

BIOASSAYS OF THE CITY OF EDGEWATER

SEWAGE TREATMENT PLANT

EDGEWATER, VOLUSIA COUNTY, FLORIDA

NPDES #FL0021431

SAMPLED 12/7/87

FEBRUARY 15, 1988

Biology Section
Division of Environmental Programs

BIOASSAYS OF THE CITY OF EDGEWATER

SEWAGE TREATMENT PLANT

EDGEWATER, VOLUSIA COUNTY, FLORIDA

NPDES #FL0021431

Biology Section
Bureau of Laboratories and
Special Programs
February 15, 1988

EXECUTIVE SUMMARY

City of Edgewater WWTP, Edgewater, Volusia County, Florida, NPDES #FL0021431, on 8 to 10 December, 1987.

The sample of chlorinated discharge from the City of Edgewater WWTP was not acutely toxic to the test organisms Ceriodaphnia dubia, Daphnia pulex, Notropis leedsi, or Pimephales promelas. The only mortality occurred in the C. dubia test with one dead in the controls and two dead in the 50% test concentration. A chlorine residual of 0.05 mg/l was measured in the field and a chlorine residual of 0.0 mg/l was measured in the lab; therefore, the sample was not de-chlorinated in the lab. Total ammonia was 4.50 mg/l and the unionized ammonia was 0.03 mg/l.

The Microtox® assay, using the bacterium, Photobacterium phosphoreum, exhibited minimal toxicity with an EC_{50} of 98.5%. Due to the slight toxicity of the sample to one organism, Photabacterium phosphoreum, chemical analyses were not performed.

INTRODUCTION

The City of Edgewater Wastewater Treatment Plant is located at the west end of Ocean Street, in Edgewater, Volusia County, Florida (Figure 1). The wastewater treatment plant has a design capcity of 2.5 MGD with an average approximate flow of 0.534 MGD and a peak flow of 2.32 MGD. The facility is an extended aeration package plant. The discharge is through Outfall #001 into Indian River North.

The Central Florida District of the FDER requested that the FDER Biology Section evaluate the existence and extent of toxicity in this facility's discharge. The Biology Section performed four acute toxicity bioassays and one Microtox® Assay on the sample from this facility. Those involved in performing the tests and in preparation of this report were: D. A. Chasteen, J. M. Faircloth, and L. A. Williams.

