DEPARTMENT OF ENVIRONMENTAL REGULATION

STATE OF FLORIDA

BIOASSAYS OF GULF COAST LEAD COMPANY

TAMPA, HILLSBOROUGH COUNTY, FLORIDA

NO NPDES NUMBER

SAMPLED 1/26/88

MARCH 4, 1988

Biology Section
Division of Environmental Programs

BIOASSAYS OF GULF COAST LEAD COMPANY

TAMPA, HILLSBOROUGH COUNTY, FLORIDA

NO NPDES NUMBER

Biology Section
Bureau of Laboratories and
Special Programs
March 4, 1988

EXECUTIVE SUMMARY

Gulf Coast Lead Company, Tampa, Hillsborough County, Florida, No NPDES Number, on 27 to 29 January, 1988.

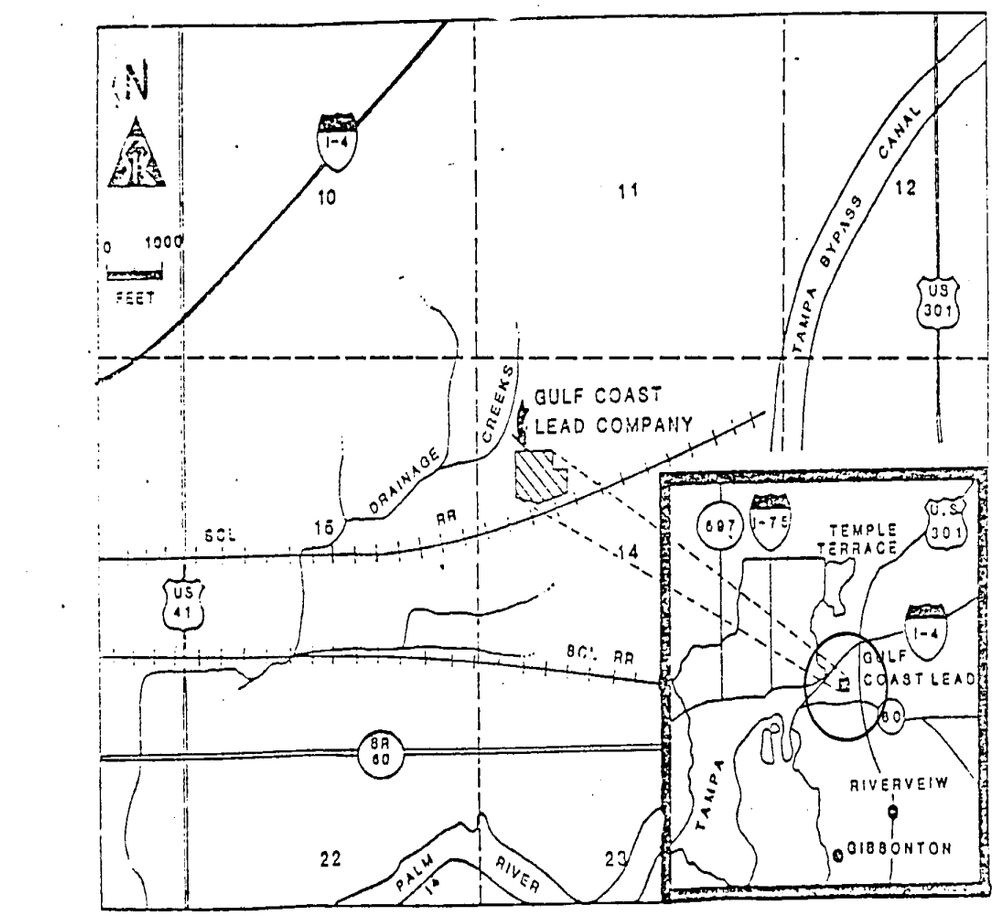
The effluent from Gulf Coast Lead, a battery recycling plant, was not acutely toxic to the test organisms, Ceriodaphnia dubia, Daphnia pulex, or Notropis leedsi. The Microtox® assay, using the bacterium, Photobacterium phosphoreum, was also non toxic producing an EC_{50} > 100% effluent concentration. Due to the non toxic nature of the sample, chemical analyses were not performed.

