	99	93	100	57
0	86	78	100	60
0	79	75	85	50
12.38	48	40	79	47
12.38	45	38	80	47
12.38	45	37	76	45
24.75	28	19	68	40
24.75	27	19	65	38
24.75	23	16	64	38
49.5	9	4	50	29
49.5	9	4	55	33
49.5	8	4	55	34
99	1	.2	36	20
99	1	.2	37	20
99	1	.3	35	20

EC_{50} Chlorinated (15 minute, 15 °C) = 14.25% sample
EC_{50} Dechlorinated (15 minute, 15 °C) = 59.03% 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 (Microbics) Systems Operating Manual, 1982.

Table 5. LC_{50} Data for Bioassay of Cooper City West STP.

Organism	Method of Data Analysis	48 Hour LC_{50} (95% Confidence Intervals)
Chlorinated discharge		
Ceriodaphnia dubia	noncalculable	<100% [a]
Daphnia pulex	noncalculable	<100% [a]
Notropis leedsi	noncalculable	<100% [a]
Dechlorinated discharge		
Ceriodaphnia dubia	Binomial	65.96% (50.00%,85.00%)
	Probit	[b]
	Moving Average	[b]
Daphnia pulex		not toxic
Notropis leedsi		not toxic

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

b 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 Cooper City West STP, Broward County, Florida.

Organics

Acid Extractables	None detected
Base Neutral Extractables	Two small unidentified peaks
Pesticide Extractables	Diazinon (0.47µg/l)
	g-BHC (0.04µg/l)
	Numerous unidentified components sensitive to ECD
	Several unidentified components sensitive to NPD

Metals

Arsenic	*
Silver	0.08 µg/l
Zinc	22.0 µg/l

* Arsenic value invalidated due to blank contamination.

Discussion of the Toxicity Criteria

The toxicity standards of Chapters 17-3 and 17-4, F.A.C., are complex. Because of this complexity, they will be briefly reviewed here so that these test results may be more readily compared with the standards. For legal purposes, however, the language of the Florida Administrative Code should be consulted directly. Applicable portions of the F.A.C. are: 17-3.021(1), 17-3.021(4), 17-3.051(1)(d), 17-3.061(3)(p), 17-3.402(1), 17-4.244(4), and 17-4.244(6).

The particular restrictions applied to a given discharger depend upon the type of discharge, the type of water body which is impacted, and the type of mixing zone, if any, which has been permitted. The most stringent toxicity limitations which apply to the various combinations of these factors are listed below, specified in terms of the most dilute concentration of effluent which is allowed to kill 50% of the test organisms in 96 hours. Note that any listed concentration greater than 100% is extrapolated from toxicity curves determined from testing various effluent concentrations of 100% or less. Violations of the toxicity standards occur in the following conditions.

I. Discharges to Surface Water

   A. With no mixing zone, or with only a dredge and fill mixing zone the discharge may not exhibit an $LC_{50} < 2000\%$ at the point of discharge.

   B. With a non-dredge and fill mixing zone the discharge may not exhibit an $LC_{50} < 100\%$ at the point of discharge and may not exhibit an $LC_{50} < 2000\%$ at the edge of the mixing zone.

   C. With a non-dredge and fill mixing zone, and either discharging to the open ocean through multiport diffusers or meeting the provisions of 17-4.244(4)(b) the LC_{50} at the point of discharge cannot exceed 30% sample concentration.

II. Discharges to ground water may not exceed an LC_{50} of 300% at the point of contact with surface waters

A violation of these provisions occurs if toxicity is found at a more dilute concentrations of the sampled discharge than allowed above.

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: Cooper City west WWTP
Address/City: 11791 SW 49 ST
County: Broward
Contact/District: P. Strauss S.E
NPDES Permit #: _____ Outfall #: _____

Sample Collection: Date 12/4/98 Time 1140
Test Beginning: Date 12/11/98 Time 1100
Test Ending: Date 12-15-98 Time 1115
Test Organism: Ceriodaphnia dubia
Life Stage/Age: Neonate

Test Number: 1 of 6 Test Type: Screening (Definitive)
(Static) | Static Renewal | Flow-through

Remarks: Dechlor

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr	7@7.99	9.0@21°C	1240@1247@1.28	20.7@20.6
24 hr	7@7.99	9.0@21°C	1287@1997@0.65	19.0@19.2
48 hr	7@7.99	8.5@22°C	1333@1342@0.26	20.5@20