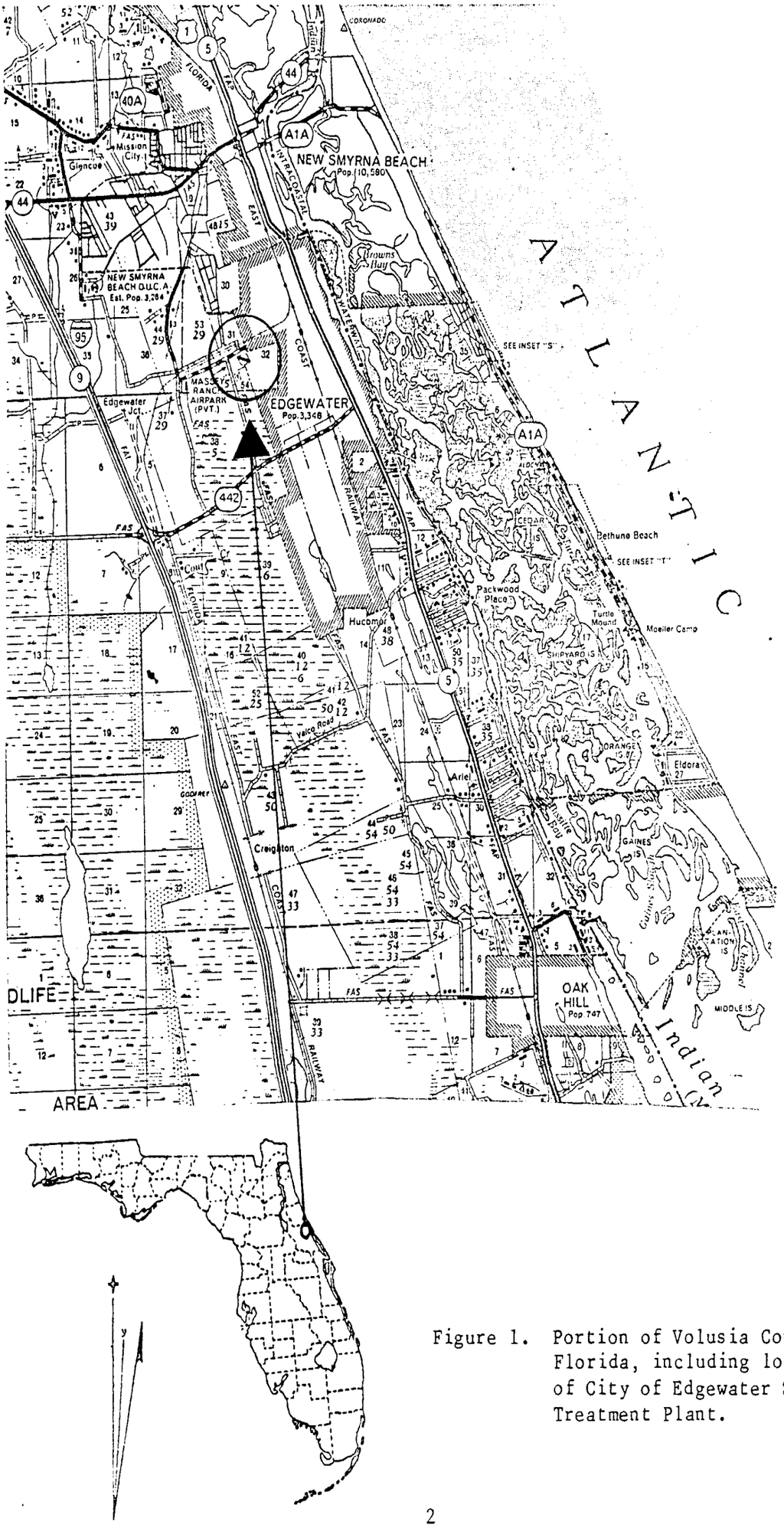


Figure 1. Portion of Volusia County, Florida, including location of City of Edgewater Sewage Treatment Plant.

