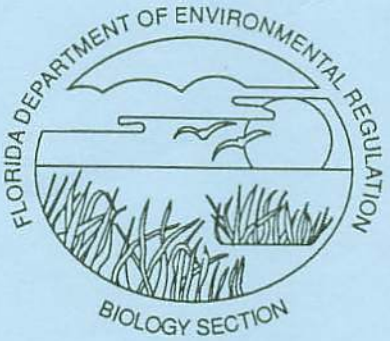


Bioassays of

Manatee County Southwest Wastewater Treatment Plant

Bradenton, Manatee County, Florida

NPDES #FL0027847

Sampled 10/17/88

March 16, 1989

Biology Section
Division of Administrative and Technical Services

Bioassays of

Manatee County Southwest Wastewater Treatment Plant

Bradenton, Manatee County, Florida

NPDES #FL0027847

Biology Section
Bureau of Laboratories
March 16, 1989

Executive Summary

Manatee County Southwest Wastewater Treatment Plant, Bradenton, Manatee County, Florida, NPDES #FL0027847, on 18 to 20 October, 1988.

The Manatee County Southwest Wastewater Treatment Plant is an activated sludge contact stabilization treatment facility with a design flow of 16.0 MGD. Discharge, from outfall #001 to Sarasota Bay, does not occur except during rainfall, as most of the treated water goes to ponds or for spray irrigation.

The Biology Section performed six static acute bioassays on a sample from this facility on 18 to 20 October, 1988. Two Microtox® assays were performed on the sample on 18 October, 1988.

The sample of chlorinated discharge from the Manatee County SW WWTP was toxic to the bioassay test organisms, *Ceriodaphnia dubia*, *Daphnia pulex*, and *Notropis leedsi*, producing LC_{50}'s of < 100%. The chlorinated sample adversely affected the Microtox® assay test organism, *Photobacterium phosphoreum*, producing an EC_{50} of 4.35%.

The dechlorinated sample was toxic to the bioassay test organisms, *C. dubia* and *D. pulex*, producing LC_{50}'s of 67.1% and < 100%, respectively. The dechlorinated sample also adversely affected the Microtox® assay organism, *P. phosphoreum*, producing an EC_{50} of 178.8%.

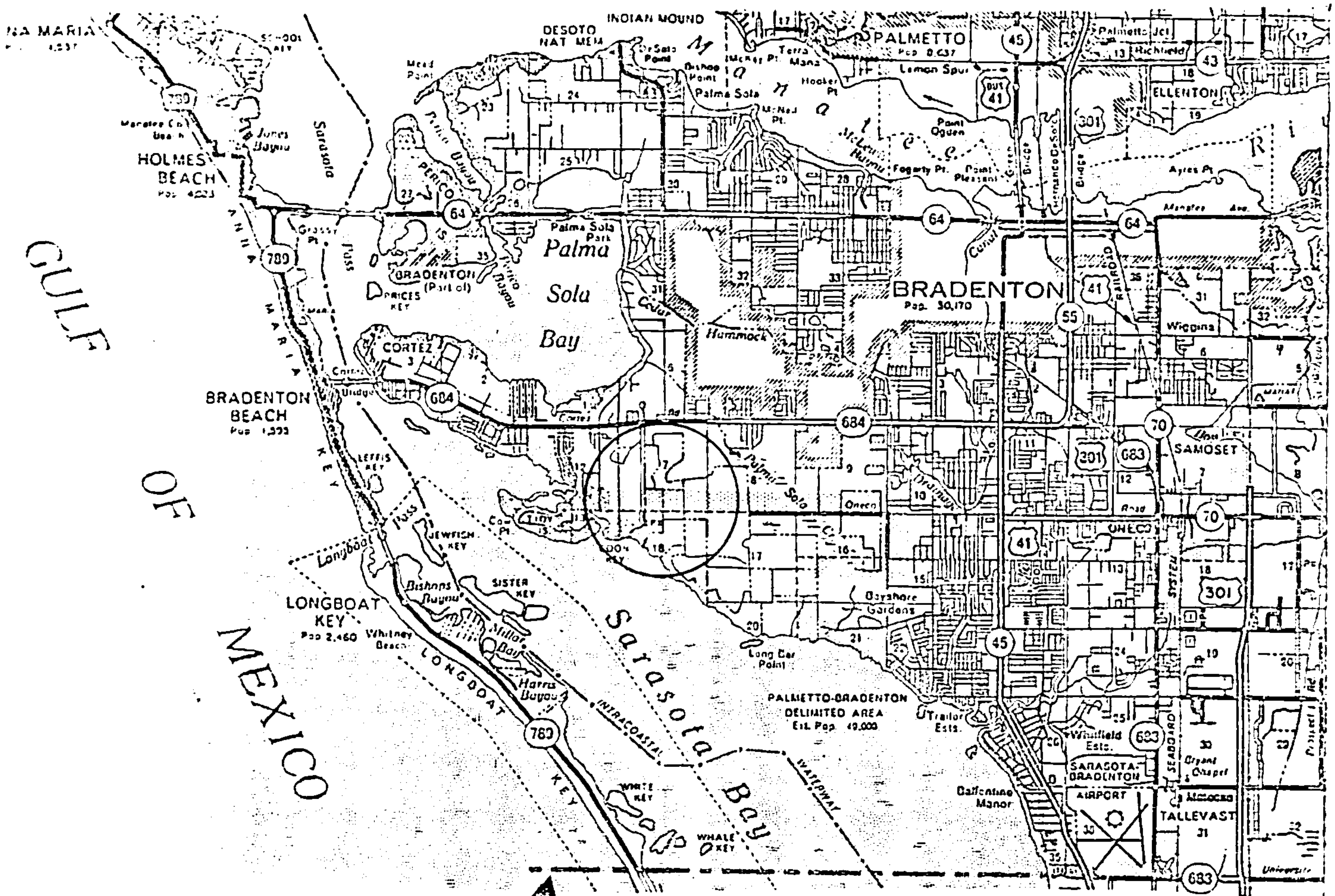
Although the total residual chlorine concentration of the sample (2.7 mg/l Hach and 4.1 mg/l Iodometric) was more than sufficient to have caused the observed mortality in the chlorinated test; the mortality in the dechlorinated tests shows that the total residual chlorine was not the only toxic agent in the sample.

Chemical analyses detected the pesticides, Aldrin (0.2 µg/l), g-BHC [Lindane] (0.07 µg/l), and several unidentified components sensitive to electron capture and nitrogen/phosphorus detection. The metals, silver (0.11 µg/l) and zinc (5.0 µg/l), were also detected in the sample. The concentrations of the identified components in the sample were not thought to be of sufficient quantity to have caused the observed toxic effects in the dechlorinated sample, thus a cause of toxicity was not established in the dechlorinated sample.