		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	1	5	5	5	9.0	8.4		8.1		8.4	19.1	22.1				[illegible]
Control	2	5	5	5	9.0	8.4		8.1		8.4				210		235
Control	3	5	5	5	9.0	8.4		8.1		8.5						
Control	4	5	5	5	9.0	8.4		8.1		8.5				210		235
10 %	5	5	5	5	8.9	8.3		8.1		8.4	19.0	22.2				
10 %	6	5	5	5	8.9	8.3		8.1		8.4						
10 %	7	5	5	5	8.9	8.4		8.1		8.4						
10 %	8	5	5	5	8.9	8.4		8.1		8.4				245		250
30 %	9	5	5	5	8.8	8.4		7.9		8.3	19.2	22.2				
30 %	10	5	5	5	8.9	8.4		7.9		8.3						
30 %	11	5	5	5	8.9	8.4		7.9		8.3						
30 %	12	5	5	5	8.9	8.4		7.9		8.3				320		265
50 %	13	5	5	5	8.8	8.3		7.8		8.3	19.3	22.3				
50 %	14	5	5	5	8.8	8.3		7.8		8.3						
50 %	15	5	5	5	8.8	8.3		7.8		8.3						
50 %	16	5	5	5	8.8	8.3		7.8		8.3				395		[illegible]
70 %	17	5	5	0	8.7	8.3		7.7		8.3	19.8	22.3				
70 %	18	5	5	2	8.7	8.3		7.7		8.3						
70 %	19	5	5	2	8.7	8.3		7.7		8.3						
70 %	20	5	4	3	8.7	8.4		7.7		8.3				470		460
85 %	21	5	4	0	8.7	8.3		7.6		8.2	19.8	22.3				
85 %	22	5	5	0	8.7	8.3		7.6		8.2						
85 %	23	5	3	0	8.7	8.3		7.6		8.2						
85 %	24	5	5	0	8.7	8.3		7.6		8.2				540		610
100 %	25	5	1	0	8.7	8.5		7.5		8.2	19.8	22.5				
100 %	26	5	0	0	8.7	8.5		7.5		8.2						
100 %	27	5	2	0	8.7	8.5		7.5		8.2						
100 %	28	5	1	0	8.7	8.5		7.5		8.2				605		650
Measured by:		SHW	SHW	MF	MF	JMF		MF		JMF	MF	JMF		MF		[illegible]
Recorded by:		SHW	SHW	MF	MF	KML		MF	[illegible]	KML	MF	KML		SHW		KML

Investigators' Signatures

[signature]
Steven H Welp
KM Lurding
[signature]
Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			1.5	Hach	
Lab Tot. Resid. Cl2:			1.3/1.0	Hach/Colo	JMF
Alkalinity:	120	125	125	Hach	JMF
Hardness:	125	130	120	Hach	JMF
Total Ammonia:	0	0	1.07	Orion	AHW

slope = -54.6

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: Cogen City, West WWTP
Address/City: _____
County: _____
Contact/District: _____
NPDES Permit #: _____ Outfall #: _____

Sample Collection: Date 12/12/88 Time 1140
Test Beginning: Date 12/13/88 Time 1100
Test Ending: Date 12/15/88 Time 1115
Test Organism: Daphnia pulex
Life Stage/Age: Neonate

Test Number: 2 of 6 Test Type: (Screening) Definitive
(Static) Static Renewal | Flow-through

Remarks: Dechlor
* loading error

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	29	5	5	5	8.9	8.5		8.0		8.4	19.2	22.8				
Control	30	5	5	5	9.0	8.5		8.0		8.4						
Control	31	4*	4	4	9.0	8.5		8.0		8.4						
Control	32	5*	5	5	9.0	8.5		8.0		8.4				210		210
100 %	33	5	5	5	8.7	8.3		7.5		8.2	19.9	23.0				
100 %	34	5	5	5	8.7	8.3		7.5		8.2						
100 %	35	5	5	5	8.7	8.3		7.5		8.2						
100 %	36	5	5	5	8.7	8.3		7.5		8.2				590		580
Measured by:		JHF	SHW	MF	MF	JMF		MF		JMF	MF	JMF		MF		JMF
Recorded by:		MF	MF	MF	MF	KHL		MF		KHL	MF	KHL		SHW		KHL

Investigators' Signatures

Water-quality Parameters

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

Reviewer

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: Cooper City West WWTP
Address/City: _____
County: _____
Contact/District: _____
NPDES Permit #: _____ Outfall #: _____

