BIOASSAYS OF GULF POWER CRIST PLANT

PENSACOLA, ESCAMBIA COUNTY, FLORIDA

NPDES #FL0002275

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Biology Section
Division of Environmental Programs

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Biology Section
Bureau of Laboratories and
Special Programs
November 8, 1985

EXECUTIVE SUMMARY

Gulf Power Crist Plant, Pensacola, Escambia County, Florida, NPDES #FL0002275, on 15 to 17 October 1985.

The Biology Section performed a 48 hour static acute toxicity screening bioassay on a sample of ash pond overflow collected from the Gulf Power Crist Plant outfall #002. The sample was not toxic to the test organism, Heterandria formosa. Chemical analyses were not performed since the sample was not toxic.

INTRODUCTION

The Gulf Power Crist Electric Generating Plant is located at 75 North Pace Boulevard, Pensacola, Escambia County, Florida (Fig. 1). This coal fired power plant operates a wastewater treatment facility for condenser cooling water, metal cleaning wastes, boiler blowdown, and other process wastewaters. The facility discharges once through cooling water from outfall #001 (34 MGD) and ash pond overflow through outfall #002. This latter dishcarge may contain oils, grease, copper and iron (data from NPDES file). These wastewaters are discharged to the Escambia River North of Thompson Bayou.

In August, 1980, a 48 hour bioassay was performed on effluent from this facility using Mysidopsis bahia as the test organism. At that time, 30% of the organisms died in the 100% concentraton.

To re-evaluate the toxicity of effluent from this facility, the Biology Secton performed a 48 hour static screening bioassay on ash pond overflow (outfall #002), from 15 to 17 October, 1985. The results of this test are presented in this report. Those involved in performing the test and in preparation of this report were: R. B. Frydenborg, M. L. Moultrie and M. L. Roll.