Introduction

The Manatee County Southwest Wastewater Treatment Plant, NPDES #FL0027847, is located at 6615 Cortez Road, Bradenton, Manatee County, Florida (Figure 1). The facility has a design capacity of 16.0 MGD with a highest 30 day average flow of 15.9 MGD. Treatment consists of a bar screen aerated grit chamber, flow equalization, and biological treatment using activated sludge (12.0 MGD) or contact stabilization (4.0 MGD). Discharge water is then chlorinated and discharged to 4 polishing ponds in series (total of 12 acres), then to 2 holding ponds (58 acre total), then to a retention pond (53 acres), then to an abandoned shellpit (52 acres), and is then used to irrigate a golf course or agricultural land. Sludge is treated by aerobic digestion and DAF sludge thickening, dried in sludge drying beds, and then hauled to flower farms for use as a soil conditioner. The outfall #001 of this facility is a ditch to Sarasota Bay; however, discharge does not occur except during rainfall as most of the treated water goes to ponds or for spray irrigation.

To evaluate the existence and extent of toxicity from this facility, the Biology Section, at the request of the FDER Southwest District Office in Tampa, performed six (6) static acute bioassays and two (2) Microtox® assays on a sample of discharge from this facility. The results of those tests are presented in this report. Those involved in performing the tests and in preparation of this report were: J. M. Faircloth, L. A. Williams, and S. H. Wolfe.



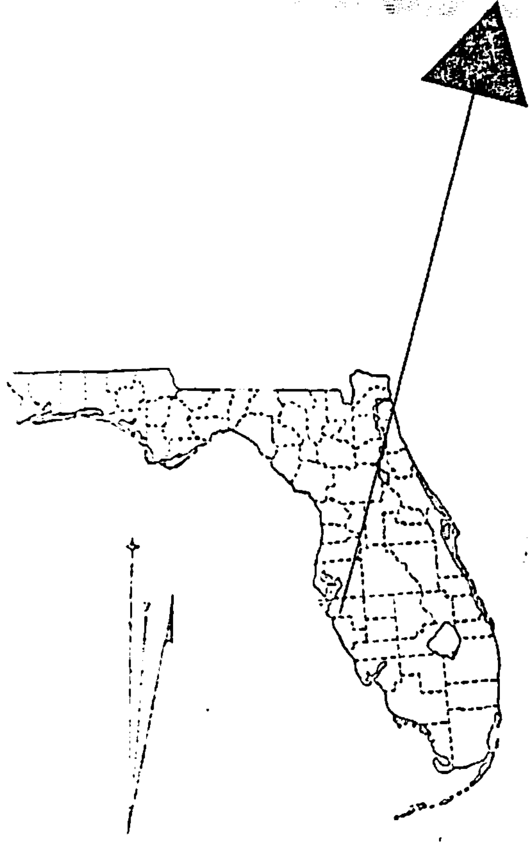


Figure 1. Portion of Manatee County, Florida, showing general location of Manatee County Southwest WWTP.

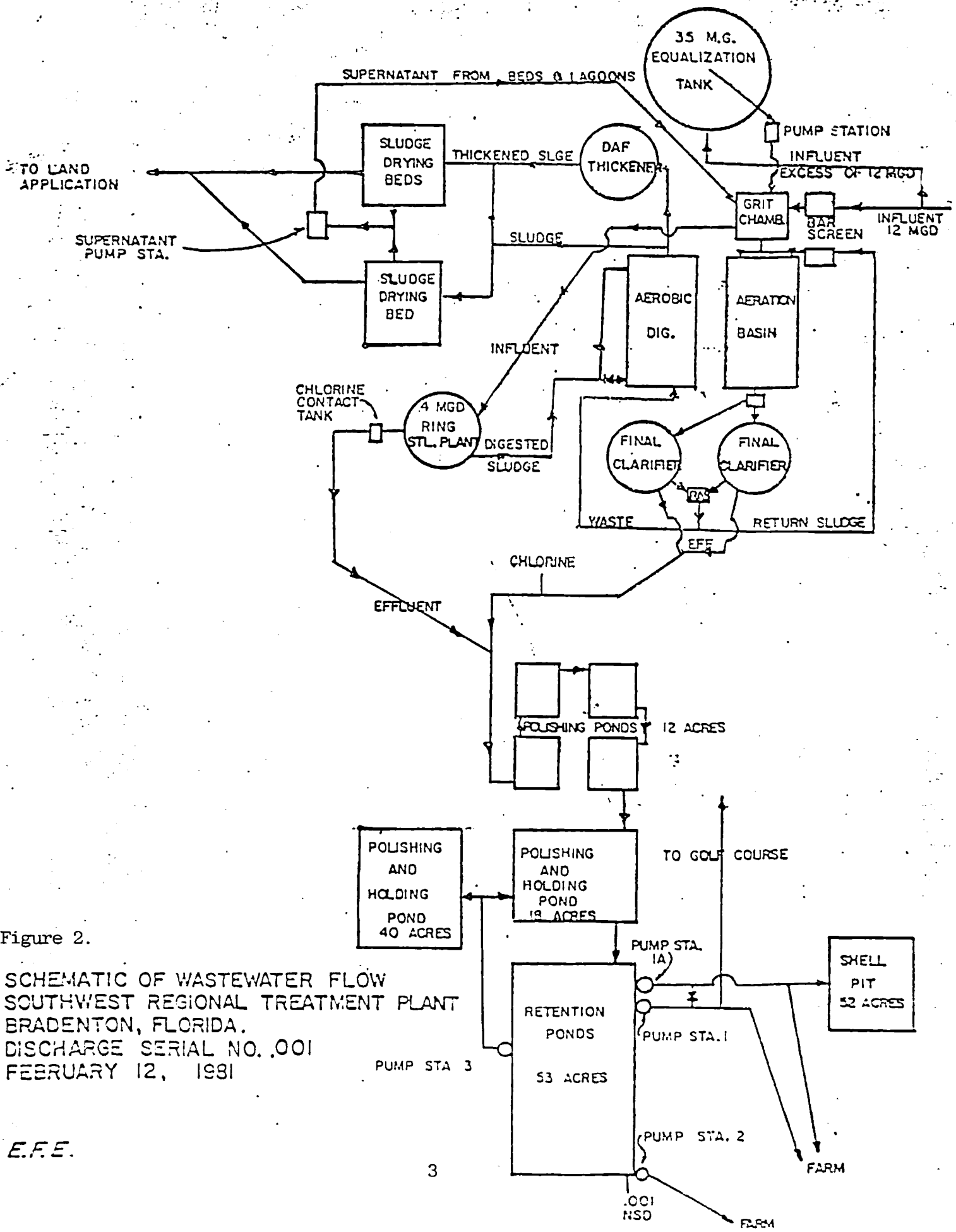


Figure 2.

SCHEMATIC OF WASTEWATER FLOW
SOUTHWEST REGIONAL TREATMENT PLANT
BRADENTON, FLORIDA.
DISCHARGE SERIAL NO. .001
FEBRUARY 12, 1981

E.F.E.

Methods and Materials

Test methods used to conduct these static bioassays are extensively described by Peltier and Weber (1985) and the FDER Biology Section (1985). The organisms selected for this study include a species recommended by Peltier and Weber (1985) and the FDER Biology Section (1985). Additionally, the Biology Section maintains cultures of several species of organisms indigenous to the State of Florida. One of these indigenous species was also selected for testing. Life histories of these test organisms and maintenance procedures used to culture them are detailed below.

The Microtox® assay was run according to the manufacturer's protocol described in the Microtox® System Operating Manual (Beckman 1982).