INTRODUCTION

The Gulf Coast Lead Company is located at 1901 North 66th Street, Tampa, Hillsborough County, Florida (Figure 1). Gulf Coast Lead Company operates a treatment facility for the treatment of low pH (1.0-4.0 pH units) lead bearing (2.0-50.0 ppm) process water and recovered groundwater (Figure 2). The treatment facility design capacity is 28,000 gallons of wastewater per day. After treatment the effluent is discharged to Palm River, which then flows to Hillsborough Bay.

A bioassay performed on effluent from the Gulf Coast Lead Company on 14 to 16 June, 1986, by Environmental Science and Engineering of Gainesville, Florida, did not find acute toxicity to the test organisms Daphnia pulex and Pimephales promelas. There was some mortality in the water flea control and in the 100% sample, but not in the fish.

To evaluate the discharge from this facility, the Biology Section performed three acute toxicity bioassays and one Microtox® assay on a sample from the facility. Those involved in performing the tests and in preparation of this report were: D. A. Chasteen, J. M. Faircloth, and L. A. Williams.



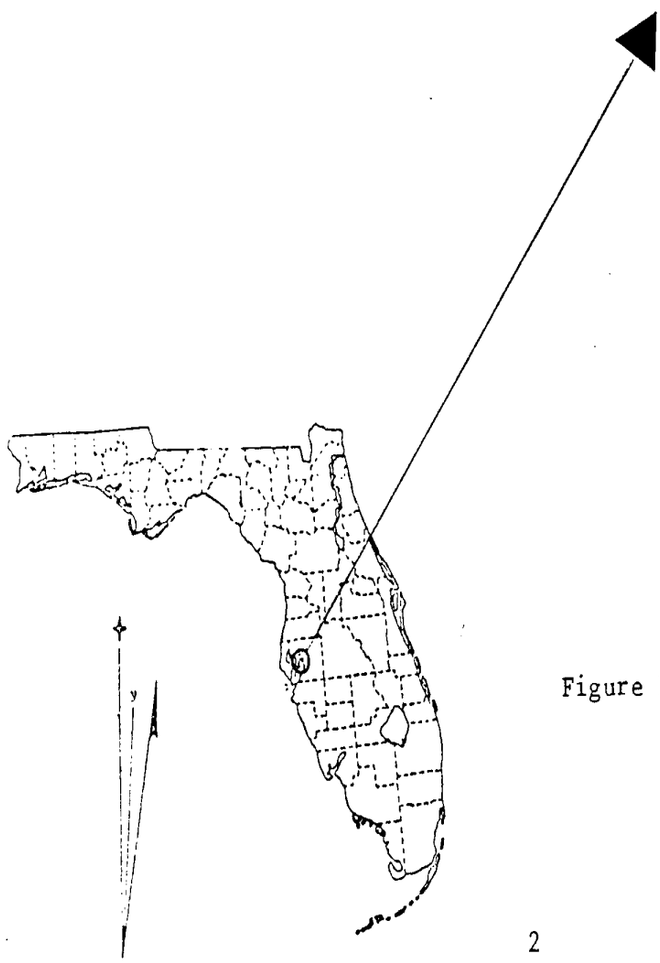


Figure 1. Portion of Hillsborough County, Florida, including location of Gulf Coast Lead Company.

