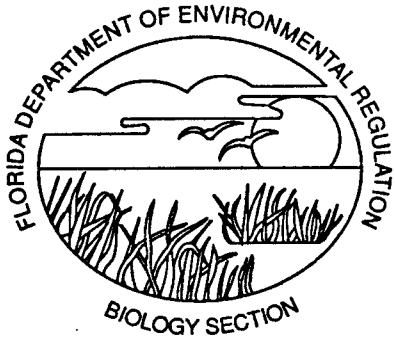


Bioassays of

Davie #2 Wastewater Treatment Plant

Davie, Broward County, Florida

NPDES #FL0040541

Sampled 10/3/88

January 10, 1989

Biology Section
Division of Administrative and Technical Services

Bioassays of

Davie #2 Wastewater Treatment Plant

Davie, Broward County, Florida

NPDES #FL0040541

Biology Section
Bureau of Laboratories
January 10, 1989

Executive Summary

Davie #2 Wastewater Treatment Plant, NPDES #FL0040541, Davie, Broward County, Florida, on 4 to 6 October, 1988.

The sample of chlorinated discharge from the Davie #2 WWTP was toxic to the bioassay test organisms, *Ceriodaphnia dubia*, *Daphnia pulex*, and *Notropis leedsi*. The chlorinated sample adversely affected the Microtox® assay organism, *Photobacterium phosphoreum*. The chlorinated bioassay tests were terminated at the end of 24 hours because all of the bioassay organisms were dead in the lowest test concentration (100%); therefore, the LC_{50} for each bioassay organism was less than 100%. The EC_{50} for the Microtox® assay organism was 11.39%. The dechlorinated sample of discharge from the Davie #2 WWTP was toxic to the bioassay organism, *Ceriodaphnia dubia*, producing an LC_{50} of 93.83%. The dechlorinated sample was not toxic to the bioassay test organisms, *D. pulex* or *N. leedsi*.

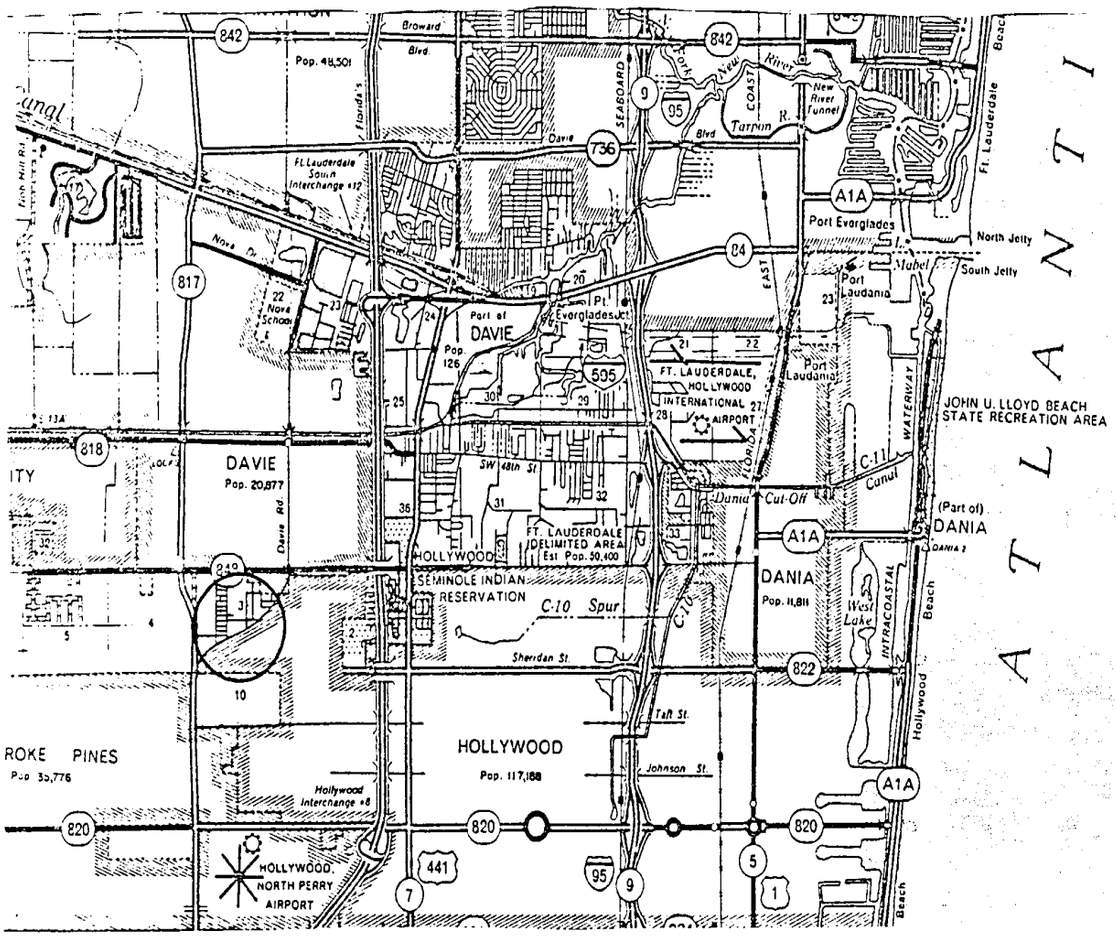
The chlorinated sample contained 0.5 mg/l (Hach) of total residual chlorine, sufficient to have contributed to the observed mortality in the chlorinated tests. Further chemical analyses detected the pesticide, g-BHC (0.01 µg/l) and two unidentified components sensitive to electron capture (ECD) and nitrogen/phosphorus (NPD) detection in the sample. The metals, lead (2.5 µg/l), silver (0.56 µg/l), and zinc (40.0 µg/l) were also detected. The organic components, g-BHC and the two unidentified compounds, may have contributed to the observed mortality in both the dechlorinated and dechlorinated bioassay tests.