1. History and Maintenance of Bioassay Organisms

Daphnia pulex (water flea)—A breeding culture of *Daphnia pulex* was obtained from the EPA laboratory in Athens, Georgia, in June, 1987. This culture has been maintained since its arrival in 2 1/2 gallon all-glass aquaria, filled with unchlorinated DER well water, under a 16:8 hour light-dark cycle. Organisms are fed a liquified blend of Purina Trout Chow® and Cerophyl® twice daily, once daily on weekends, and are kept at a constant temperature of 22 ±2 °C. The aquaria are cleaned weekly by siphoning off half the water along with the detritus and excess organisms, and then refilling with fresh aerated well water. Additional measures are taken and/or new cultures started in the event of abnormal circumstances such as: declining populations, ephippia formation, or excessive fungal or bacterial growth.

Ceriodaphnia dubia (water flea)—A breeding culture of *Ceriodaphnia dubia* was obtained from the EPA laboratory in Athens, Georgia, in June, 1985. The culture is maintained in 2-1/2 gallon all-glass aquaria, filled with unchlorinated DER well water, under a 16:8 hour light-dark cycle. Organisms are fed a liquified blend of Purina Trout Chow®, Cerophyl® and Fleischmann's® yeast twice daily, once daily on weekends, and are kept at a constant temperature of 26 ±2 °C. The aquaria are cleaned weekly by siphoning off half the water along with the detritus and excess organisms, and then refilling with fresh aerated well water. Additional measures are taken and/or new cultures started in the event of abnormal circumstances such as: declining populations, ephippia formation, or excessive fungal or bacterial growth.

Notropis leedsi (bannerfin shiner)—Approximately 40 adult bannerfin shiners were obtained from an indigenous population in the upper Suwannee River during October, 1981. The breeding stock is maintained in 125 gallon all-glass aquaria equipped with a flow-through water exchange system. Water for this system is unchlorinated and is pumped from the DER deep well. The bannerfin shiners are reared at 22 ±2 °C under a 16:8 hour light-dark cycle and are fed Aquarian® flake food and frozen *Artemia* (brine shrimp) twice daily, and once daily on weekends. Breeding and egg hatching are encouraged at 25 °C. The eggs are laid between stacked red ceramic tiles separated by a 3mm bead of silicone. Most of the eggs adhere to the tiles and are easily removed to heated, aerated hatching tanks. The narrow space between the tiles eliminates egg predation by adult fish. New hatching tanks are started regularly to segregate fry into even age groups. Newly hatched fry are fed a liquefied blend of Purina Trout Chow® and Cerophyl® twice daily. After one week, feeding is augmented with newly hatched *Artemia* nauplii and finely crushed Aquarian® flake food. The fish used were 18 days old when the test commenced.

Photobacterium phosphoreum, a luminescent marine bacterium, is maintained as a freeze-dried culture, purchased from Microbics Corporation. Lot number M-606 was used in this assay. Immediately prior to the assay, the culture is rehydrated with 1.0 ml of specially purified water (Microtox Reconstitution Solution).

2. Standard Reference Toxicity Assays

To ensure the uniform sensitivity of these test organisms to toxic substances, the Biology Section conducts monthly standard reference toxicant bioassays using sodium lauryl sulfate as the reference toxicant.

3. Test Methods

Methods used to perform acute toxicity bioassays are described by Peltier and Weber (1985) and the FDER Biology Section (1985). Some of the methods described below are more specific than those of Peltier and Weber. These will be noted in more detail.

Sampling Methods and Test Dates

Six separate 48 hour acute toxicity bioassays and two Microtox® assay were performed on a sample from the Manatee Couty Southwest WWPT facility. The tests were performed from 1100 hours on 18 October to 1100 hours on 20 October, 1988.

Separate samples were obtained for chemical and biological testing. Samples for metal analyses were preserved with $HN0_3$. Samples for organic chemical analyses and for the bioassays were unpreserved. The samples were collected by Mr. David Demmi of the FDER's Southwest District Office in Tampa, at 1030 hours on 17 October, 1988, using standard wastewater sampling procedures. The samples were iced and transported to the DER laboratory in Tallahassee for analyses within 24 hours of collection.

Test Temperature

Upon arrival of the iced (4 °C) bioassay samples in the Tallahassee laboratory, the containers were placed in warm water and the temperature of the samples allowed to rise to 20 ± 2 °C. Although this temperature may be different than the temperature of the sample during collection, it is the temperature range to which the test organisms are acclimatized and is the range recommended in the above referenced bioassay protocols. This avoids stressful effects caused by exposure to unusually cold or warm samples.

Total Residual Chlorine

Since many reclaimed waters are chlorinated, especially those originating from sewage treatment facilities, it is often desirable to differentiate between the toxicity resulting from chlorine and the toxicity associated with other components of the reclaimed water. To accomplish this, the Biology Section performed concurrent bioassays on a sample of chlorinated reclaimed water in which the chlorine had been neutralized. Dechlorination was accomplished by adding a calculated amount of 0.025N sodium thiosulfate. The total residual chlorine concentrations of the tested sample of reclaimed water are given on the bioassay data forms. A comparison of the results of these tests will distinguish between the toxicity due solely to residual chlorine and the toxicity inherently contained in the reclaimed water.

Method

Freshwater for diluting the water samples being tested was obtained from the same DER deep well that is used to culture the test organisms. The concentration series selected for this study is given in Table 1.

Four replicates consisting of 30 ml plastic vials containing 15 mls of the control and each test concentration were used in bioassays with the water fleas, *Ceriodaphnia dubia* and *Daphnia pulex*. Adult *Ceriodaphnia* and *Daphnia* were separated using a nylon mesh sieve and placed into large culture dishes 18 hrs before the beginning of the test. Neonates produced during the intervening period (i.e., <18 hr old) were then captured by glass pipette, examined for injury, and transferred into the test chambers. Five individuals for both *C. dubia* and *D. pulex* were loaded

per chamber, resulting in 20 per test concentration. The water fleas were not fed during these tests.

Two replicates of each concentration and a control were used for the *Notropis leedsi* (bannerfin shiner) bioassay. The fish were transferred individually or by twos using a pipette into wide mouth quart jars containing 500 ml each of the appropriate test concentration. Five were loaded per chamber, resulting in 10 per concentration. Fish were not fed during this test.

Test Parameters

Dissolved oxygen (YSI Model 57 oxygen meter), pH (Corning Model 7 pH meter with Orion Ross® combination electrode), temperature (NBS calibrated glass thermometer), and the number of live organisms were recorded for each test concentration at 0 hours, 24 hours, and 48 hours. Total alkalinity and total hardness (measured as $CaCO_3$ using Hach Chemical Company reagents) were recorded at the beginning of the test for the controls and the 100% reclaimed water concentration. The specific conductance (YSI Model 35 Conductance meter) of each test concentration was recorded at the beginning and end of the test. All instruments were calibrated before use according to manufacturer's recommendations. Ammonia concentrations, including the total and unionized fraction (expressed in mg/l as N and as NH_3, respectively), were recorded in the controls and the 100% reclaimed water test concentration at the beginning of the test. Total ammonia concentrations were determined using an Orion specific ion probe and an Orion Ionalyzer®. The unionized fraction was then calculated based on the total ammonia concentration and the pH, temperature, and salinity of the sample. These values were recorded on the bioassay data forms and are presented in Tables 2 and 3.