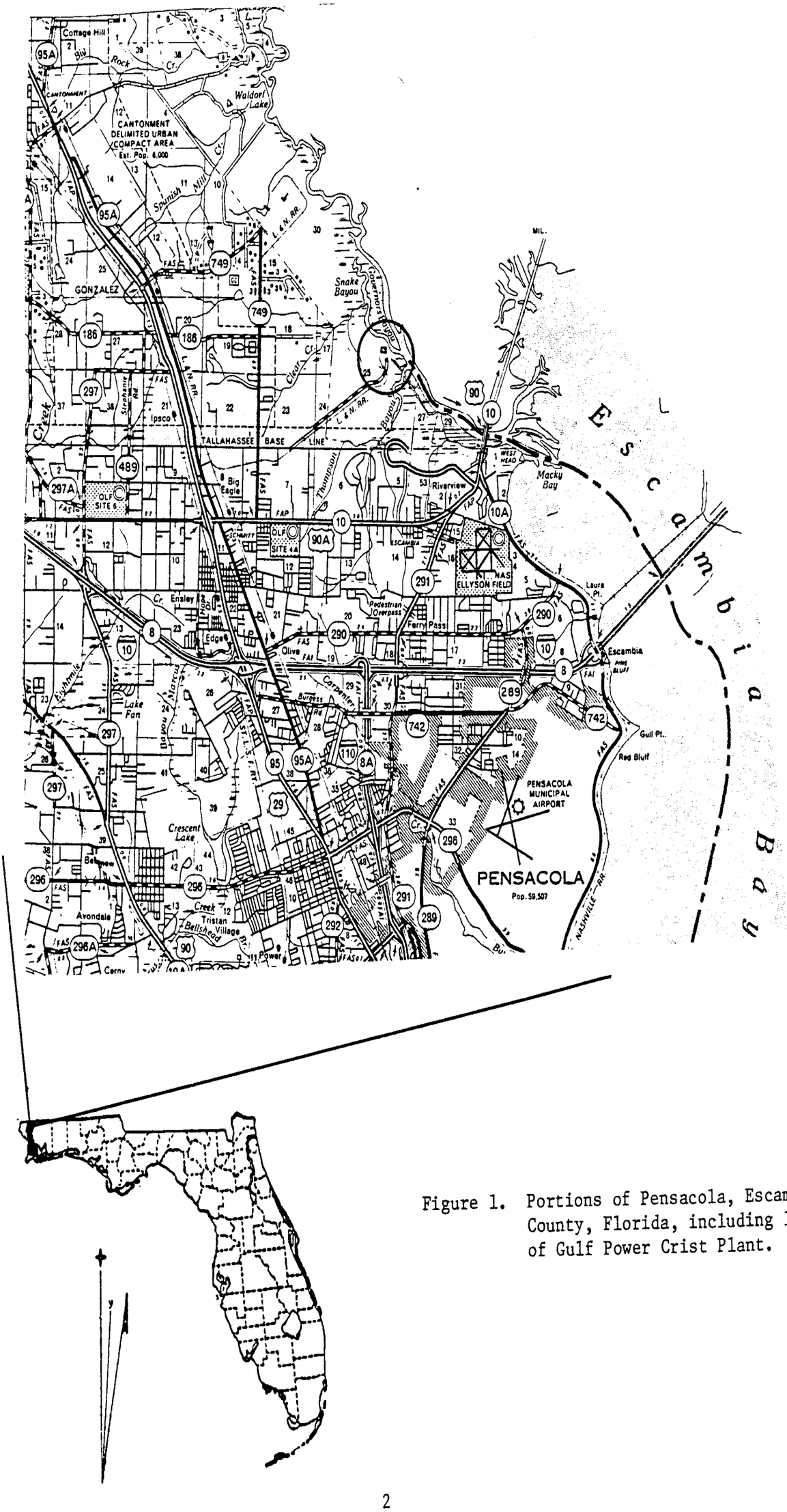


Figure 1. Portions of Pensacola, Escambia County, Florida, including location of Gulf Power Crist Plant.

METHODS AND MATERIALS

Test methods used to conduct this static bioassay are extensively described by Peltier and Weber (1985) and the FDER Biology Section (1985). The organism selected for this study is among those recommended by the FDER Biology Section (1985). The life history and maintenance procedures used to culture the organism are detailed below.

Heterandria formosa (least killifish) - Approximately 100 adult least killifish were obtained from a wild population in the St. Marks Wildlife Refuge (Wakulla County, Florida) during August, 1980. The fish are maintained in two and one-half to 15 gallon all-glass aquaria equipped with a flow-through water exchange system. Water for this system is unchlorinated and is pumped from a deep well near the DER laboratory. The least killifish are reared at 22° ± 2°C under a 16:8 hour light-dark cycle and are fed freshly hatched Artemia (brine shrimp) and Tetra-Min® twice daily and once daily on weekends. New born fish are initially maintained in the adult tanks, but are transferred to separate aquaria at weekly intervals, thereby segregating fish into even age groups. The fish used in this test were 3 weeks old.

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

A 48 hour static acute toxicity screening bioassay was performed on a sample of effluent collected from the Gulf Power Crist Plant outfall #002 from 1115 hours on 15 October to 1100 hours on 17 October, 1985.

The sample was collected by Mr. Stephen Baisden of DER's Northwest District office at 1513 hours on 14 October, 1985, using standard wastewater sampling procedures. 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 bioassay were unpreserved. 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 sample in the Tallahassee laboratory, the containers were placed in warm water and the temperature of the sample 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 effluent sample was obtained from the same DER deep well that is used to culture the test organisms. The concentration series selected for this study is presented in Table 1.

Two replicates, of each concentration and a control, were used for the Heterandria formosa (least killifish) 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 tests.

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 control 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 form and are presented in Table 2.

Table 1. Concentration Series and Volumes Used for This Static Bioassay.

Heterandria formosa (least killifish)

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

Table 2. *Heterandria formosa*

Gulf Power Crist Plant, Pensacola, Escambia County, Florida, NPDES #FL0002275 on 15 to 17 October, 1985.

Concentration or %	Number of Live Organisms			Dissolved Oxygen (mg/l)			pH			Temperature (°C)			Salinity (ppt)	
	0	24	48	0	24	48	0	24	48	0	24	48	0	48
Control	5	5	5	8.4	8.8	8.1	7.7	8.0	8.0	22.0	21.5	21.6		
Contrl	5	5	5	8.4	8.8	8.1	7.7	8.0	8.0				212	215
50.0%	5	5	5	8.3	8.8	8.1	7.6	7.8	7.8	21.6	21.4	21.5		
50.0%	5	5	5	8.3	8.8	8.1	7.6	7.8	7.8				3510	3510
100.0%	5	5	5	8.3	8.8	8.1	7.3	7.4	7.4	21.1	21.4	21.5		
100.0%	5	5	5	8.3	8.8	8.1	7.3	7.4	7.4				6500	6800

Control Water

NH_3(as NH_3)(mg/l): 0

Total ammonia (as N)(mg/l): 0

Total Alkalinity (mg/l $CaCO_3$): 100

Total Hardness (mg/l $CaCO_3$): 115

100% Effluent

NH_3(as NH_3)(mg/l): 0

Total ammonia (as N)(mg/l): .05

Total Alkalinity (mg/l $CaCO_3$): 18

Total Hardness (mg/l $CaCO_3$): 480

RESULTS AND DISCUSSIONS

The Biology Section performed a 48 hour static acute toxicity screening bioassay on a sample of ash pond overflow collected from the Gulf Power Crist Plant outfall #002. The sample was not toxic to the test organism, Heterandria formosa (Table 2). Chemical analyses were not performed since the sample was not toxic.

LITERATURE CITED

Florida Department of Environmental Regulation, Biology Section. 1985a. Methods and Quality Assurance for Performing Acute Toxicity Tests. FDER. 53 pp.

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 pp.