In conclusion, the sample of discharge from the Davie #2 WWTP was toxic on 3 October, 1988.

Introduction

The Davie #2 Wastewater Treatment Plant, NPDES #FL0040541, is located at 3591 NW 76th Avenue, Davie, Broward County, Florida (Fig. 1). The facility has a design capacity of 3.0 MGD and treats approximately 2 MGD (highest 30 day average) of sewage. The plant has two wastewater treating units which include the contact stabilization process for treatment. The discharge is dechlorinated and sent to a pumping station for transfer to the City of Hollywood wet well, with eventual discharge through Hollywood's ocean outfall. Sludge is aerobically digested and then dewatered on vacuum drying beds.

To evaluate the existence and extent of toxicity in the discharge from this facility, the Biology Section, at the request of the FDER Southeast Florida District, performed six (6) static acute toxicity bioassays and two (2) Microtox® assays on a sample of discharge from the 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, R. B. Frydenborg, K. M. Lurding, L. A. Williams, and S. H. Wolfe.



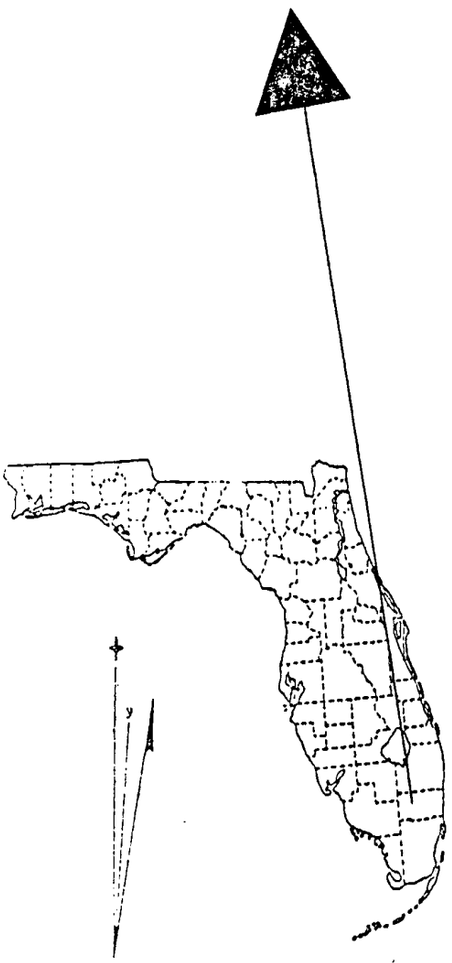


Figure 1. Portion of Broward County, Florida, showing approximate location of Davie #2 WWTP.

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 was performed on a sample from the Davie #2 WWTP facility. The tests were performed from 1000 hours on 4 October, 1988, to 1000 hours on 6 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. Paul Strauss of the FDER's Southeast District Office in Port St. Lucie at 1015 hours on 3 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 (for *C. dubia* and for *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 two's 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 Davie #2 WWTP was toxic to the bioassay test organisms, *Ceriodaphnia dubia, Daphnia pulex* and *Notropis leedsi* (Table 2). The chlorinated sample adversely affected the Microtox® assay organism, *Photobacterium phosphoreum.* The chlorinated bioassay tests were terminated at the end of 24 hours because all of the bioassay organisms were dead in the lowest test concentration (100%). The LC_{50}'s for each bioassay organism was less than 100% (Table 6). The EC_{50} for the Microtox® assay organism was 11.39%. The dechlorinated sample of discharge from the Davie #2 WWTP was toxic to the bioassay organism, *Ceriodaphnia dubia*, producing an LC_{50} of 93.83% (Table 5). The dechlorinated sample also adversely affected the Microtox® test organism, producing an EC_{50} of 13.49% (Table 4). The dechlorinated sample was not toxic to the bioassay test organisms, *D. pulex* or *N. leedsi.* (Table 3).