Microtox® Test

Upon receipt at the DER laboratory, a 20 ml subsample was collected for Microtox® analysis. The sample was adjusted to 2% salinity with reagent grade dry sodium chloride to maintain the osmotic balance of the test bacterium during the assay. Four two-fold dilutions were made of the test sample resulting in a test range of 99%, 49.5%, 24.75%, 12.38%, and 0%. An incubation temperature of 15 °C was maintained throughout the assay. Ten µl of bacterial suspension was added to each of the 1.0 ml test dilutions. Light output (luminescence) was read after 5 and 15 minutes incubation, using the Microtox® analyzer and recorded on a Perkin-Elmer strip chart recorder. In the presence of a toxicant, the luminescence of the test organisms will decrease. In the presence of a stimulant, the luminescence will increase. Toxicity is calculated as a function of the light lost in the test sample, normalized to the control, and is reported as the effective concentration at which a 50% reduction, of light output is determined in 15 minutes (EC_{50}). Results are given in Table 4.

Results and Discussion

The sample of chlorinated discharge from the Manatee County SW WWTP was toxic to the bioassay test organisms, *Ceriodaphnia dubia*, *Daphnia pulex*, and *Notropis leedsi*, producing LC_{50}'s of < 100%. The chlorinated sample adversely affected the Microtox® assay test organism, *Photobacterium phosphoreum*, producing an EC_{50} of 4.35%.

The dechlorinated sample was toxic to the bioassay test organisms, *C. dubia* and *D. pulex*, producing LC_{50}'s of 67.1% and < 100%, respectively. The dechlorinated sample also adversely affected the Microtox® assay organism, *P. phosphoreum*, producing an EC_{50} of 178.8%.

The total residual chlorine concentration of the sample (2.7 mg/l Hach and 4.1 mg/l Iodometric) was more than sufficient to have caused the observed mortality in the chlorinated test; however, the mortality in the dechlorinated tests shows that the total residual chlorine was not the only toxic agent in the sample.

Chemical analyses detected the pesticides, aldrin (0.2 µg/l), g-BHC [Lindane] (0.07 µg/l), and several unidentified components sensitive to electron capture and nitrogen/phosphorus detection. The metals, silver (0.11 µg/l) and zinc (5.0 µg/l) were also detected in the sample. The concentrations of the identified components in the sample were not thought to be great enough to have caused the observed toxic effects in the dechlorinated sample, thus a contributing cause of toxicity was not established in the dechlorinated sample.

In conclusion, the sample from the Manatee County SW WWTP was toxic on 17 October, 1988. Toxicity was noted in both the chlorinated and dechlorinated tests; indicating that the total residual chlorine was not the only toxic substance in the sample.

Biology Section Recommendations

The Biology Section recommends that the facility be required to undertake additional toxicity and chemical testing of their discharge even though the discharge does not go to Sarasota Bay except occasionally during rainfall. The recommendation of chemical testing is to determine if the pesticides, Aldrin and g-BHC, are consistently present in the treated water from the facility and because of concern for the possible bioaccumulation effects, especially of Aldrin. Chemical testing could also show that the amount of chlorine used to treat the discharge might be reduced if it is consistently high. If the toxicity is persistent, then they should be required to undertake a TRE with the goal of removing the toxicity, or to cease discharge to the Bay under any conditions.

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 acute bioassay of a sample of chlorinated discharge from the Manatee County Southwest WWTP, NPDES #FL0027847, Bradenton, Manatee County, Florida, on 18 to 20 October, 1988.

Facility: **Manatee Co. SW STP** NPDES # **FL0027847** Facility Type: **Municipal**
Location: 6615 Cortez Rd. Bradenton Contact/District: D. Demmi
County: Manatee Test type: Static Screen
Sample Collection Date: **10/17/88** Time: 1030 # tests: 6 Receiving Water: Sarasota Bay when overfl
Test Beginning Date: 10/18/88 Time: 1100 Chlorination Type: **Chlorinated**
Test Ending Date: 10/20/88 Time: 1100 **Page 1 of 2**

Total Residual Cl2	mg/l	Method
Field:	>3.0	Hach
Lab:	2.7	Hach
Lab:	4.1	Iodometric

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control Water (daphnids):	0.04	0.00
100% Sample:	0.00	0.00

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	125	115
Cond. Control Water (daphnids):	130	135
100% Sample:	45	300

Salinity (ppt)	
Control Water:	0
100% Sample:	1

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	48 hour
Control	5	5	-	8.8	8.3	-	8.1	8.1	-	19.3	20.5	-	-	-
Control	5	5	-	8.8	8.3	-	8.1	8.1	-	-	-	-	-	-
Control	5	5	-	8.8	8.3	-	8.1	8.1	-	-	-	-	-	-
Control	5	5	-	8.9	8.3	-	8.1	8.1	-	-	-	-	220	250
100%	5	0	-	8.7	8.4	-	7.0	7.6	-	20.2	20.5	-	-	-
100%	5	0	-	8.7	8.5	-	7.0	7.6	-	-	-	-	-	-
100%	5	0	-	8.8	8.5	-	6.9	7.6	-	-	-	-	-	-
100%	5	0	-	8.7	8.5	-	6.9	7.6	-	-	-	-	1680	1850

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	48 hour
Control	5	5	-	8.7	8.1	-	8.0	8.1	-	19.4	20.7	-	-	-
Control	5	5	-	8.8	8.2	-	8.0	8.1	-	-	-	-	-	-
Control	5	5	-	8.7	8.2	-	8.0	8.1	-	-	-	-	-	-
Control	5	5	-	8.7	8.2	-	8.0	8.1	-	-	-	-	220	260
100%	5	0	-	8.5	8.4	-	6.8	7.6	-	19.3	20.6	-	-	-
100%	5	0	-	8.6	8.4	-	6.7	7.6	-	-	-	-	-	-
100%	5	0	-	8.6	8.5	-	6.8	7.6	-	-	-	-	-	-
100%	5	0	-	8.6	8.5	-	6.8	7.6	-	-	-	-	1630	1830

Organism: ***Notropis leedsi*** Age: 18 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	48 hour
Control	5	5	-	8.6	8.2	-	7.6	7.8	-	21.7	19.8	-	-	-
Control	5	5	-	8.6	8.2	-	7.6	7.8	-	-	-	-	225	220
100%	5	0	-	7.9	8.5	-	6.4	7.0	-	19.7	19.7	-	-	-
100%	5	0	-	8.0	8.5	-	6.4	7.0	-	-	-	-	1745	1755

Table 3. Data recorded during the 48 hour static acute bioassay of a dechlorinated sample of discharge from the Manatee County Southwest WWTP, NPDES #FL0027847, Bradenton, Manatee County, Florida, on 18 to 20 October, 1988.