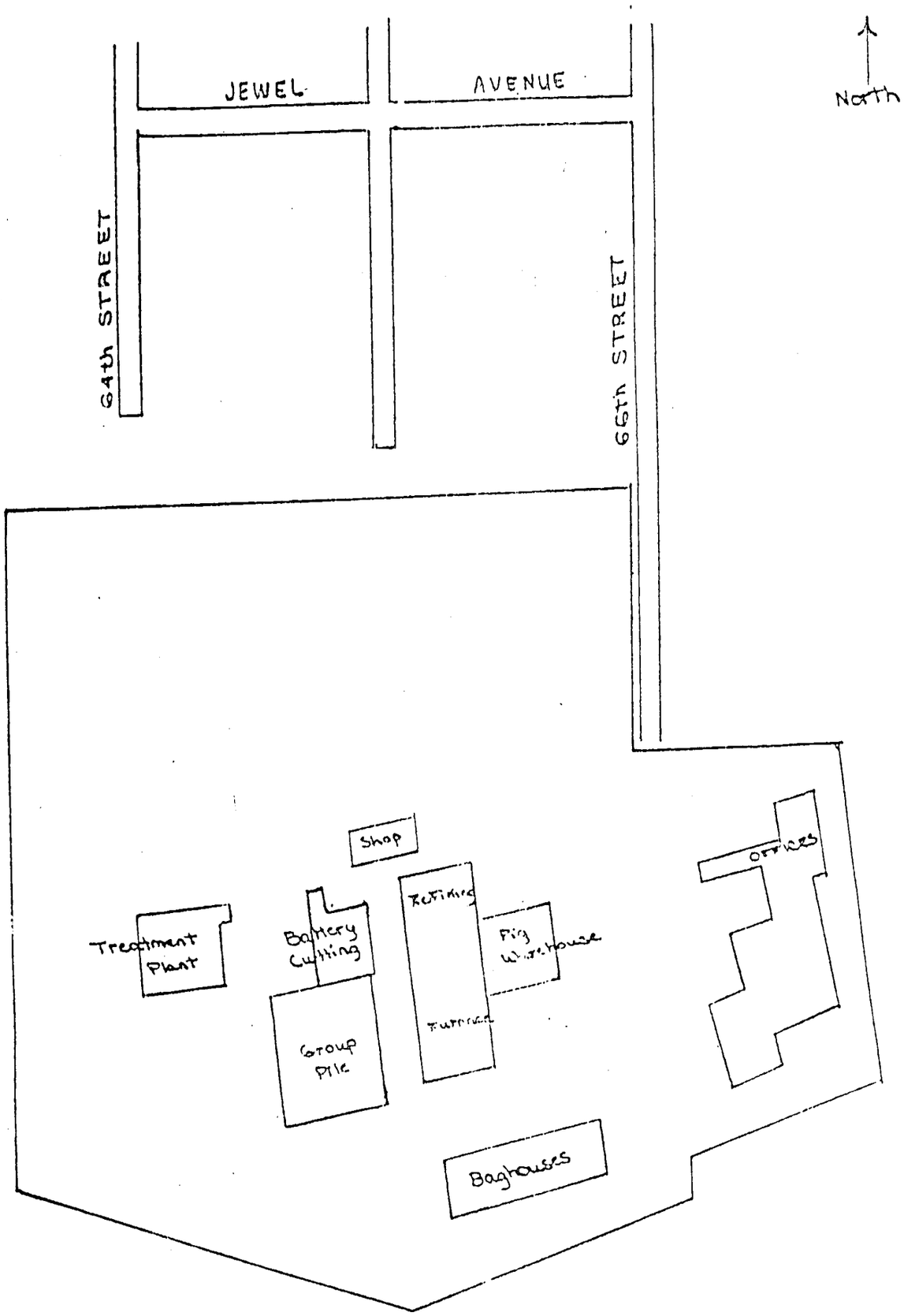


Figure 2. Schematic of Gulf Coast Lead Company.

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.

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 27 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

Three static acute toxicity bioassays and one Microtox® assay were performed on effluent from the Gulf Coast Lead Company. They were performed from 0910 hours on 27 January to 0900 hours on 29 January, 1988.

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. David Demmi of the FDER Southwest Branch Office at 0925 hours on 26 January, 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° $\pm$ 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 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 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% effluent 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% effluent 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 effluent sample taken on 26 January, 1988 from Gulf Coast Lead was not acutely toxic to the test organisms, Ceriodaphnia dubia, Daphnia pulex, and Notropis leedsi (Table 2). The Microtox® assay was also non toxic (EC_{50} > 100%) (Table 3). This supports the conclusion that the effluent from this facility was non toxic on January 26, 1988.

Since the sample was non toxic, 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
30.0%	35.0 ml	15.0 ml	50 ml
60.0%	20.0 ml	30.0 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
30.0%	140.0 ml	60.0 ml	200 ml
60.0%	80.0 ml	120.0 ml	200 ml
100.0%	--------	200.0 ml	200 ml

Notropis leedsi (bannerfin shiner)

Concentration	Dilution Water	Sample	Total Volume
Control	500 ml	--------	500 ml
30.0%	350 ml	150 ml	500 ml
60.0%	200 ml	300 ml	500 ml
100.0%	------	500 ml	500 ml

Table 2. Data recorded during 48 hour, Ceriodaphnia dubia, Daphnia pulex, and Notropis leedsi static acute toxicity bioassay of Gulf Coast Lead Company, Hillsborough County, No NPDES, on 27 to 29 January, 1988.