The chlorinated sample contained 0.5 mg/l (Hach) of total residual chlorine which was sufficient to have contributed to the observed mortality in the chlorinated tests. Further chemical analyses detected the pesticide, g-BHC (0.01 µg/l), and two unidentified components sensitive to electron capture (ECD) and nitrogen/phosphorus (NPD) detection in the sample. The metals, lead (2.5 µg/l), silver (0.56 µg/l), and zinc (40.0 µg/l), were also detected in the sample (Table 6). The organic components, g-BHC and the two unidentified compounds, may have contributed to the observed mortality in both the chlorinated and dechlorinated bioassay tests.

In conclusion, the sample of discharge from the Davie #2 WWTP was toxic on 3 October, 1988.

Biology Section Recommendations

The Biology Section recommends that the facility be required to undertake additional toxicity testing of their discharge as the first step in a Toxicity Reduction Evaluation. Should additional toxicity tests show that the discharge from the facility is again toxic, then the facility should be required to continue the Toxicity Reduction Evaluation with the goal of meeting state water quality standards.

Table1. 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	0.0 ml	15 ml
100.0%	0.0 ml	15.0 ml	15 ml

Notropis leedsi (bannerfin shiner)

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

Table 2. Data recorded during the 48 hour static acute bioassay of a sample of chlorinated discharge from the Davie #2 WWTP, NPDES #FL0040541, Davie, Broward County, Florida, on 4 October to 6 October, 1988.

Facility:	**Davie # 2 STP**		**NPDES #**	**FL0040541**	Facility Type: **Municipal**
Location:	3591 NW 76 Ave. , Davie		Contact/District:	P. Strauss	
County:	Broward		Test type:	Static Screen	
Sample Collection Date:	**10/3/88**	Time: 1015	# tests:	6	Receiving Water: Atlantic Ocean via
Test Beginning Date:	10/4/88	Time: 1000	Chlorination Type:	**Chlorinated**	Hollywood STP
Test Ending Date:	10/6/88	Time: 1000			**Page 1 of 2**

Total Residual Cl2	mg/l	Method
Field:	0.9	Hach
Lab:	0.5	Hach
Lab:	0.4	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:	0.00	0.00

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	122	125
Cond. Control Water (daphnids):	125	130
100% Sample:	45	125

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	48 hour
Control	5	5	-	8.0	9.3	-	8.3	8.4	-	20.6	21.0	-	-	-
Control	5	5	-	8.0	9.3	-	8.3	8.4	-	-	-	-	-	-
Control	5	5	-	8.0	9.3	-	8.3	8.4	-	-	-	-	-	-
Control	5	5	-	7.9	9.3	-	8.3	8.4	-	-	-	-	205	245
100%	5	0	-	8.2	9.4	-	6.9	7.9	-	20.3	21.1	-	-	-
100%	5	0	-	8.2	9.5	-	6.9	7.9	-	-	-	-	-	-
100%	5	0	-	8.2	9.5	-	6.9	7.9	-	-	-	-	-	-
100%	5	0	-	8.2	9.5	-	6.9	7.9	-	-	-	-	451	495

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	-	8.1	8.8	-	8.3	8.3	-	20.5	21.8	-	-	-
Control	5	5	-	8.1	8.9	-	8.3	8.3	-	-	-	-	-	-
Control	5	5	-	8.0	8.8	-	8.3	8.3	-	-	-	-	-	-
Control	5	5	-	8.0	8.8	-	8.3	8.3	-	-	-	-	217	255
100%	5	0	-	8.2	9.1	-	7.9	7.9	-	20.3	20.8	-	-	-
100%	5	0	-	8.2	9.1	-	7.9	7.9	-	-	-	-	-	-
100%	5	0	-	8.2	9.1	-	7.9	7.8	-	-	-	-	-	-
100%	5	0	-	8.2	9.1	-	7.9	7.8	-	-	-	-	461	505

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	-	8.0	8.8	-	7.9	8.0	-	21.0	19.6	-	-	-
Control	5	5	-	8.0	8.7	-	7.9	8.0	-	-	-	-	223	220
100%	5	0	-	8.3	9.2	-	6.8	7.3	-	21.0	19.7	-	-	-
100%	5	0	-	8.3	9.2	-	6.8	7.3	-	-	-	-	495	485

Table 3. Data recorded during th3 48 hour static acute bioassay of a dechlorinated sample of discharge from the Davie #2 WWTP, NPDES #FL0040541, Davie, Broward County, Florida, on 4 October to 6 October, 1988.