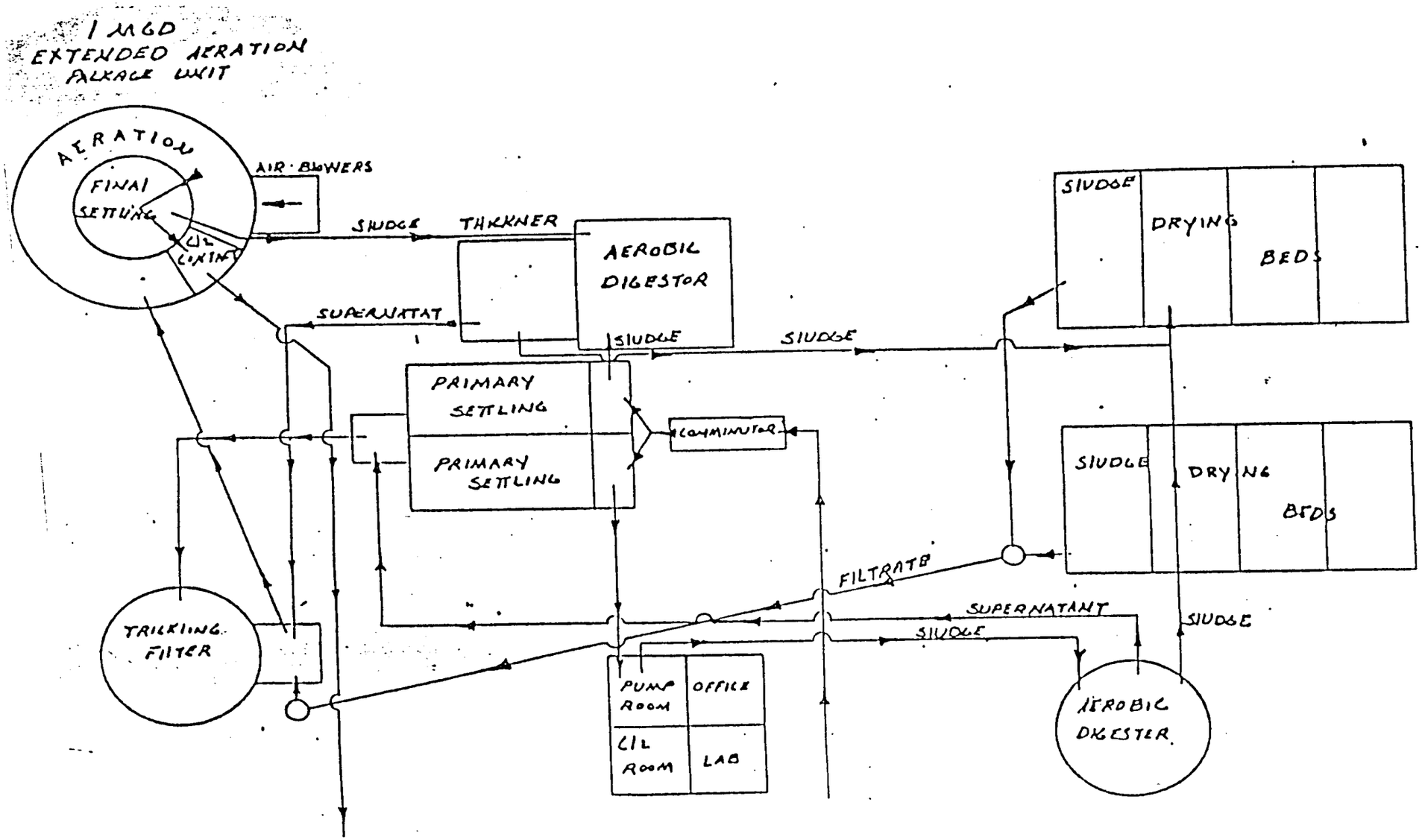


Figure 2. Flow schematic for the City of Edgewater Sewage Treatment Plant.

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 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).

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.

Pimephales promelas (fathead minnows) - A breeding culture of approximately 100 adult fathead minnows was obtained from the EPA laboratory in Cincinnati, Ohio, in May, 1979. This breeding population is augmented with fry hatched in our laboratory and with additional adult fish from EPA as required. The fish are maintained in all-glass aquaria (15 to 125 gallons), equipped with flow-through water exchange systems, using unchlorinated well water obtained from a deep well near the DER laboratory. The fathead minnows are reared at a temperature of 22° ± 2°C under a 16:8 hour light-dark cycle. These fish are fed Glencoe Mills "#3 size enriched trout fry granules" or Tetra-Min®, and frozen Artemia (brine

shrimp) at a rate of 0.75g/30 fish, twice daily, and once daily on weekends. Breeding has been encouraged by placing several halved clay pots in each tank to serve as substrates for eggs and to provide cover for the fish. Tanks are examined twice daily (at feeding time) for egg production. Clay pots containing egg clusters are immediately transferred to 2-1/2 to 15 gallon aerated aquaria for hatching. A new aquarium is prepared for each week's production of eggs, thereby segregating fish into even age groups to be used for testing. After hatching, fathead minnow fry are fed twice daily with freshly hatched Artemia. The fish used in this test were 22 days old at the time of the test.

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 30 and 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 Tetra-Min® 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 Tetra Min®. The fish used in this test were 26 days old at the time of the test.

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).

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.

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

Four static acute toxicity bioassays and one Microtox® Assay were performed on the sample of discharge from the City of Edgewater Wastewater

Treatment Plant Outfall #001. The tests were performed from 1010 hours on 8 December to 1010 hours on 10 December, 1987.

Separate samples were obtained for chemical and biological testing. Samples for metal analyses were preserved with HNO_3. Samples for organic chemical analyses and for the bioassays were unpreserved. The samples were collected by Mr. Louis Ley of the FDER Central Florida District at 1345 hours on 7 December, 1987, 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.

Freshwater Tests

Freshwater for dilution of the recovered water samples 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.

Two replicates, of each concentration and a control, were used to test with the water fleas, Ceriodaphnia dubia and Daphnia pulex. Flint glass jars of either 60 ml (for C. dubia) or 250 ml (for D. pulex) capacity were used as test chambers, and either 50 ml or 200 ml of the appropriate test concentration was placed in each chamber. Ceriodaphnia were siphoned into a large culture dish and neonates were transferred by glass pipette, and loaded 10 per chamber, resulting in 20 per test concentration. Daphnia were siphoned into a large culture dish to isolate the proper size and age organisms (neonates). To accomplish this, the Daphnia were siphoned through a stainless steel screen. The trapped adults were then discarded. These neonates were then transferred by glass pipette, examined for injury, and were loaded 10 per chamber, resulting in 20 per test concentration. Water fleas were not fed during these tests.

