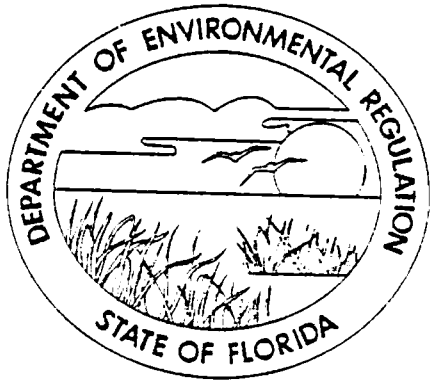


BIOASSAYS OF LYKES PASCO PACKING COMPANY

DADE CITY, PASCO COUNTY, FLORIDA

NPDES #FL0000485

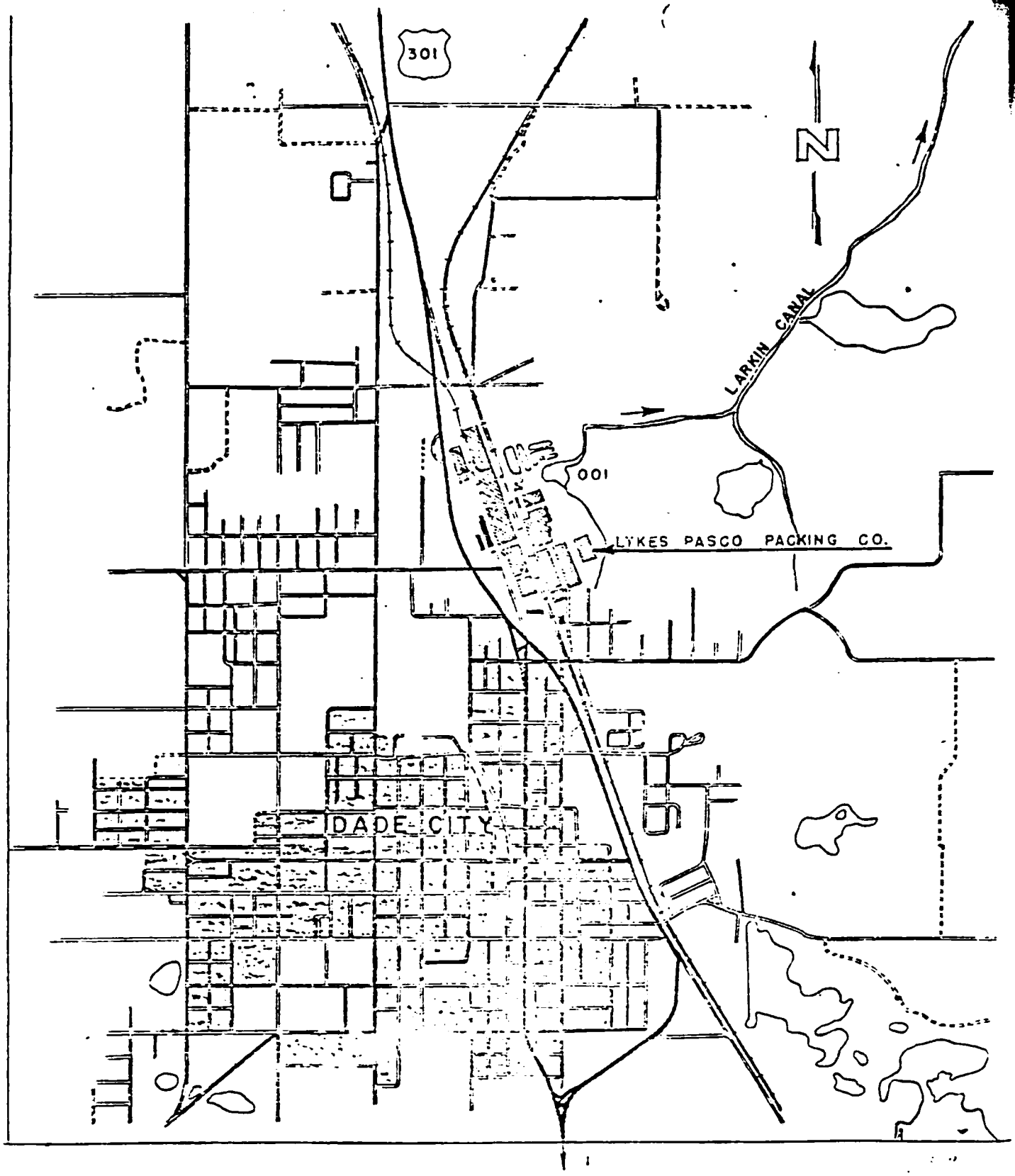
Biological Section
Bureau of Water Analysis
February, 1982