Facility:	GULF COAST LEAD COMPANY			NPDES # None		Facility Type:	Industry
Location:	Hillsborough County			Contact/District:	D. Moores / sw		
Sample Collection Date:	1/26/88	Time:	925	Test type:	Static Screening		
Test Beginning Date:	1/27/88	Time:	910	# tests:	3	Receiving Water:	Palm River
Test Ending Date:	1/29/88	Time:	900	Chlorination Type:	Non-chlorinated		

Parameter	
Total Residual Cl2:	0
Method:	Hach
By:	DAC
Salinity:	1.5

Ammonia:	Control Water	100% Sample
Unionized NH3:	0.00	0.01
Total NH3:	0	1.08

Organism: *Ceriodaphnia dubia* — Age/Life stage: Neonates
LC50: Binomial: — Moving Average: — Probit:
non-toxic

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	8.9	8.6	8.3	7.9	7.9	7.9	19.4	19.3	19.3		
Control	10	10	10	8.9	8.6	8.3	8	7.9	8					
30%	10	10	10	9	8.7	8.5	7.9	8	8	19.4	19.1	19		
30%	10	10	10	9	8.7	8.5	7.9	8	8					
60%	10	10	10	9.2	8.7	8.5	7.7	7.8	7.8	19.4	18.9	18.8		
60%	10	10	10	9.2	8.7	8.5	7.7	7.8	7.8					
100%	10	10	10	9.4	8.8	8.5	7.2	7.4	7.4	19.5	19.2	18.9		
100%	10	10	10	9.4	8.8	8.5	7.2	7.4	7.4					

	Control water	100% sample
Alkalinity:	118	8
Hardness:	120	735

Organism: *Daphnia pulex* — Age/Life stage: Neonates
LC50: Binomial: — Moving Average: — Probit:
non-toxic

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	8.8	8.7	8.5	8.1	8	8	19.7	19.1	19.1		
Control	10	10	10	8.9	8.7	8.5	8.1	8	8				200	205
30%	10	10	10	9.2	8.9	8.6	7.9	8	8	19.8	19	18.8		
30%	10	10	10	9.2	8.9	8.7	7.9	8	8				900	890
60%	10	10	10	9.4	8.9	8.7	7.6	7.8	7.8	20	18.5	18.5		
60%	10	10	10	9.4	8.9	8.7	7.6	7.8	7.8				1500	1480
100%	10	10	10	9.8	9	8	6.9	7.2	7.1	20	18.8	18.8		
100%	10	10	10	9.8	9	8	6.8	7.2	7.1				2250	2220

	Control water	100% sample
Alkalinity:	118	8
Hardness:	120	735

Organism: *Notropis leedsi* — Age/Life stage: 27 days old
LC50: Binomial: — Moving Average: — Probit:
non-toxic

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	8.5	8.3	7.5	7.4	7.7	7.8	20.3	19.1	19.2		
Control	5	4	4	8.5	8.3	7.5	7.4	7.7	7.7				208	210
30%	5	5	5	8.7	8.4	7.5	7.4	7.7	7.7	20.2	18.5	18.8		
30%	5	5	5	8.7	8.3	7.5	7.4	7.7	7.7				910	900
60%	7	5	5	9.2	8	7.2	7.3	7.5	7.5	20.1	18.5	18.6		
60%	5	5	5	9.2	8	7.2	7.3	7.5	7.5				1520	1500
100%	5	4	4	9.7	8.4	7.8	6.8	7	7.1	20.1	18.8	18.9		
100%	5	5	5	9.7	8.4	7.8	8.8	6.9	7				2280	2280

	Control water	100% sample
Alkalinity:	115	8
Hardness:	120	735

Table 3. Microtox test results , Gulf Coast Lead Co. Inc., Tampa , Hillsborough County, no NPDES # , on 1/27/88.

Microtox Test Culture lot # M-606

Final Reclaimed Water

% Sample	Non-chlorinated	
	5-min	15-min
0	89	47
0	78	40
0	75	39
12.38	80	42
12.38	88	49
12.38	81	44
24.75	83	46
24.75	81	46
24.75	82	47
49.5	79	46
49.5	81	47
49.5	78	46
99	77	47
99	75	46
99	78	49

EC-50 Non-chlorinated (15 minute , 15 degree C) > 100%

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.