Facility:	**Davie # 2 STP**		**NPDES #**	**FL0040541**	Facility Type: **Municipal**
Location:	3591 NW 76 Ave. , Davie		Contact/District:	P. Strauss	
County:	Broward		Test type:	definitive	
Sample Collection Date:	**10/3/88**	Time: 1015	# tests:	6	Receiving Water: Atlantic Ocean via
Test Beginning Date:	10/4/88	Time: 1000	Chlorination Type:	**dechlorinated**	Hollywood STP
Test Ending Date:	10/6/88	Time: 1000			**Page 1 of 2**

Total Residual Cl2	mg/l	Method
Field:	0.9	Hach
Lab:	0.5	Hach
Lab:	0.4	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:	0.00	0.00

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	122	125
Cond. Control Water (daphnids):	125	130
100% Sample:	45	125

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

Organism: ***Ceriodaphnia dubia*** Life stage: neonate
LC50: - Binomial: 93.8% 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	7.9	-	8.8	8.4	-	8.1	20.0	-	20.2	-	-
Control	5	5	5	8.0	-	8.8	8.4	-	8.1	-	-	-	-	-
Control	5	5	5	8.0	-	8.8	8.4	-	8.1	-	-	-	-	-
Control	5	5	5	8.0	-	8.8	8.4	-	8.1	-	-	-	201	255
10%	5	5	5	8.1	-	8.9	8.3	-	8.1	19.9	-	20.4	-	-
10%	5	5	5	8.1	-	8.9	8.3	-	8.1	-	-	-	-	-
10%	5	5	5	8.2	-	8.8	8.3	-	8.1	-	-	-	-	-
10%	5	5	5	8.2	-	8.8	8.3	-	8.1	-	-	-	240	290
30%	5	5	5	7.9	-	8.9	8.1	-	8.1	20.3	-	20.5	-	-
30%	5	5	5	7.9	-	8.9	8.1	-	8.1	-	-	-	-	-
30%	5	5	5	8.1	-	8.9	8.1	-	8.1	-	-	-	-	-
30%	5	5	5	8.1	-	8.9	8.1	-	8.1	-	-	-	288	340
50%	5	5	5	8.2	-	8.9	7.9	-	8.1	20.4	-	20.7	-	-
50%	5	5	5	8.2	-	8.6	7.9	-	8.1	-	-	-	-	-
50%	5	5	5	8.2	-	8.9	7.9	-	8.1	-	-	-	-	-
50%	5	5	5	8.2	-	8.9	7.9	-	8.1	-	-	-	338	400
70%	5	5	4	8.3	-	8.8	7.5	-	7.9	20.5	-	20.7	-	-
70%	5	5	5	8.3	-	8.8	7.5	-	7.9	-	-	-	-	-
70%	5	5	5	8.3	-	8.8	7.5	-	7.9	-	-	-	-	-
70%	5	5	5	8.2	-	8.8	7.5	-	7.9	-	-	-	398	465
85%	5	5	5	8.2	-	8.8	7.4	-	7.9	20.6	-	20.6	-	-
85%	5	5	5	8.2	-	8.8	7.4	-	7.9	-	-	-	-	-
85%	5	5	5	8.2	-	8.8	7.4	-	7.9	-	-	-	-	-
85%	5	5	5	8.2	-	8.8	7.4	-	7.9	-	-	-	425	500
100%	5	5	2	8.1	-	8.8	7.2	-	7.8	20.6	-	20.7	-	-
100%	5	5	0	8.2	-	8.9	7.2	-	7.8	-	-	-	-	-
100%	5	5	0	8.3	-	8.8	7.2	-	7.8	-	-	-	-	-
100%	5	5	0	8.3	-	8.8	7.2	-	7.8	-	-	-	463	550

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	8.0	-	8.7	8.4	-	8.1	20.1	20.8	-	-	-
Control	5	5	5	8.0	-	8.7	8.4	-	8.1	-	-	-	-	-
Control	5	5	5	8.0	-	8.7	8.4	-	8.1	-	-	-	-	-
Control	5	5	5	8.0	-	8.7	8.4	-	8.1	-	-	-	211	255
100%	5	5	5	8.2	-	8.7	7.1	-	7.7	20.1	20.8	-	-	-
100%	5	5	5	8.2	-	8.7	7.1	-	7.7	-	-	-	-	-
100%	5	5	5	8.2	-	8.7	7.1	-	7.7	-	-	-	-	-
100%	5	5	5	8.2	-	8.7	7.1	-	7.7	-	-	-	424	530

Table 3. Continued.