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SCALE 1:24000

"LOCATION MAP"
DADE CITY QUADRANGLE
LACOOCHEE QUADRANGLE
FROM U.S. GEOLOGICAL SURVEY MAP, 1960
LYKES PASCO PACKING CO.
DADE CITY, PASCO, FLORIDA

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Figure 1. Map of Lykes Pasco Packing Company, Dade City, Pasco County, Florida, showing Outfall #001 to the Larkin Canal and eventually to the Withlacoochee River.

METHODS AND MATERIALS

Test methods used to conduct these static bioassays are extensively described by Peltier (1978). The organisms selected for this study include a species recommended by Peltier (1978) and the U.S. EPA (1978). Additionally, the Biological 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.

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 March, 1979. 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, and are kept at a constant temperature of 22° plus or minus 1°C. The aquaria are cleaned weekly by siphoning off half the water along with the detritus and excess organisms. They are then refilled 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.

Simocephalus serrulatus (water flea) - An indigenous breeding population of Simocephalus serrulatus was collected from Lake Jackson, Leon County, Florida, in March, 1980, by personnel from DER's Biological Section. Positive identification of the organisms was made by Mr. Jeff Foran of the University of Florida Department of Environmental Engineering Sciences. The cultures are maintained in two and one-half gallon all glass aquaria, filled with unchlorinated DER well water, under a 16:8 hour light-dark cycle. The organisms are fed a liquified blend of Purina Trout Chow® and Cerophyl® twice daily, and are kept at a constant temperature of 22° plus or minus 1°C. The aquaria are cleaned weekly by siphoning off half the water along with the detritus and excess organisms. They are then refilled 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.

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

Test Methods

Two separate 48 hour static acute toxicity bioassays were performed on a grab sample of effluent from Lyke's Outfall #001 to the Larkin Canal. The tests were performed from 0900 hours on 10 February, to 0930 hours on 12 February, 1982. The sample was collected by Ms. Phyllis Jones of DER's Southwest District at 0955 hours on 9 February, 1982 using standard wastewater sampling procedures. The sample was iced and transported to the DER laboratory in Tallahassee for analysis within 24 hours of collection.

Freshwater for dilution of the effluent samples was obtained from the same DER deep well that is used to culture the test organisms. The concentration series selected for this study (Table 1) is that recommended by APHA (1980).

Two replicates, each with six concentrations and a control, were used to test with the water fleas, Daphnia Pulex and Simocephalus serrulatus. Flint glass jars of 250 ml capacity were used as test chambers, and 200 ml of the appropriate test concentration was placed in each chamber. Daphnia and Simocephalus were siphoned into large culture dishes 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. Simocephalus neonates were separated from the adults visually in the culture dish prior to loading. 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.

Dissolved oxygen, pH, temperature, and the number of live organisms were recorded for each test chamber at 0 hours, 24 hours, and 48 hours. Total alkalinity and total hardness were recorded at the beginning of the test for the controls and the 100% effluent concentration. The specific conductance of each test concentration was recorded at the beginning and end of the test. Ammonia concentrations, including total and unionized fractions (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 and end of the test. Total ammonia concentrations were determined using an Orion® specific ion probe and a Corning® pH/millivolt meter. The unionized fraction was then determined 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.

Table 1. Concentration Series and Volumes Used for These Static Bioassays *Daphnia pulex* and *Simocephalus serrulatus* (water fleas)

Concentration	Dilution Water	Effluent	Total Volume
Control	200 ml	---	200 ml
5.6%	188.8 ml	11.2 ml	200 ml
10.0%	180 ml	20 ml	200 ml
18.0%	164 ml	36 ml	200 ml
32.0%	136 ml	64 ml	200 ml
56.0%	88 ml	112 ml	200 ml
100.0%	--	200 ml	200 ml

Table 2. Data recorded during 48 hour, Daphnia pulex, static acute toxicity bioassay of Lykes Pasco Packing Company, Dade City, Pasco County, Florida, NPDES #FL0000485, on 10 to 12 February, 1982.