Industry/Toxicant Gulf Coast Lead Nontoxic
Address 1901 66th St., Tampa
Contact/District SW
Effluent Serial Number
NPDES Permit Number

BIOASSAY DATA FORM

Test Number: 1 of 3
Test Type: Static, Renewal, Screening, Conventional
Other:

Sample Collection: Date 1/26/88 Time 0925
Test Beginning: Date 1/27/88 Time 0910
Test Ending: Date 1/29/88 Time 0900
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
Control	99	10	10	9			8.9	8.6	8.3			7.9	7.9	7.9			19.4	19.3	19.3		
Control	20	10	10	10			8.9	8.6	8.3			8.0	7.9	8.0							
30%	95	10	10	10			9.0	8.7	8.5			7.9	8.0	8.0			19.4	19.1	19.0		
30%	9	10	10	10			9.0	8.7	8.5			7.9	8.0	8.0							
60%	88	10	10	10			9.2	8.7	8.5			7.7	7.8	7.8			19.4	18.9	18.8		
60%	1	10	10	10			9.2	8.7	8.5			7.7	7.8	7.8							
100%	92	10	10	10			9.4	8.8	8.5			7.2	7.4	7.4			19.5	19.2	18.9		
100%	85	10	10	10			9.4	8.8	8.5			7.2	7.4	7.4							
Initial of Investigator		MF	MF	DAC			MF	MF	MF			MF	MF	MF			MF	MF	MF DAC		

Alkalinity/Hardness (mg/l as $CaCO_3$)
Control Water: 118/120
100% Sample: 8/735
Other:
Measured by: DAC

Ammonia unionized/total (mg/l as NH_3/N)
Hour 0
Control Water: 0.0/0.0
100% Sample: 0/1.0
Other:

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

Slope = -61.0

Signature(s)
David Snyder
Marshall Seipelt

Instrument Calibrations:

	pH Meter:	DO Meter:	S-C-T Meter:
0 Hours	7.01 9.07	9.2 @ 20°C	10.2 @ 10 28.0 @ 30
24 Hours	7.01 9.09	9.2 @ 20°	
48 Hours	7.01 9.09	9.2 @ 20°C	10.0 @ 10 30.0 @ 30
72 Hours	can		
96 Hours			

Total Residual Chlorine:
Field data: Method:
Lab: 0 Method: Hach
Lab: Method:

De-chlorinated:
Measurements by: DAC

Reviewed by:
Date: 3/3/88

Remarks: conductivity Standard - KCl
read 1280 @ 19°C > very good -
std 1246 @ 19°C

Industry/Toxicant Gulf Coast Lead
Address
Contact/District SW
Effluent Serial Number 001
NPDES Permit Number

BIOASSAY DATA FORM

Test Number: 2 of 3
Test Type: Definitive, Renewal, Screening, Conventional
Other:

Sample Collection: Date 1/26/88 Time 0925
Test Beginning: Date 1/27/88 Time 0910
Test Ending: Date 1/29/88 Time 0900
Test Organism Mysidopsis bahia
Age/Life Stage 1 neonate

Conc. or %	Test Container Number	Number of Live Organisms 0	24	48	72	96	Dissolved Oxygen (mg/l) 0	24	48	96	pH 0	24	48	72	96	Temperature °C 0	24	48	72	96	Conductivities 0	24	48	72	96
Control	72	10	10	10			8.8	8.7	8.3	8.5	8.1	8.0	8.0			19.7	19.1	19.1							
Control	66	10	10	10			8.7	8.7	8.3	8.5	8.1	8.0	8.0								200	205			
30%	10	10	10	10			9.2	8.9	8.5	8.6	7.7	8.0	8.0			19.5	19.0	18.8							
30%	50	10	10	10			9.2	8.9	8.5	8.7	7.9	8.0	8.0								700	790			
60%	40	10	10	10			9.4	8.9	8.5	8.7	7.6	7.8	7.8			20.0	18.5	18.5							
60%	42	10	10	10			9.4	8.9	8.5	8.7	7.6	7.8	7.8								1500	1450			
100%	1	10	10	10			9.8	9.0	8.5	8.0	6.9	7.2	7.1			20.0	18.8	18.8							
100%	26	10	10	10			9.8	9.0	8.5	8.0	6.8	7.2	7.1								2250	2220			
									e.d.	v.p.															
Initial of Investigator		DAC	DE	DAC			DAC	MF	DAC		DAC	MF	DAC			DAC	MF	DAC			DAC	DAC			