Facility:	**Davie # 2 STP**		**NPDES #**	**FL0040541**	Facility Type: **Municipal**
Location:	3591 NW 76 Ave. , Davie		Contact/District:	P. Strauss	
County:	Broward		Test type:	definitive	
Sample Collection Date:	**10/3/88**	Time: 1015	# tests:	6	Receiving Water: Atlantic Ocean via
Test Beginning Date:	10/4/88	Time: 1000	Chlorination Type:	**dechlorinated**	Hollywood STP
Test Ending Date:	10/6/88	Time: 1000			**Page 2 of 2**

Total Residual Cl2	mg/l	Method
Field:	0.9	Hach
Lab:	0.5	Hach
Lab:	0.4	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:	0.00	0.00

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	122	125
Cond. Control Water (daphnids):	125	130
100% Sample:	45	125

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

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	7.8	8.7	8.1	7.9	7.9	8.0	21.0	20.0	20.4	-	-
Control	5	5	5	7.8	8.7	8.1	7.9	7.9	8.0	-	-	-	214	225
10%	5	5	5	8.0	8.8	8.2	7.8	7.9	7.9	21.2	19.9	20.0	-	-
10%	5	5	5	8.0	8.8	8.3	7.8	7.9	7.9	-	-	-	250	250
30%	5	5	5	8.0	8.7	8.1	7.6	7.7	7.8	21.0	19.7	19.8	-	-
30%	5	5	5	8.0	8.7	8.2	7.6	7.7	7.8	-	-	-	304	305
50%	5	5	5	8.0	8.8	8.4	7.3	7.5	7.7	20.7	19.6	19.7	-	-
50%	5	5	5	8.1	8.9	8.5	7.3	7.5	7.7	-	-	-	358	360
70%	5	5	5	8.3	8.8	8.4	7.1	7.5	7.6	20.5	19.6	19.7	-	-
70%	5	5	5	8.3	8.8	8.4	7.1	7.5	7.6	-	-	-	413	415
85%	5	5	5	8.4	8.9	8.3	7.0	7.4	7.5	20.2	19.5	19.7	-	-
85%	5	5	5	8.4	8.9	8.4	7.0	7.4	7.5	-	-	-	451	455
100%	5	5	5	8.5	8.9	8.4	6.8	7.3	7.4	19.8	19.6	19.8	-	-
100%	5	5	5	8.5	8.9	8.4	6.8	7.2	7.4	-	-	-	489	500

Table 4. Microtox test results, Davie # 2 WWTP discharge, Broward County, NPDES #FL0040541, on 4 October, 1988.

Microtox Test Culture Lot # M-606

% Sample	Final Reclaimed Water			
	Chlorinated		Dechlorinated	
	5-min	15-min	5-min	15-min
0	100	66	84	58
0	100	70	79	54
0	96	80	79	56
12.38	43	25	47	27
12.38	43	26	43	24
12.38	40	25	45	25
24.75	5	6	23	14
24.75	7	7	25	15
24.75	15	12	25	15
49.5	.5	.3	8	7
49.5	.2	.1	8	7
49.5	.2	.2	8	7
99	.2	.1	1	1
99	.2	.1	.5	1
99	.2	.1	1	1

EC_{50} Chlorinated (15 minute, 15 °C) = 11.39% sample
EC_{50} Dechlorinated (15 minute, 15 °C) =13.49% 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% [b]
Daphnia pulex	noncalculated	<100% [b]
Notropis leedsi	noncalculated	<100% [b]
Dechlorinated discharge		
Ceriodaphnia dubia	Binomial	93.83% (85.0% , 100%)
	Moving Average	a
	Probit	a
Daphnia pulex		not toxic
Notropis leedsi		not toxic

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

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

Table 6. Results of chemical analyses on the sample of discharge from the Davie # 2 WWTP, Davie, Broward County, Florida.

Organics

Acid Extractables	None detected
Base Neutral Extractalbes	None detected
Pesticide Extractables	g-BHC (0.01µg/l) Two unidentified components sensitive to ECD and NPD

Metals

Lead	2.5 µg/l
Silver	0.56 µg/l
Zinc	40.0 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.