Facility:	Manatee Co. SW STP	NPDES #	FL0027847	Facility Type:	Municipal
Location:	6615 Cortez Rd. Bradenton	Contact/District:	D. Demmi		
County:	Manatee	Test type:	definitive		
Sample Collection Date:	10/17/88 Time: 1030	# tests:	6	Receiving Water:	Sarasota Bay
Test Beginning Date:	10/18/88 Time: 1100	Chlorination Type:	dechlorinated		when overflow occurs
Test Ending Date:	10/20/88 Time: 1100				

Total Residual Cl2	mg/l	Method
Field:	>3.0	Hach
Lab:	2.7	Hach
Lab:	4.1	Iodometric

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control Water (daphnids):	0.04	0.00
100% Sample:	0.00	0.00

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	125	115
Cond. Control Water (daphnids):	130	135
100% Sample:	45	300

Salinity (ppt)	
Control Water:	0
100% Sample:	1

Organism: *Ceriodaphnia dubia* Life stage: neonate
LC50: - Binomial: 67.1% 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	-	8.6	8.4	-	8.3	19.4	-	19.9	-	-
Control	5	5	5	8.9	-	8.6	8.4	-	8.3	-	-	-	-	-
Control	5	5	5	8.9	-	8.7	8.4	-	8.3	-	-	-	-	-
Control	5	5	5	8.9	-	8.7	8.4	-	8.3	-	-	-	215	265
10%	5	5	5	9.1	-	8.7	8.1	-	8.2	19.0	-	20.0	-	-
10%	5	5	5	9.2	-	8.7	8.1	-	8.2	-	-	-	-	-
10%	5	5	5	9.1	-	8.7	8.1	-	8.2	-	-	-	-	-
10%	5	5	5	9.1	-	8.8	8.1	-	8.2	-	-	-	370	450
30%	5	5	5	9.0	-	8.7	7.8	-	8.1	19.6	-	20.0	-	-
30%	5	5	5	9.0	-	8.7	7.8	-	8.1	-	-	-	-	-
30%	5	5	5	9.0	-	8.8	7.8	-	8.1	-	-	-	-	-
30%	5	5	5	9.1	-	8.8	7.8	-	8.1	-	-	-	660	780
50%	5	5	5	9.0	-	8.8	7.5	-	8.0	19.5	-	19.9	-	-
50%	5	5	5	9.0	-	8.8	7.8	-	8.0	-	-	-	-	-
50%	5	5	5	9.0	-	8.8	7.8	-	8.0	-	-	-	-	-
50%	5	5	5	9.0	-	8.7	7.4	-	8.0	-	-	-	965	1125
70%	5	5	1	8.9	-	8.8	7.3	-	7.9	20.0	-	20.0	-	-
70%	5	5	1	8.9	-	8.8	7.3	-	7.9	-	-	-	-	-
70%	5	5	3	8.9	-	8.8	7.3	-	7.9	-	-	-	-	-
70%	5	5	3	8.9	-	8.7	7.3	-	7.9	-	-	-	1245	1460
85%	5	5	0	8.7	-	8.7	7.1	-	7.8	20.3	-	20.1	-	-
85%	5	5	0	8.7	-	8.7	7.1	-	7.8	-	-	-	-	-
85%	5	5	0	8.8	-	8.7	7.1	-	7.8	-	-	-	-	-
85%	5	4	0	8.8	-	8.8	7.1	-	7.8	-	-	-	1485	1720
100%	5	0	0	8.5	-	8.8	6.9	-	7.7	20.8	-	20.1	-	-
100%	5	0	0	8.5	-	8.8	6.9	-	7.7	-	-	-	-	-
100%	5	0	0	8.6	-	8.8	6.9	-	7.7	-	-	-	-	-
100%	5	0	0	8.6	-	8.8	6.9	-	7.7	-	-	-	1720	1990

Organism: *Daphnia pulex* Life stage: neonate
LC50: <100% 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	8.8	-	8.5	8.1	-	8.2	19.6	20.1	-	-	-
Control	5	5	5	8.8	-	8.5	8.1	-	8.2	-	-	-	-	-
Control	5	5	5	8.9	-	8.5	8.1	-	8.2	-	-	-	-	-
Control	5	5	5	8.8	-	8.6	8.1	-	8.2	-	-	-	215	265
100%	5	3	3	8.4	-	8.6	6.8	-	7.7	19.5	20.1	-	-	-
100%	5	4	0	8.4	-	8.6	6.7	-	7.7	-	-	-	-	-
100%	5	4	3	8.5	-	8.6	6.8	-	7.7	-	-	-	-	-
100%	5	3*	-*	8.6	-	8.6	6.8	-	7.7	-	-	-	1640	1985

* spilled after count

Table 3. Continued.

Facility:	Manatee Co. SW STP		NPDES #	FL0027847	Facility Type: Municipal
Location:	6615 Cortez Rd. Bradenton		Contact/District:	D. Demmi	
County:	Manatee		Test type:	definitive	
Sample Collection Date:	10/17/88	Time: 1030	# tests:	6	Receiving Water: Sarasota Bay when overfl
Test Beginning Date:	10/18/88	Time: 1100	Chlorination Type:	dechlorinated	
Test Ending Date:	10/20/88	Time: 1100			Page 2 of 2

Total Residual Cl2	mg/l	Method
Field:	>3.0	Hach
Lab:	2.7	Hach
Lab:	4.1	Iodometric

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control Water (daphnids):	0.04	0.00
100% Sample:	0.00	0.00

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	125	115
Cond. Control Water (daphnids):	130	135
100% Sample:	45	300

Salinity (ppt)	
Control Water:	0
100% Sample:	1

Organism: *Notropis leedsi* Age: 18 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	8.7	8.0	8.3	7.6	8.0	8.0	2 0.9	19.8	19.3	-	-
Control	5	5	5	8.7	8.2	8.2	7.6	8.0	8.0	-	-	-	220	225
10%	5	5	5	8.7	8.3	8.2	7.4	7.9	7.9	21.0	19.4	19.1	-	-
10%	5	5	5	8.7	8.3	8.2	7.4	7.9	7.9	-	-	-	445	450
30%	5	4	4	8.6	8.3	8.0	7.3	7.8	7.8	21.2	19.3	19.0	-	-
30%	5	5	5	8.6	8.3	8.0	7.3	7.8	7.7	-	-	-	695	700
50%	5	5	5	8.4	8.2	8.1	7.1	7.6	7.6	21.2	19.3	19.0	-	-
50%	5	5	5	8.5	8.2	8.2	7.7	7.6	7.6	-	-	-	1040	1020
70%	5	5	5	8.2	8.1	8.2	6.9	7.4	7.5	21.1	19.3	19.1	-	-
70%	5	5	5	8.3	8.1	8.2	6.9	7.4	7.5	-	-	-	1355	1330
85%	5	5	5	8.1	8.1	8.2	6.7	7.3	7.4	21.2	19.3	19.1	-	-
85%	5	5	5	8.2	8.1	8.0	6.7	7.3	7.4	-	-	-	1590	1560
100%	5	4	4	8.0	7.9	7.9	6.6	7.1	7.2	21.1	19.6	19.1	-	-
100%	5	5	5	8.1	8.0	8.0	6.6	7.1	7.2	-	-	-	1820	1790

Table 4. Microtox test results, Manatee County Southwest WWTP discharge, Manatee County, NPDES #FL0027847, on 18 October, 1988.