DAC — water down on worst organisms

Alkalinity/Hardness (mg/l as $CaCO_3$)
Control Water: 118/120
100% Sample: 5/735
Other:
Measured by: DAC

Ammonia unionized/total (mg/l as NH_3/N)
Hour 0
Control Water: 0.0 / 0.0
100% Sample: / 1.08
Other:

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

Salinity 100% = 1.5‰

Signatures:
David Chaston
Marshall Faircloth
J Hopkins

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: 0 Method: Hach
Lab: Method:

De-chlorinated:
Measurements by: DAC

Reviewed by:
Date: 3/3/88

NONTOXIC

Industry/Toxicant: Gulf Coast Lead
Address:
Contact/District:
Effluent Serial Number:
NPDES Permit Number:

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

Sample Collection: Date 1/26/88 Time 0925
Test Beginning: Date 1/27/88 Time 0918
Test Ending: Date 2/10/88 Time 0800
Test Organism: Mysidopsis bahia
Age/Life Stage: 1-2 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 mmhos 0	24	48	72	96
Control	71	5	5	5			8.5	8.3	8.5	7.5		7.4	7.7	7.8			20.3	19.1	19.2							
Control	55	5	4	4			8.5	8.3	8.5	7.5		7.4	7.7	7.7								208	210			
30 %	239	5	5	5			8.7	8.4	8.6	7.5		7.4	7.7	7.7			20.2	18.5	18.8							
30 %	54	5	5	5			8.7	8.3	8.7	7.5		7.4	7.7	7.7								910	900			
60 %	15	7	7	7			9.2	8.0	8.7	7.2		7.3	7.5	7.5			20.1	18.5	18.6							
60 %	68	5	5	5			9.2	8.0	8.7	7.2		7.3	7.5	7.5								1520	1500			
100 %	44	5	4	4			9.7	8.4	8.0	7.8		6.8	7.0	7.1			20.1	18.8	18.9							
100 %	47	5	5	5			9.7	8.4	8.0	7.8		6.8	6.9	7.0								2280	2250			
								DAC ditto																		
Initial of Investigator		DAC	MF	DAC			MF	MF	MF			MF	MF	MF			MF	MF	DAC			MF	MF			

Alkalinity/Hardness (mg/l as $CaCO_3$)
Control Water: 124/124
100% Sample: 8/735
Other:
Measured by: DAC

Ammonia unionized/total (mg/l as NH_3/N)
Hour 0
Control Water: 0.0 | 0.0
100% Sample: | 1.08
Other:

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

Total Residual Chlorine: 0 Salinity 100% = 1.5 °/oo

Signature: David Charles
Marshall Sandbott

Instrument Calibrations:

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

Remarks:

Field data: ____ Method: ____
Lab: 0.0 Method: titrate
Lab: ____ Method: ____

De-chlorinated:
Measurements by: DAC

Reviewed by:
Date: 3/3/88

C62

MICROTOX™ Data Reduction Sheet

SOURCE: Gulf Coast Lead

GRAPH CALC EC 50 (15 MIN, 15 °C) = 7100 (%SAMPLE) mg/L. Stimulatory

SAMPLE DATA:

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

DATE ASSAYED: 1-27-88 TIME: 8:30

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: Leslee Williams REAGENT VIAL LOT NO. M-606

REMARKS: non-Cl_2

MICROTOX™ 99% TEST

SAMPLE CUVETTE	% SAMPLE	READINGS 5 MIN	READINGS 15 MIN	Γ5	Γ15	NOTES
A1	0	89	47	X	X	
B1		78	40			
C1		75	39			
A2	12.38	80	42	-.028	-.067	
B2		88	49			
C2		81	44			
A3	24.75	83	46	-.016	-.094	
B3		81	46			
C3		82	47			
A4	49.5	79	46	.017	-.094	
B4		81	47			
C4		78	46			
A5	99	77	47	.052	-.113	
B5		75	46			
C5		78	49			
EC_{50} (MIN, °C)				618.9	Stimulatory	

REVIEWED BY:

DATE: 3/3/88