C# 012

Industry/Toxicant Davie #25TP
Address 3591 NW 76 Ave
Contact/District
Effluent Serial Number
NPDES Permit Number

BIOASSAY DATA FORM

Test Number: 1 of 6
Test Type: Static Renewal, Screening Conventional
Other: toxic de Cl2

Sample Collection: Date 10-3-88 Time 1015
Test Beginning: Date 10-4-88 Time 1000
Test Ending: Date 10-8-88 Time 1200
Test Organism Ceriodaphnia 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			7.9/8.0		8.5/8.6			8.4/8.4		8.1/8.1			20.0		20.2							
Control	3/4	5/5	5/5	5/5			8.0/8.0		8.8/8.8			8.4/8.4		8.1/8.1								301		255		
10%	5/6	5/5	5/5	5/5			8.1/8.1		8.9/8.9			8.3/8.3		8.1/8.1			19.9		20.4							
10%	7/8	5/5	5/5	5/5			8.2/8.2		8.8/8.8			8.3/8.3		8.1/8.1								240		290		
30%	9/10	5/5	5/5	5/5			7.9/7.9		8.5/8.4			8.1/8.1		8.1/8.1			20.3		20.5							
30%	11/12	5/5	5/5	5/5			8.1/8.1		8.9/8.9			8.1/8.1		8.1/8.1								288		340		
50%	13/14	5/5	5/5	5/5			8.2/8.2		8.9/8.6			7.9/7.9		8.0/8.0			20.4		20.7							
50%	15/16	5/5	5/5	5/5			8.2/8.2		8.9/8.9			7.9/7.9		8.0/8.0								338		400		
70%	17/18	5/5	5/5	4/5			8.3/8.3		8.8/8.8			7.5/7.5		7.9/7.9			20.5		20.7							
70%	19/20	5/5	5/5	5/5			8.3/8.2		8.5/8.8			7.5/7.5		7.9/7.9								348		465		
85%	21/22	5/5	5/5	5/5			8.2/8.2		8.7/8.8			7.4/7.4		7.9/7.9			20.6		20.6							
85%	23/24	5/5	5/5	5/5			8.2/8.2		8.5/8.8			7.4/7.4		7.4/7.4								424		500		
100%	25/26	5/5	5/5	3/0			8.1/8.2		8.8/8.9			7.2/7.2		7.5/7.8			20.6		20.7							
100%	27/28	5/5	5/5	0/0			8.3/8.3		8.8/8.8			7.2/7.2		7.8/7.8								463		570		
Initial of Investigator		MML	MF	MF			RBF		MF			RBF		MF			RBF		MF			RBF		MF		

Alkalinity/Hardness (mg/l as $CaCO_3$)
Control Water: 125 130
100% Sample: 45 125
Other:
Measured by: MF

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

Hour 0
Control Water:
100% Sample:
Other:
Measured by: JMF

large sol'n

Signatures:
Joseph Faudath
Stephen Wolf
KA Lindell
Russell Frydenborg

Instrument Calibrations:

	pH Meter:	DO Meter:	S-C-T Meter:
0 Hours	7cd 7, 9a19	8.8cd 21°C	1249 at 21.3°C
24 Hours	7a 7, 7a9	8.1 at 21.1	1300 @ 13.0 (20.1)
48 Hours	7a 7, 7a 9	9.0 @ 21.4°C	1215 @ 1313 (21.5)
72 Hours			
96 Hours			

Reviewer: DO temp 21.6 at 21.6

Total Residual Chlorine:
Final data: 0.0 Method: HACH
Lab: 0.5 Method: HACH
Lab: 0.4 Method: ICDC

Dechlorinated by:
Measurements by: RBF

Reviewed by:
Date: 3/10/89

Industry/Town: Davie #2 STP
Address:
Contact/District:
Effluent Serial Number:
NPDES Permit Number:

CLASSIFY DATA SHT.

Test Number: 2 of 6
Test Type: Static Renewal, Screening, Conventional
Other: de Cl2

Sample Collected: Date 10-3-88 Time 1015
Test Beginning: Date 10-4-88 Time 1000
Test Ending: Date 10-6-88 Time 1000
Test Organism: Daphnia pulex
Age/Life Stage: neonate

Conc. 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			8.0		8.7			8.4		8.1			20.1		20.8							
"	30	5	5	5			8.0		8.7			8.4		8.1												
"	31	5	5	5			8.0		8.7			8.4		8.1												
"	32	5	5	5			8.0		8.7			8.4		8.1								211		165		
100%	33	5	5	5			8.2		8.7			7.1		7.7			20.1		20.8							
"	34	5	5	5			8.2		8.7			7.1		7.7												
"	35	5	5	5			8.2		8.7			7.1		7.7												
"	36	5	5	5			8.2		8.7			7.1		7.7								424		330		
Initial of Investigator		MF	MF	MF			RBF		MF			RBF		MF			RBF		MF			RBF		MF		