Sample Collection: Date 12/12/88 Time 1140
Test Beginning: Date 12/13/88 Time 1100
Test Ending: Date 12/15/88 Time 1115
Test Organism: Ceriodaphnia dubia
Life Stage/Age: 24 hrs

Test Number: 3 of 36 Test Type: Screening (Definitive)
(Static) | Static Renewal | Flow-through

Remarks: Declor

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr				
24 hr				
48 hr				

		Number Live			DO (mg/l)			pH			Temp. (°C)			Cond. (umhos/cm)		
Conc.	Chamber #	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control	17	5	5	5	8.5	8.6	8.3	7.4	7.9	7.9	20.0	19.1	20.2			
Control	71	5	5	5	8.5	8.6	8.3	7.4	7.9	7.9				220		225
10%	52	5	5	5	8.5	8.4	8.1	7.4	7.9	7.8	20.0	18.9	19.8			
10%	16	5	5	5	8.5	8.5	8.0	7.4	7.9	7.8				260		265
30%	68	5	5	5	8.4	8.3	8.1	7.3	7.8	7.8	20.0	18.8	19.8			
30%	6	5	5	5	8.4	8.3	8.1	7.3	7.9	7.8				350		355
50%	38	5	5	5	8.4	8.0	8.1	7.2	7.8	7.8	20.1	18.8	19.8			
50%	13	5	5	5	8.4	7.9	8.1	7.2	7.8	7.8				430		440
70%	22	5	5	5	8.3	7.8	7.9	7.1	7.8	7.8	20.2	18.8	20.0			
70%	20	5	5	5	8.4	7.9	8.0	7.1	7.8	7.8				520		525
85%	58	5	5	5	8.2	8.0	8.0	7.0	7.8	7.8	20.2	18.8	20.2			
85%	27	5	5	5	8.3	8.1	7.9	7.0	7.8	7.8				535		575
100%	19	5	5	5	8.1	7.8	8.2	7.0	7.7	7.8	20.3	19.0	20.5			
100%	228	5	5	5	8.2	7.8	8.3	7.0	7.7	7.8				630		665
~~Control~~																
Measured by:		MF	MF	MF	MF	SHW	MF	MF	SHW	MF	MF	SHW	MF	MF		MF
Recorded by:		MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF		MF

Investigators' Signatures

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: Cooper City West WWTP
Address/City: _____
County: _____
Contact/District: _____
NPDES Permit #: _____ Outfall #: _____

Sample Collection: Date 12/12/05 Time MF 1140
Test Beginning: Date 12/13/05 Time 1100
Test Ending: Date 12/15/05 Time 1115
Test Organism: Ceriodaphnia dubia
Life Stage/Age: Neonate

Test Number: 4 of 6 Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through

Remarks: Cl_2
Term @ 24 hrs

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	37	5	5		8.8	8.8		7.9	8.3		19.2	19.4				
Control	38	5	5		8.9	8.8		7.9	8.3							
Control	39	5	5		8.9	8.9		7.9	8.3							
Control	40	5	5		8.9	8.9		7.9	8.3					210	215	
100 %	41	5	Ø MF		8.3	8.9		7.1	8.2		19.7	19.3				
100 %	42	5	Ø MF		8.2	8.9		7.1	8.2							
100 %	43	5	Ø MF		8.2	9.0		7.1	8.2							
100 %	44	5	Ø MF		8.2	9.0		7.1	8.2					540	565	
Measured by:		MF	MF		MF	SHW		MF	SHW		MF	SHW		MF	SHW	SH
Recorded by:		MF	MF		MF	MF		MF	MF		MF	MF		SHW	MF	

Investigators' Signatures

M 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:					

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: Cooper City West WWTP
Address/City:
County:
Contact/District:
NPDES Permit #: Outfall #:

Sample Collection: Date 12/12/88 Time 1140
Test Beginning: Date 12/13/88 Time 1100
Test Ending: Date 12/15/88 Time 1115
Test Organism: Daphnia pulex
Life Stage/Age: Neonate

Test Number: 5 of 6 Test Type: (Screening) Definitive
(Static) Static Renewal | Flow-through