Microtox Test — Culture Lot # M-606

% Sample	Final Reclaimed Water			
	Chlorinated		Dechlorinated	
	5-min	15-min	5-min	15-min
0	73	50	42	28
0	69	47	35	23
0	71	53	35	23
12.38	0.1	0	41	27
12.38	0.6	8	41	27
12.38	0.1	0	41	28
24.75	47	30	40	26
24.75	48	32	40	26
24.75	48	32	40	26
49.5	59	41	37	23
49.5	59	41	37	23
49.5	62	41	37	23
99	62	40	34	19
99	62	41	33	19
99	65	42	34	19

EC_{50} Chlorinated (15 minute, 15 °C) = 4.35% sample
EC_{50} Dechlorinated (15 minute, 15 °C) =178.95% 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

Organism	Method of Data Analysis	48 Hour LC_{50} (95% Confidence Intervals)
Chlorinated discharge		
Ceriodaphnia dubia	noncalculated	<100% [a]
Daphnia pulex	noncalculated	<100% [a]
Notropis leedsi	noncalculated	<100% [a]
Dechlorinated discharge		
Ceriodaphnia dubia	Binomial	67.13% (50.00% , 85.00%)
	Moving Average	[b]
	Probit	[b]
Daphnia pulex	noncalculated	<100% [a]
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 Manatee County Southwest WWTP, Bradenton, Manatee County, Florida.

Organics	
Acid Extractables	None detected
Base Neutral Extractables	None detected
Pesticide Extractables	Aldrin (0.2µg/l)
	g-BHC (0.07µg/l)
	Several unidentified components sensitive to ECD and NPD

Metals	
Silver	0.11 µg/l
Zinc	5.0 µg/l

Literature Cited

Beckman Instruments, Inc. 1982. Microtox system operating manual.

Florida Department of Environmental Regulation. 1985. Quality assurance manual for performing acute toxicity tests (Second Edition). Biology Section, Tallahassee.

Peltier, W. and C. I. Weber. 1985. Methods for measuring the acute toxicity of effluents to aquatic organisms (Third Edition). Environmental Research Laboratory. Athens, Georgia. EPA-600/4-85-012. 217 p.

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 concentration of the sampled discharge than allowed above.

dechlorinated Control # 014

Industry/Toxicant Manatee Co S.W. STP
Address 6615 Cortez Rd
Contact/District D Dimmig / Southwest SW
Effluent Serial Number Not Effluent
NPDES Permit Number FLC027847

BIOASSAY DATA FORM

Test Number: 1 of 6
Test Type: Static Renewal, Screening Conventional
Other:

Sample Collection: Date 10-12-88 Time 1030
Test Beginning: Date 10-18-88 Time 1100
Test Ending: Date 10-20-88 Time 1100
Test Organism C. Dubia
Age/Life Stage Neonate

Conc. or %	Test Container Number	Number of Live Organisms 0	24	48	72	96	Dissolved Oxygen (mg/l) 0	24	48	72	96	pH 0	24	48	72	96	Temperature °C 0	24	48	72	96	Conductivity 0	24	48	72	96
Control	1/2	5/5	5/5	5/5			8.9/8.9		8.6/8.6			8.4/8.4		8.3/8.3			19.4/		19.7/							
Control	3/4	5/5	5/5	5/5			8.9/8.9		8.7/8.7			8.4/8.4		8.3/8.3								215		265		
10%	5/6	5/5	5/5	5/5			9.1/9.2		8.7/8.7			8.1/8.1		8.2/8.2			19.0		20.0							
10%	7/8	5/5	5/5	5/5			9.1/9.1		8.7/8.8			8.1/8.1		8.2/8.2								370		450		
30%	9/10	5/5	5/5	5/5			9.0/9.0		8.7/8.7			7.8/7.8		8.1/8.1			19.5		20.0							
30%	11/12	5/5	5/5	5/5			9.6/9.1		8.8/8.8			7.8/7.8		8.1/8.1								669		780		
50%	13/14	5/5	5/5	5/5			9.6/9.6		8.8/8.8			7.5/7.5		8.0/8.0			19.5		19.9							
50%	15/16	5/5	5/5	5/5			9.6/9.6		8.8/8.7			7.5/7.4		8.0/8.0								965		1125		
70%	17/18	5/5	5/5	1/1			8.9/8.9		8.8/8.8			7.3/7.3		7.9/7.9			20.0		20.0							
70%	19/20	5/5	5/5	3/3			8.9/8.9		8.8/8.7			7.3/7.3		7.9/7.9								1245		1460		
85%	21/22	5/5	5/5	0/0			8.7/8.7		8.7/8.7			7.1/7.1		7.8/7.8			20.3/		20.1/							
85%	23/24	5/5	5/4	0/0			8.8/8.8		8.7/8.8			7.1/7.1		7.8/7.8								1485		1720		
100%	25/26	5/5	0/0	0/0			8.8/8.8		8.8/8.8			6.9/6.9		7.7/7.7			20.2/		20.2/							
100%	27/28	5/5	0/0	0/0			8.6/8.6		8.8/8.8			6.9/6.9		7.7/7.7								1720		1980		
Initial of Investigator		mf	SHW mf	mf			SHW		SHW			SHW		SHW			SHW		SHW			SHW		SHW		

Alkalinity/Hardness (mg/l as $CaCO_3$) A H
Control Water: 130 135
100% Sample: 45 300
Other: 125 115
Measured by: mf

Ammonia unionized/total (mg/l as NH_3/N)
Hour 0
Control Water: 0.043
100% Sample: 0.0
Other: 0.0
Hour 72
Control Water:
100% Sample:
Other:
Measured by: MF

Signatures: Mark Hamblett
Marion Hodges

Instrument Calibration:

	pH Meter:	D. O. Meter:	S-C-T Meter:
0 Hours	7.0 9.8 7	9.0 @ 21.2°C	1300 µ 1305 @ 21.2°C
24 Hours	7.0 10.0 7	9.1 @ 21.2°C	1300 µ 1300 @ 21.0°C
48 Hours	7.0 10.0 7	9.0 @ 21°C	1290 µ 1294 @ 21.0
72 Hours			
96 Hours			

Remarks: 24hr °C DO mg/l 19.8 @ 19.7
48hr °C DO mg/l 19.3 @ 19.3

Total Residual Chlorine:
Field data: 3.0 Method: Hach
Lab: 3.7 Method: Hach
Lab: 4.1 Method: Hach

Recalculated: Recommended by: MF/KBF/KBF

Reviewed by:
Date: 3/13/89

slope - 54.5

Laboratory/Facility: Manatee Co. SW STP
Address: 6615 Cortez Rd
Contact/District: D. Dobmi SE
Effluent Serial Number: Plat Effluent
NPDES Permit Number: FL0027847

BIOASSAY DATA FORM

Test Number: 2 of 6
Test Type: Static Renewal, Screening Conventional
Other:

Sample Collection: Date 10-17-88 Time 1030
Test Beginning: Date 10-18-88 Time 1100
Test Ending: Date 10-20-88 Time 1100
Test Organism: D. pulex
Age/Life Stage: Neonate