Alkalinity/Hardness (mg/l as $CaCO_3$)
Control Water: 125 130
100% Sample: 45 125
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 Fairbett
Steven Weeks
MF Murdoch
Russel Frydenborg

Instrument Calibrations:

	pH Meter:	DO Meter:	S-C-T Meter:
0 Hours	7.01 7; 9.09	8.8 at 22°C	1297 at 21.3°C
24 Hours			
48 Hours			
72 Hours			
96 Hours			

Remarks:

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

Reviewed by:
Date: 3/10/89
Data Entered by:

Industry/Toxicant: Davie #2 STP
Address:
Contact/District:
Effluent Serial Number:
NPDES Permit Number:

BIOASSAY DATA FORM

Test Number: 3 of 6
Test Type: Static Renewal, Screening Conventional
Other: & Cl2

Sample Collection: Date 10-3-88 Time 1015
Test Beginning: Date 10-4-88 Time 1000
Test Ending: Date 10-6-88 Time 1000
Test Organism: Cyprinodon variegatus
Age/Life Stage: 18 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	67	5	5	5			7.8	8.7	8.1			7.9	7.9	8.0			↑	20.0	20.4							
Control	31	5	5	5			7.8	8.7	8.1			7.9	7.9	8.0			21.0					214		225		
10%	39	5	5	5			8.0	8.8	8.2			7.8	7.9	7.9			↑	19.9	20.0							
10%	52	5	5	5			8.0	8.8	8.3			7.8	7.9	7.9			21.2					250		250		
30%	19	5	5	5			8.0	8.7	8.1			7.6	7.7	7.8			↑	19.7	19.9							
30%	131	5	5	5			8.0	8.7	8.2			7.6	7.7	7.8			21.0					314		305		
50%	20	5	5	5			8.0	8.8	8.4			7.3	7.5	7.7			↑	19.6	19.7							
50%	18	5	5	5			8.1	8.9	8.5			7.3	7.5	7.7			20.7					358		360		
70%	234	5	5	5			8.3	8.8	8.4			7.1	7.5	7.6			↑	19.6	19.7							
70%	86	5	5	5			8.3	8.8	8.4			7.1	7.5	7.6			20.5					413		415		
85%	6	5	5	5			8.4	8.9	8.3			7.0	7.4	7.5			↑	19.5	19.7							
85%	21	5	5	5			8.4	8.9	8.4			7.0	7.4	7.5			21.2					451		455		
100%	16	5	5	5			8.5	8.9	8.4			6.8	7.3	7.4			↑	19.6	19.8							
100%	2	5	5	5			8.5	8.9	8.4			6.8	7.2	7.4			19.5					489		500		
Initial of Investigator		RBF	MF	MF			RBF	JMF	MF			RBF	SHW	MF			DBF	JMF	MF			RBF		MF		

Alkalinity/Hardness (mg/l as $CaCO_3$)
Control Water: 122 125
100% Sample: 45 125
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 Faulkner
Steven H. Weeks
K. M. Lucas
Russel Frydenborg

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:
Pentachlorophenol:
Measurements by:

Reviewed by:
Date: 3/16/89

Industry/Facility: Davie #2 STP
Address:
Contact/District:
Effluent Serial Number:
NPDES Permit Number:

24 hrs and

Test Number: 4 of 6
Test Type: Static Renewal Screening Conventional
Other: Cl2

Sample Collection: Date 10-3-88 Time 1015
Test Beginning: Date 10-4-88 Time 1000
Test Ending: Date 10-6-88 Time 1000
Test Organism: C. 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	Conductivity 0	24	48	72	96
Control	37	5	5 Ø	SHW			8.0	9.3				8.3	8.4				20.6	21.0								
"	38	5	5 Ø	SHW			8.0	9.3				8.3	8.4				"									
"	39	5	5 Ø	SHW			8.0	9.3				8.3	8.4													
"	40	5	5 Ø	SHW			7.9	9.3				8.3	8.4									205	245			
100%	41	5	0				8.2	9.4				6.9	7.9				20.3	21.1								
"	42	5	0				8.2	9.5				6.9	7.9													
"	43	5	0				8.2	9.5				6.9	7.9													
"	44	5	0				8.2	9.5				6.9	7.9									451	495			
Initial of Investigator		JWL	JMF				RBF	JMF				RBF	JMF				RBF	JMF				RBF	JMF			

Alkalinity/Hardness (mg/l as $CaCO_3$)
Control Water: 125 130
100% Sample: 45 125
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:
Joyce Tandlett
Steven Hoff
Russel Frydenborg

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:
Date: 3/10/89
Technical Director: ____
Quality Assurance Officer: ____