Remarks: Cl_2
Temp @ 24 hr

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	45	5	5		8.9	8.9		7.9	8.3		19.5	19.4				
Control	46	5	5		8.9	8.4		7.9	8.3							
Control	47	5	5		8.9	8.4		7.9	8.3							
Control	48	5	5		8.9	9.0		7.9	8.3					210	220	
100%	49	5	0 mt		8.3	8.9		7.1	8.2		19.7	19.4				
100%	50	5	0 mt		8.3	8.4		7.1	8.2							
100%	51	5	0 mt		8.3	8.9		7.1	8.2							
100%	52	5	0 mt		8.3	8.9		7.1	8.2					575	575	
Measured by:		SHW	mf		mf	SHW		mf	SHW		mf	SHW		MF	SHW	
Recorded by:		mf	mf		mf	mf		mf	mf		mf	mf		SHW	mf	

Investigators' Signatures

M Faircloth
Steven J 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:					

DER Biology Section — Acute-bioassay Bench Sheet

Sample Source: Cooper City West WWTP

Address/City:

County:

Contact/District:

NPDES Permit #: Outfall #:

Sample Collection: Date 12/12/88 Time ~~[illegible]~~ 1100

Test Beginning: Date 12/14/88 Time 1100

Test Ending: Date 12-15-88 Time 1115

Test Organism: [illegible]

Life Stage/Age: 21 days

Test Number: 6 of 6

Test Type: (Screening) | Definitive

(Static) | Static Renewal | Flow-through

Remarks: Cl.

Term at 24 hrs

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr				
24 hr				
48 hr				

Conc.	Chamber #	Number Live 0	Number Live 24	Number Live 48	DO (mg/l) 0	DO (mg/l) 24	DO (mg/l) 48	pH 0	pH 24	pH 48	Temp. (°C) 0	Temp. (°C) 24	Temp. (°C) 48	Cond. (umhos/cm) 0	Cond. (umhos/cm) 24	Cond. (umhos/cm) 48
Control	3	5	5		8.5	8.4		7.4	7.9		20.0	19.3				
Control	234	5	5		8.6	8.4		7.4	7.9					220	220	
100%	18	5	0		7.5	8.8		6.9	7.7		19.8	19.2				
100%	19	5	0		7.7	8.8		6.9	7.7		~~19.8~~ [illegible]			595	590	
Measured by:		MF	MF		MF	SHW		MF	SHW		MF	SHW		MF	SHW	
Recorded by:		MF	MF		MF	MF		MF	MF		MF	MF		MF	MF	

Investigators' Signatures

M. Fairchild [signature]

Steven H. Wolfe [signature]

[signature]

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:					

MICROTOX™ Data Reduction Sheet

SOURCE: Cooper City

GRAPH CALC EC 50 (15 MIN, 15 °C) = 59.03 (%SAMPLE) mg/L

SAMPLE DATA:

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

DATE ASSAYED: 12-12-88 TIME: 9:45

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: Leslie Williams REAGENT VIAL LOT NO. M-603

REMARKS:

MICROTOX™ 99% TEST

SAMPLE CUVETTE	% SAMPLE	READINGS 5 MIN	READINGS 15 MIN	Γ5	Γ15	NOTES
A1	0	100	57	X	X	
B1		100	60			
C1		85	50			
A2	12.38	79	47	.213	.201	
B2		80	47			
C2		76	45			
A3	24.75	68	40	.447	.440	
B3		65	38			
C3		64	38			
A4	49.5	50	29	.781	.740	
B4		55	33			
C4		55	34			
A5	99	36	20	1.639	1.783	
B5		37	20			
C5		35	20			
EC_{50} (MIN, °C)				60.34	59.03	

REVIEWED BY:

DATE: 5/23/89

MICROTOX™ Data Reduction Sheet

SOURCE: Cooper City

GRAPH CALC EC 50 (15 MIN, 15 °C) = 14.3 (%SAMPLE) mg/L

SAMPLE DATA:

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

DATE ASSAYED: 12-12-88 TIME: 9:25

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: Leslie Williams REAGENT VIAL LOT NO. M-603

REMARKS:

MICROTOX™ 99% TEST

SAMPLE CUVETTE	% SAMPLE	READINGS 5 MIN	READINGS 15 MIN	Γ5	Γ15	NOTES
A1	0	99	93			
B1		86	78			
C1		79	75			
A2	12.38	48	40	.913	1.139	
B2		45	38			
C2		45	37			
A3	24.75	28	19	2.385	3.556	
B3		27	19			
C3		23	16			
A4	49.5	19 9	4	9.154	19.5	
B4		19 9	4			
C4		8	4			
A5	99	1	.2	87.0	350.43	
B5		1	.2			
C5		1	.3			
EC_{50} (MIN, °C)				12.77	14.25	

REVIEWED BY:

DATE: 5/23/89