Concentration or %	Number of Live Organisms			Dissolved Oxygen (mg/l)			pH			Total Alakalinity (mg/l as $CaCO_3$)		Total Hardness (mg/l as $CaCO_3$)		Temperature (°C)			$NH_4NH_3+NH_4$ (mg/l)		Conductivity (umhos/cm)	
	0	24	48	0	24	48	0	24	48	0	48	0	48	0	24	48	0	48	0	48
Control	10	9	9	8.9	9.1	9.1	7.9	8.2	8.2	118		119		20.8	20.2	19.8	.01/.30	-		
Control	10	10	9	8.9	9.1	9.1	7.9	8.2	8.2										198	208
5.6%	10	10	10	8.8	9.1	9.0	7.9	8.2	8.2					20.8	20.0	19.8				0
5.6%	10	10	10	8.8	9.1	9.0	7.9	8.2	8.2										205	210
10.0%	10	10	10	8.8	9.1	9.1	7.9	8.2	8.2					20.5	20.0	19.7				
10.0%	10	10	10	8.8	9.1	9.1	7.9	8.2	8.2										210	212
18.0%	10	10	10	8.8	9.1	9.1	7.9	8.2	8.2					20.5	19.8	19.7				
18.0%	10	10	10	8.8	9.1	9.0	7.9	8.2	8.2										220	220
32.0%	10	10	10	8.5	9.1	9.0	7.9	8.2	8.2					21.0	19.8	19.5				
32.0%	10	10	10	8.5	9.1	9.0	7.9	8.2	8.2										235	240
56.0%	10	10	10	8.3	8.8	9.0	8.0	8.2	8.2					21.0	19.8	19.5				
56.0%	10	10	10	8.3	8.8	9.0	8.0	8.2	8.2										265	265
100.0%	10	10	10	7.9	8.7	8.9	8.0	8.2	8.2	156		142		21.5	20.0	19.8	.02/.47	—		
100.0%	10	10	10	7.8	8.7	8.9	8.0	8.2	8.2										320	310

Remarks:

Table 3. Data recorded during 48 hour, *Simocephalus serrulatus*, static acute toxicity bioassay of Lykes Pasco Packing Company, Dade City, Pasco County, Florida, NPDES #FL0000485, on 10 to 12 February, 1982.

Concentration or %	Number of Live Organisms			Dissolved Oxygen (mg/l)			pH			Total Alakalinity (mg/l as $CaCO_3$)		Total Hardness (mg/l as $CaCO_3$)		Temperature (°C)			$NH_4 + NH_3 + NH_4$ (ug/l)		Conductivity (umhos/cm)	
	0	24	48	0	24	48	0	24	48	0	48	0	48	0	24	48	0	48	0	48
Control	10	10	8[a]	8.6	9.0	9.0	7.8	8.2	8.2	118		119		20.8	20.2	19.7	.01/.30	-		
Control	10	10	10	8.7	9.0	9.0	7.8	8.2	8.2										200	205
5.6%	10	10	10	8.7	9.0	9.0	7.8	8.2	8.2					20.8	20.0	19.7				
5.6%	10	9[b]	8	8.7	9.0	9.0	7.8	8.2	8.2										210	210
10.0%	10	9	9	8.8	9.0	9.0	7.9	8.2	8.2					20.6	20.0	19.7				
10.0%	10	10	10	8.8	9.0	9.0	7.9	8.2	8.2										215	215
18.0%	10	9[b]	9	8.7	9.0	9.0	7.9	8.2	8.2					20.6	20.0	19.7				
18.0%	10	9[b]	9	8.7	9.0	9.1	7.9	8.2	8.2										220	225
32.0%	10	10	10	8.6	9.0	9.0	7.9	8.2	8.2					20.8	20.0	19.5				
32.0%	10	10	10	8.6	9.0	9.1	7.9	8.2	8.2										240	240
56.0%	10	10	10	8.5	8.9	9.1	7.9	8.2	8.2					21.2	19.8	19.5				
56.0%	10	10	10	8.5	8.9	9.1	8.0	8.2	8.2										265	265
100.0%	10	10	10	8.1	8.8	9.0	8.0	8.2	8.2	156		142		22.0	19.8	19.7	.02/.47	-		
100.0%	10	10	10	8.1	8.8	9.0	8.0	8.2	8.2										320	310

Remarks: a. Dead organisms entangled in filaments.

b. Dead organism trapped on surface.

RESULTS AND DISCUSSION

The grab sample of effluent collected from Lyke's Outfall #001 to the Larkin Canal was not acutely toxic to the test organisms, Daphnia pulex and Simocephalus serrulatus. No Daphnia died during the test, and only random Simocephalus mortalities, in the low and mid test concentrations, were observed.

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