Dose or %	Test Contained Number	Number of Live Organisms 0	24	48	72	96	Dissolved Oxygen (mg/l) 0	24	48	72	96	pH 0	24	48	72	96	Temperature °C 0	24	48	72	96	Conductivity 0	24	48	72	96
Control	29	5	5	5			8.8		8.5			8.1		8.2			19.6		20.1							
Control	30	5	5	5			8.8		8.5			8.1		8.2												
Control	31	5	5	5			8.9		8.5			8.1		8.2												
Control	32	5	5	5			8.8		8.6			8.1		8.2								215		265		
100%	33	5	3	3			8.4		8.6			6.8		7.7			19.5		20.1							
100%	34	5	4	0			8.4		8.6			6.7		7.7												
100%	35	5	4	3			8.5		8.6			6.8		7.7												
100%	36	5	3*	—			8.6		8.6			6.8		7.7								1640		1985		
Initial of Investigator		SHW	MF	MF			SHW		SHW			SHW	SHW	SHW			SHW		SHW			SHW		SHW		

Alkalinity/hardness (mg/l as $CaCO_3$)
Control Water:
100% Sample:
Other:
Measured by:

Ammonia unionized/total (mg/l as NH_3/N)
Hour 0
Control Water: 0.647
100% Sample: 0.0
well water: 0.0

Hour ____
Control Water:
100% Sample:
Other:
Measured by:

Signatures:
Marshall Faircloth
Steven H. Woodfe

Instrument Calibrations:

	pH Meter:	D.O. Meter:	S-C-T Meter:
0 hours			13C 21°C
24 hours			
48 hours			
72 hours			
96 hours			

Remarks: *split at 24hrs (after count) Chl 21.0 21.2

Total Residual Chlorine:
Field data: ____ Method: ____
Lab: ____ Method: ____
Lab: ____ Method: ____

Reviewed by: [signature]
Date: 3/13/89

Dechlorination:
Comments (+/-):

Industry/Toxicant: Manatee GSWSTP
Address: 6615 Lorts Rd
Contact/District: D. Dennis SW
Effluent Serial Number: Post Effluent
NPDES Permit Number: FL0027847

BIOASSAY DATA FORM

Test Number: 3 of 6
Test Type: Static Renewal, Screening Conventional
Other:

Sample Collection: Date 10-12-88 Time 1030
Test Beginning: Date 10-18-88 Time
Test Ending: Date Time
Test Organism: Mysidopsis bahia
Age/Life Stage: 28 days

Conc. or %	Test Container Number	Number of Live Organisms 0	24	48	72	96	Dissolved Oxygen (mg/l) 0	24	48	72	96	pH 0	24	48	72	96	Temperature °C 0	24	48	72	96	Conductivity 0	24	48	72	96
Control	13	5	5	5			8.7	8.0	8.3			7.6	8.0	8.0			20.9	19.8	19.3							
Control	9	5	5	5			8.7	8.2	8.2			7.6	8.0	8.0								220	220	225		
10%	228	5	5	5			8.7	8.3	8.2			7.4	7.9	7.9			21.0	19.4	19.1							
10%	12	5	5	5			8.7	8.3	8.2			7.4	7.9	7.9								445	440	450		
30%	18	5	4	4			8.6	8.3	8.0			7.3	7.8	7.8			21.2	19.3	19.0							
30%	50	5	5	5			8.6	8.3	8.0			7.3	7.8	7.7								695	695	700		
50%	19	5	5	5			8.4	8.2	8.1			7.1	7.6	7.6			21.2	19.3	19.0							
50%	18	5	5	5			8.5	8.2	8.2			7.1	7.6	7.6								1040	1010	1020		
70%	52	5	5	5			8.2	8.1	8.2			6.9	7.4	7.5			21.1	19.3	19.1							
70%	39	5	5	5			8.3	8.1	8.2			6.9	7.4	7.5								1355	1320	1330		
85%	20	5	5	5			8.1	8.1	8.2			6.7	7.3	7.4			21.2	19.3	19.1							
85%	72	5	5	5			8.2	8.1	8.0			6.7	7.3	7.4								1590	1550	1560		
100%	49	5	4	4			8.0	7.9	7.9			6.6	7.1	7.2			21.1	19.6	19.1							
100%	86	5	5	5			8.1	8.1	8.0			6.6	7.1	7.2								1820	1780	1790		
Initial of Investigator		SHW	MT	MT			SHW	SHW	SHW			SHW	SHW	SHW			SHW	SHW	SHW			SHW	SHW	SHW		

Alkalinity/Hardness (mg/l as $CaCO_3$)

Control Water:
100% Sample:
Other:
Measured by:

Ammonia unionized/total (mg/l as NH_3/N)
Hour 0

Control Water: 0.0
100% Sample: 0.0
Control Other: 0.1043

Hour 0

Control Water:
100% Sample:
Other:
Measured by: MT

Signatures: Marshall Faircloth

Instrument Calibrations:

	pH Meter:	DO Meter:	S-C-T Meter:
0 Hours			
24 Hours			
48 Hours			
72 Hours			
96 Hours			

Total Residual Chlorine:

Sold data: Method:
Lab: Method:
Lab: Method:

Reviewed by:

Date: 3/13/89

Facility Name: Manatee Co SW STF
Address: 6615 Lorna Rd
Contact/District: D. Dennis SW
Effluent Serial Number: Chlorinated Effluent
NPDES Permit Number: FLA027847

4 of 4 C

ACUTE BIOASSAY DATA SHEET

Test Number: 4of6 Chlorinated
Test Type: Static Renewal, Screening Conventional
Other:

Sample Collection: Date 10-17-88 Time 1030
Test Beginning: Date 10-18-88 Time
Test Ending: Date Time
Test Organism: C. dubia
Age/Life Stage: Neonate

Concentration %	Test Container Number	Number of Live Organisms: 0	24	48	72	96	Dissolved Oxygen (mg/l): 0	24	48	72	96	pH: 0	24	48	72	96	Temperature °C: 0	24	48	72	96	Conductivity: 0	24	48	72	96
Control	37	5	5				8.8	8.3				8.1	8.1				19.3	20.5				2	250			
Control	38	5	5				8.8	8.3				8.1	8.1													
Control	39	5	5				8.8	8.3				8.1	8.1													
Control	40	5	5				8.9	8.3				8.1	8.1									220	250			
100%	41	5	0				8.7	8.4				7.0	7.6				20.2	20.5								
100%	42	5	0				8.7	8.5				7.0	7.6													
100%	43	5	0				8.8	8.5				6.9	7.6													
100%	44	5	0				8.7	8.5				6.9	7.6									164	185			
Initial of Investigator		MF	MF				SHW	SHW				SHW	SHW				SHW	SHW				SHW	SHW			

Alkalinity/Hardness (mg/l as CaCO3)

Control Water:
100% Sample:
Other:
Measured by:

Ammonia unionized/total (mg/l as NH3/N)
Hour 0

Control Water:
100% Sample:
Other:

Hour

Control Water:
100% Sample:
Other:
Measured by:

Signatures:
Marshall Faircloth
Steven H. Wolfe

Instrument Calibrations:

	pH Meter:	DO Meter:	S-C-T Meter:
0 Hours			
24 Hours			
48 Hours			
72 Hours			
Hours			

Remarks:

Total Residual Chlorine:

Field data: Method:
Lab: Method:
24h: Method:

Reviewed by:
Date: 3/13/89

Checked by:
Measurements by:

Industry/Toxicant Rayonier & S.U STP
Address 6615 Cate Rd.
Contact/District D. Dennis SFI
Effluent Serial Number 22-7 effluent
NPDES Permit Number FPCC 25847

BIOASSAY DATA FORM

Test Number: 5 of 6
Test Type: Static Renewal, Screening, Conventional
Other:

Sample Collection: Date 12-17-88 Time 1030
Test Beginning: Date 12-18-88 Time
Test Ending: Date Time
Test Organism Daphnia pulex
Age/Life Stage Neonate

Conc. or %	Test Container Number	Number of Live Organisms 0	24	48	72	96	Dissolved Oxygen (mg/l) 0	24	48	72	96	pH 0	24	48	72	96	Temperature °C 0	24	48	72	96	Conductivity 0	24	48	72	96
Control	45	5	5				8.7	8.1				8.0	8.1				19.4	20.7				220				
Control	46	5	5				8.8	8.2				8.0	8.1													
Control	47	5	5				8.7	8.2				8.0	8.1													
Control	48	5	5				8.7	8.2				8.0	8.1									220	260			
100%	49	5	0				8.5	8.4				6.8	7.6				19.3	20.6								
100%	50	5	0				8.6	8.4				6.7	7.6													
100%	51	5	0				8.6	8.5				6.8	7.6													
100%	52	5	0				8.6	8.5				6.8	7.6									1630	1850			
Initial of Investigator		SHW	AH				SHW	SHW				SHW	SHW				SHW	SHW				SHW	SHW			

Alkalinity/Hardness (mg/l as $CaCO_3$)
Control Water:
100% Sample:
Other:
Measured by:

Ammonia unionized/total (mg/l as NH_3/N)
Hour 0
Control Water:
100% Sample:
Other:
Hour
Control Water:
100% Sample:
Other:
Measured by:

Signatures:
Mayrad Hardtke
Steven W. Hardtke

Instrument Calibrations:

	pH Meter:	DO Meter:	S-C-T Meter:
0 Hours			
24 Hours			
48 Hours			
72 Hours			
96 Hours			

Total Residual Chlorine:
Field data: Method:
Lab: Method:
Lab: Method:
Reviewed by:
Dechlorinated:
Measurements by:
Date: 3/13/89

Facility/Site: Manatee Co SW STP + outfall
Address: 6615 Cortez Rd
Contact/District: D. Dixon SW
Effluent Serial Number: Plant Effluent
NPDES Permit Number: FL0027847

Test Number: 6 of 6
Test Type: Static Renewal, Screening Conventional
Other:

Sample Collection: Date 10-17-88 Time 1030
Test Beginning: Date 10-18-88 Time
Test Ending: Date Time
Test Organism: M. bahia
Age/Life Stage: 20 days

Concentration %	Test Container Number	Number of Live Organisms 0	24	48	72	96	Dissolved Oxygen (mg/l) 0	24	48	72	96	pH 0	24	48	72	96	Temperature °C 0	24	48	72	96	Conductivity 0	24	48	72	96	Salinity/Hardness (mg/l as $CaCO_3$)
Control	47	5	5				8.6	8.2				7.6	7.8				19.8										Control Water:
Control	10	5	5				8.6	8.2				7.6	7.8				21.7					225	220				100% Sample:
100%	21	5	0*				7.9	8.5				6.4	7.0				19.7										Other:
100%	6	5	0*				8.9	8.5				6.4	7.0									1745	1755				Measured by:
Initial of Investigator		SHW	SHW				SHW	SHW				SHW	SHW				SHW	SHW				SHW	SHW				

Salinity uncorrected/Total (mg/l as NaCl-M)
Hour 0

Control Water:
100% Sample:
Other:

Hour

Control Water:
100% Sample:
Other:
Measured by:

Signatures:
Marshall Faircloth
Steven H Wolfe

Instrument Calibrations:

	pH Meter:	DO Meter:	S-C-T Meter:
0 Hours			
24 Hours			
48 Hours			
72 Hours			
96 Hours			

Remarks: * dead after 1 hour

Total Residual Chlorine:
Field data: Method:
Lab: Method:
Lab: Period:

Reviewed by:
Date 3/13/89

Re-determined:
Reviewed by:

MICROTOX™ Data Reduction Sheet

SOURCE: Manatee Co. SW

GRAPH CALC EC 50 (15 MIN, 15 °C) = 4.35 (%SAMPLE) mg/L

SAMPLE DATA:

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

DATE ASSAYED: 10-18-88 TIME: 9:00 Am

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-6010

REMARKS:

MICROTOX™ 99% TEST

SAMPLE CUVETTE	% SAMPLE	READINGS 5 MIN	READINGS 15 MIN	Γ5	Γ15	NOTES
A1	0	73	50	X	X	
B1		69	47			
C1		71	53			
A2	12.38	.1	0	33.36	17.75	
B2		6	8			
C2		.1	0			
A3	~~9.75~~ 6.19	47	30	.490	.596	
B3		48	32			
C3		48	32			
A4	~~19.5~~ 3.09	59	41	.183	.220	
B4		59	41			
C4		62	41			
A5	~~99~~ 1.15	62	40	.127	.220	
B5		62	41			
C5		65	42			
EC_{50} (MIN, °C)				4.41	4.35	

REVIEWED BY:

DATE: 3/13/89

MICROTOX™ Data Reduction Sheet

SOURCE: Manatee CO SW

GRAPH CALC EC 50 (15 MIN, 15 °C) = 178.75 (%SAMPLE) mg/L

SAMPLE DATA:

SAMPLE TYPE (EFFLUENT, LEACHATE, ETC.): effluent - deCl2

DATE ASSAYED: 10-18-88 TIME: 9:30AM

VISUAL COLOR: CORRECTION REQUIRED: YES NO

VISUAL TURBIDITY: SEPARATION REQUIRED: YES NO

INITIAL pH: pH ADJUSTED TO: WITH:

OSMOTICALLY ADJUSTED WITH: MOAS (DRY NaCl) OTHER

PRIMARY DILUTION OF SAMPLE:

OPERATOR: Leeie Williams REAGENT VIAL LOT NO. M- 606

REMARKS:

MICROTOX™ 99% TEST

SAMPLE CUVETTE	% SAMPLE	READINGS 5 MIN	READINGS 15 MIN	Γ5	Γ15	NOTES
A1	0	42	28	X	X	
B1		35	23			
C1		35	23			
A2	12.38	41	27	-.089	-.098	
B2		41	27			
C2		41	28			
A3	24.75	40	26	-.067	-.051	
B3		40	26			
C3		40	26			
A4	49.5	37	23	.009	.072	
B4		37	23			
C4		37	23			
A5	99	34	19	.965	.298	
B5		33	19			
C5		34	19			
EC_{50} (MIN, ° C)				99.48	178.75	

REVIEWED BY:

DATE: 3/13/89