Two replicates, of each concentration and a control, were used for the Pimephales promelas and the Notropis leedsi (bannerfin shiner) bioassay. The fish were transferred individually or by twos, into wide mouth quart jars containing 500 ml each of the appropriate test concentration, and were loaded 5 per chamber, resulting in 10 per concentration. Fish were not fed during these tests.

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 33 S-C-T meter) of each test concentration was recorded at the beginning and end of the test. All instruments were calibrated daily 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 Table 2.

Microtox® Test

Upon receipt at the DER laboratory, a 20 ml subsample was collected in a small beaker. 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 97%, 49.5%, 24.75%, 12.38%, and 0%. An incubation temperature of 15°C was maintained throughout the assay. Ten microliters 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 3.

RESULTS AND DISCUSSION

The water sample taken at Outfall #001 of the City of Edgewater Wastewater Treatment Plant was not acutely toxic to the test organisms Ceriodaphnia dubia, Daphnia pulex, Notropis leedsi, or Pimephales promelas (Table 2). The Microtox® Assay exhibited minimal toxicity (EC_{50} = 98.5%)(Table 3), further supporting the conclusion that the sample from this facility was essentially non-toxic on December 7, 1987. Since the sample was minimally toxic to only one organism, chemical analyses were not performed.

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

Ceriodaphnia dubia (water flea)

Concentration	Dilution Water	Sample	Total Volume
Control	50.0 ml	--------	50 ml
50.0%	25.0 ml	25.0 ml	50 ml
100.0%	-------	50.0 ml	50 ml

Daphnia pulex (water flea)

Concentration	Dilution Water	Sample	Total Volume
Control	200.0 ml	--------	200 ml
50.0%	100.0 ml	100.0 ml	200 ml
100.0%	--------	200.0 ml	200 ml

Pimephales promelas (fathead minnow)

Notropis leedsi (bannerfin shiner)

Concentration	Dilution Water	Sample	Total Volume
Control	500 ml	--------	500 ml
50.0%	250 ml	250 ml	500 ml
100.0%	------	500 ml	500 ml

Table 2. Data recorded during 48 hour, Ceriodaphnia dubia, Daphnia pulex, Notropis leedsi, and Pimephales promelas, static acute toxicity bioassay of the City of Edgewater Wastewater Treatment Plant discharge, Volusia County, NDPES #FL0021431, on 8 to 10 December, 1987.

Facility:	Edgewater STP			NPDES # FL0021431		Facility Type:	WWTP
Location:	Volusia County			Contact/District:	L. Ley /CF		
Sample Collection Date:	12/7/87	Time:	1345	Test type:	Static Screening		
Test Beginning Date:	12/8/87	Time:	1010	# tests:	4	Receiving Water:	Indian River north
Test Ending Date:	12/10/87	Time:	1010	Chlorination Type:	Non-chlorinated		

Parameter		
Total Residual Cl2:	0	
Method:	Hach	
By:	DAC	
Salinity:	0.00	
Ammonia:	Control Water	100% Sample
Unionized NH3:	0	0.03
Total NH3:	0	4.50

Organism: ***Ceriodaphnia dubia*** Age/Life stage: Neonates
LC50: Binomial: Moving Average: Probit:

Concentrations	SURVIVAL # at 0 hour	Live at 24 hr	Live at 48 hr	Dissolved Oxygen 0 hour	24 hour	48 hour	pH 0 hour	24 hour	48 hour	Temperature 0 hour	24 hour	48 hour	Conductivity 0 hour	48 hour
Control	10	10	9	8.3	8.6	8.7	8	8	8	21.1	20	20		
Control	10	10	10	8.4	8.6	8.6	8	8	8.1					
50%	10	10	10	8.4	8.7	8.6	7.4	8	8	21.3	19.9	19.9		
50%	10	10	8	8.4	8.6	8.6	7.3	8	8					
100%	10	10	10	8.6	8.7	8.6	7.1	8.1	8	21.3	19.9	19.8		
100%	10	10	10	8.6	8.7	8.6	7.1	8.1	8					

	Control water	100% sample
Alkalinity:	125	150
Hardness:	120	162

Organism: ***Daphnia pulex*** Age/Life stage: Neonates
LC50: Binomial: Moving Average: Probit:

Concentrations	SURVIVAL # at 0 hour	Live at 24 hr	Live at 48 hr	Dissolved Oxygen 0 hour	24 hour	48 hour	pH 0 hour	24 hour	48 hour	Temperature 0 hour	24 hour	48 hour	Conductivity 0 hour	48 hour
Control	10	10	10	8.2	8.4	8.5	8	8.1	8	21.3	20.2	19.9		
Control	10	10	10	8.6	8.5	8.5	8	8.1	8				211	208
50%	10	10	10	8.7	8.6	8.5	7.3	7.9	7.9	21.5	19.9	19.7		
50%	10	10	10	8.7	8.5	8.4	7.3	7.9	7.9				409	390
100%	10	10	10	8.7	8.5	8.3	7	7.9	8	21.5	19.9	19.8		
100%	10	10	10	8.7	8.5	8.3	7	7.9	8				650	600

	Control water	100% sample
Alkalinity:	125	150
Hardness:	120	162

Organism: ***Notropis leedsi*** Age/Life stage: 26 days old
LC50: Binomial: Moving Average: Probit:

Concentrations	SURVIVAL # at 0 hour	Live at 24 hr	Live at 48 hr	Dissolved Oxygen 0 hour	24 hour	48 hour	pH 0 hour	24 hour	48 hour	Temperature 0 hour	24 hour	48 hour	Conductivity 0 hour	48 hour
Control	5	5	5	8.3	8.2	7.5	7.4	7.8	7.8	21.4	20.4	20.1		
Control	5	5	5	8.4	8.2	7.6	7.4	7.8	7.8				218	220
50%	5	5	5	8.5	8.3	7.7	7.2	7.7	7.7	21.5	20.1	19.8		
50%	5	5	5	8.6	8.3	7.6	7.2	7.7	7.8				411	398
100%	5	5	5	8.7	8.1	7.2	7.1	7.7	7.8	21.9	19.9	19.6		
100%	5	5	5	8.7	8.1	7.2	7.1	7.7	7.8				670	610

	Control water	100% sample
Alkalinity:	120	150
Hardness:	115	162

Organism: ***Pimephales promelas*** Age/Life stage: 22 days old
LC50: Binomial: Moving Average: Probit:

Concentrations	SURVIVAL # at 0 hour	Live at 24 hr	Live at 48 hr	Dissolved Oxygen 0 hour	24 hour	48 hour	pH 0 hour	24 hour	48 hour	Temperature 0 hour	24 hour	48 hour	Conductivity 0 hour	48 hour
Control	5	5	5	8.4	7.3	6.7	7.4	7.6	7.6	21.4	20.1	19.7		
Control	5	5	5	8.5	7.5	6.9	7.4	7.7	7.6				216	215
50%	5	5	5	8.6	7.3	7.1	7.2	7.6	7.7	21.4	19.9	19.6		
50%	6	6	6	8.7	6.9	7.1	7.2	7.6	7.7				411	380
100%	6	6	6	8.7	6.9	7.1	7	7.6	7.7	21.3	20	19.6		
100%	5	5	5	8.8	7	7	7	7.6	7.8				660	580

	Control water	100% sample
Alkalinity:	120	150
Hardness:	115	162

Table 3. Microtox test results , Edgewater STP , Volusia County, NPDES # FL0021431 on 12/8/87 .

Microtox test Culture lot No. M-606

Final Reclaimed Water

% Sample	No chlorine detected	
	5-min	15-min
0	90	54
0	91	56
0	91	55
12.38	93	56
12.38	96	57
12.38	97	59
24.75	91	54.5
24.75	93	56
24.75	92	54
49.5	87	49
49.5	82	47
49.5	86	50
99	57	27
99	55	26
99	57	26

EC-50 (15 minute , 15 degrees C) = 98.5%

EC50 (15 minute, 15 degrees C) is calculated using the Data Reduction Computer Program developed by Microbics Corporation for the Sharp Model EL-5100 (Microbics) Systems Operating Manual, 1982.

LITERATURE CITED

Beckman Instruments, Inc. 1982. Microtox System Operating Manual.

Florida Department of Environmental Regulation, Biology Section. 1985. Quality Assurance Manual for Performing Acute Toxicity Tests (Second Edition). FDER.

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.