Industry/Toxicant Dairie #2 STP
Address
Contact/District
Effluent Serial Number
NPDES Permit Number

BIOASSAY DATA FORM

24hr end

Test Number: 5 of 6
Test Type: Static Renewal, Screening Conventional
Other: Cl2

Sample Collection: Date 10-3-88 Time 1015
Test Beginning: Date 10-4-88 Time 1000
Test Ending: Date 10-5-88 Time 1000
Test Organism D. 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	0	24	48	72	96
Control	45	5	5				8.1	8.8				8.3	8.3				20.5	21.8								
"	46	5	5				8.1	8.9				8.3	8.3													
"	47	5	5				8.0	8.8				8.3	8.3													
"	48	5	5				8.0	8.8				8.3	8.3									217	255			
100%	49	5	0				8.2	9.1				7.9	7.9				20.3	20.8								
"	50	5	0				8.2	9.1				7.9	7.9													
"	51	5	0				8.2	9.1				7.9	7.8													
"	52	5	0				8.2	9.1				7.9	7.8									461	505			
Initial of Investigator		MF	JHF				RBF	JHF				RBF	JHF				RBF	JHF				RBF	JHF			

Alkalinity/Hardness (mg/l as $CaCO_3$)
Control Water: 125 130
100% Sample: 45 125
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 Elizabeth
William Wolfe
MF Lundy
Russel Frydenborg

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
Data entered:
Measurements by:
Date: 3/10/89

Industry/Municipality: Davie #2 STP
Address:
Contact/District:
Effluent Serial Number:
NPDES Permit Number:

24hr end

Test Number: 6 of 6
Test Type: Static Renewal, Screening Conventional
Other: Cl2

Sample Collection: Date 10-3-88 Time 1015
Test Beginning: Date 10-4-88 Time 1000
Test Ending: Date 10-5-88 Time 1000
Test Organism: N. leedsi
Age/Life Stage: 18 days

Conc. or %	Test Chamber 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	120	5	5				8.0	8.8				7.9	8.0				21.0	19.6								
Control	10	5	5				8.0	8.7				7.9	8.0									223	220			
100%	44	5	0				8.3	9.2				6.8	7.3				21.0	19.7								
100%	9	5	0				8.3	9.2				6.8	7.3									495	485			
Initial of Investigator		RBF	MF				RBF	JMF				RBF	SHW				RBF	SHW				RBF	JMF			

Alkalinity/Hardness (mg/l as CaCO3)
Control Water: 122 125
100% Sample: 45 125
Other:
Measured by: MF

Ammonia unionized/total (mg/l as NH3/l)
Hour 0
Control Water:
100% Sample:
Other:
Hour
Control Water:
100% Sample:
Other:
Measured by:

Signatures:
Joseph Fandel
Steven Hable
JAMurding
Russel Frydenborg

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:
Date: 3/10/89

MICROTOX™ Data Reduction Sheet

SOURCE: Davies #2

GRAPH CALC EC 50 (15 MIN, 15 °C) = 13.5 (%SAMPLE) mg/L

SAMPLE DATA:

SAMPLE TYPE (EFFLUENT, LEACHATE, ETC.): effluent dechl2

DATE ASSAYED: 10-4-88 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: Lisa 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	84	58	X	X	
B1		79	54			
C1		79	56			
A2	12.38	47	27	0.793	1.211	
B2		43	24			
C2		45	25			
A3	24.75	23	14	2.408	2.818	
B3		25	15			
C3		25	15			
A4	49.5	8	7	9.083	7.00	
B4		8	7			
C4		8	7			
A5	99	1	1	95.80	55.00	
B5		.5	1			
C5		1	1			
EC_{50} (MIN, °C)				15.88	13.49	

REVIEWED BY:

DATE: 3/10/89

MICROTOX™ Data Reduction Sheet

SOURCE: Davies #2

GRAPH CALC EC 50 (15 MIN, 15 °C) = 11.4 (%SAMPLE) mg/L

SAMPLE DATA:

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

DATE ASSAYED: 10-4-88 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:

OPERATOR: Leslie 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	100	66	X	X	
B1		100	70			
C1		96	80			
A2	12.38	43	25	1.349	1.842	
B2		43	26			
C2		40	25			
A3	24.75	5	6	9.963	7.640	
B3		7	7			
C3		15	12			
A4	49.5	.5	.3	327.667	359.0	
B4		.2	.1			
C4		.2	.2			
A5	99	.2	.1	429.333	719.0	
B5		.2	.1			
C5		.2	.1			
EC_{50} (MIN, °C)				11.54	11.39	

REVIEWED BY:

DATE: 3/10/89