Non toxic

Industry/Toxicant Edgewater STP
Address Edgewater, Fl
Contact/District Jan Kay CF
Effluent Serial Number 27.01.0971
NPDES Permit Number FL0021431

BIOASSAY DATA FORM

Test Number: 1 of 4
Test Type: Static Renewal, Screening; Conventional
Other:

Sample Collection: Date 12/7/87 Time 1345
Test Beginning: Date 12/8/87 Time 1010
Test Ending: Date 12/10/87 Time 1010
Test Organism Ceriodaphnia dubia
Age/Life Stage neonates

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	0	24	48	72	96
Control	9	10	10	9			8.3	8.6	8.7			8.0	8.0	8.0			21.1	20.0	20.0							
Control	20	10	10	10			8.4	8.6	8.6			8.0	8.0	8.1												
50%	21	10	10	10			8.4	8.7	8.6			7.4	8.0	8.0			21.3	19.9	19.9							
50%	92	10	10	8			8.4	8.6	8.6			7.3	8.0	8.0												
100%	36	10	10	10			8.6	8.7	8.6			7.1	8.1	8.0			21.3	19.9	19.8							
100%	75	10	10	10			8.6	8.7	8.6			7.1	8.1	8.0												
Initial of Investigator		DAC	DAC	MF			DAC	JMF	JMF			DAC	JMF	JMF			DAC	JMF	MF			DAC				

Alkalinity/Hardness (mg/l as $CaCO_3$)
Control Water: 125/120
100% Sample: 150/162
Other:
Measured by: MF

03/4.50 mg/L
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:
Joseph Funderburk
David Arnold

Instrument Calibrations:

	pH Meter:	DO Meter:	S-C-T Meter:
0 Hours	7.0@7.9@9	8.8@22°C	10@10, 29@30
24 Hours	7.0@7.9@9	8.9@21.5°C	10@10, 28@30
48 Hours	7.0@7.0 9@9	9.0@21°C	10.1@10, 27@30
72 Hours			
96 Hours			

Remarks:

Total Residual Chlorine:
Field data: 0.5 Method:
Lab: 0.0 Method: Hach DAC
Lab: Method:
Reviewed by:

De-chlorinated:
Measurements by:
Date:

Non TOXIC

BIOASSAY DATA FORM

Industry/Toxicant Edgewater STP
Address Edgewater Fl.
Contact/District Louisberg CF
Effluent Serial Number 27,01,0871
NPDES Permit Number FL0021431

Test Number: 2 of 4
Test Type: Static Renewal, Screening Conventional
Other:

Sample Collection: Date 12/7/87 Time 1000
Test Beginning: Date 12/8/87 Time 1010
Test Ending: Date 12/10/87 Time 1010
Test Organism Cladoceran pulex
Age/Life Stage 1 hour

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	72	10	10	10			8.2	8.4	8.5			8.0	8.1	8.0			21.3	20.2	19.9							
Control	50	10	10	10			8.6	8.5	8.5			8.0	8.1	8.0								211	–	208		
50%	37	10	10	10			8.7	8.6	8.5			7.3	7.9	7.9			21.5	17.9	19.7							
50%	7	10	10	10			8.7	8.5	8.4			7.3	7.9	7.9								409	–	390		
100%	66	10	10	10			8.7	8.5	8.3			7.0	7.9	8.0			21.5	19.9	19.8							
100%	67	10	10	10			8.7	8.5	8.3			7.0	7.9	8.0								650	–	600		
Initial of Investigator		JMF	JMF	DAC			DAC	JMF	JMF			DAC	JMF	JMF			DAC	JMF	MF			DAC		JMF		

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

Control Water: 125/120
100% Sample: 150/162
Other:
Measured by: JMF

.03 / 4.50
Ammonia unionized/total (mg/l as NH_3/N)
Hour 0

Control Water:
100% Sample:
Other:

Hour____

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

Signatures:
Joyce Faircloth
David Chandler

Instrument Calibrations:

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

Remarks:

Total Residual Chlorine:

Field data: _____ Method: _____
Lab: _____ Method: _____
Lab: _____ Method: _____ Reviewed by: _____

De-chlorinated: Date: _____
Measurements by: _____

Industry/Toxicant Edgewater STP
Address
Contact/District CFO / Guy Hadley
Effluent Serial Number
NPDES Permit Number

BIOASSAY DATA FORM

Test Number: 3 of 4
Test Type: Static Renewal, Screening Conventional
Other:

Sample Collection: Date 12/7/87 Time 1045
Test Beginning: Date 12/8/87 Time 1015
Test Ending: Date 12/10/87 Time 1010
Test Organism Notropis procne
Age/Life Stage 1 26 days old

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	71	5	5	5			8.3	8.2	7.5			7.4	7.8	7.8			21.4	20.4	20.1							
Control	65	5	5	5			8.4	8.2	7.6			7.4	7.8	7.8								218		220		
50%	58	5	5	5			8.5	8.3	7.7			7.2	7.7	7.7 DK			21.5	20.1	19.8							
50%	4	5	5	5			8.6	8.3	7.6			7.2	7.7	7.8								411		398		
100%	63	5	5	5			8.7	8.1	7.2			7.1	7.7	7.8			21.9	19.9	19.6							
100%	9	5	5	5			8.7	8.1	7.2			7.1	7.7	7.8								670		610		
Initial of Investigator		JMF	DAC	DAC			DAC	JMF	JMF			DAC	JMF	JMF			DAC	JMF	MF			DAC		JMF		

Alkalinity/Hardness (mg/l as $CaCO_3$)
Control Water: 120/115
100% Sample: 150/162
Other:
Measured by: MF
.03/1.50

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:
Joseph Faindeth
David Arnold

Instrument Calibrations:

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

Remarks:

Total Residual Chlorine:
Field data: Method:
Lab: Method:
Lab: Method:
De-chlorinated:
Measurements by:

Reviewed by:
Date:

Industry/Toxicant: Edgewater STP
Address:
Contact/District:
Effluent Serial Number: 27.01.0821
NPDES Permit Number: FL 0021431

Nontoxic

NPDES DAY DATA FORM

Test Number: 4 of 4
Test Type: Static Renewal, Screening Conventional
Other:

Sample Collection: Date 12/7/87 Time 1345
Test Beginning: Date 12/8/87 Time 1015
Test Ending: Date 12/10/87 Time 1015
Test Organism: Cyprinodon variegatus
Age/Life Stage: 22 days old

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	72	5	5	5			8.4	7.3	6.7			7.4	7.6	7.6			21.4	20.1	19.7							
Control	234	5	5	5			8.5	7.5	6.9			7.4	7.7	7.6								216	-	215		
50%	15	5	5	5			8.6	7.3	7.1			7.2	7.6	7.7			21.4	19.9	19.6							
50%	12	6	6	6			8.7	6.9	7.1			7.2	7.6	7.7								411	-	380		
100%	54	6	6	6			8.7	6.9	7.1			7.0	7.6	7.7			21.3	20.0	19.6							
100%	55	5	5	5			8.8	7.0	7.0			7.0	7.6	7.8								660	-	580		
Initial of Investigator		DAC	DAC	DAC			DAC	VNA	VNA			DAC	VNA	VNA			DAC	VNA	MF			DAC		VNA		

Alkalinity/Hardness (mg/l as $CaCO_3$)
Control Water: 120/115
100% Sample: 150/162
Other:
Measured by: MF

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:
Joseph Faircloth
David Chandler

Instrument Calibrations:

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

Remarks:

Total Residual Chlorine:
Field data: Method:
Lab: Method:
Lab: Method:
Reviewed by:
De-chlorinated:
Measurements by:
Date:

C44

MICROTOX™ Data Reduction Sheet

SOURCE: Edgewater STP

GRAPH CALC EC 50 (15 MIN, 15 °C) = 98.5 (%SAMPLE) mg/L

SAMPLE DATA:

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

DATE ASSAYED: 12-8-87 TIME: 8:30 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: none

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

REMARKS: no residual

MICROTOX™ 99% TEST

SAMPLE CUVETTE	% SAMPLE	READINGS 5 MIN	READINGS 15 MIN	Γ5	Γ15	NOTES
A1	0	90	54	X	X	
B1		91	56			
C1		91	55			
A2	12.38	93	56	-.05	-.04	
B2		96	57			
C2		97	59			
A3	24.75	91	54.5	-.01	.003	
B3		93	56			
C3		92	54			
A4	49.5	87	49	.07	.13	
B4		82	47			
C4		86	50			
A5	99	55	27	.61	1.09	
B5		55	26			
C5		57	26			
EC_{50} (MIN, °C)				115.58	98.49	

REVIEWED BY:
DATE: