W. R. DAVIS

INDUSTRIAL WASTE SURVEY

DADE COUNTY, FLORIDA

Prepared by
Lower Florida Estuary Study
Ft. Lauderdale, Florida

Technical Report #TS03-71-208-03.1

Environmental Protection Agency
Southeast Water Laboratory
Athens, Georgia

September, 1971.

INDUSTRIAL WASTE SURVEY

DADE COUNTY, FLORIDA

Prepared by
Lower Florida Estuary Study
Ft. Lauderdale, Florida

Technical Report #TS03-71-208-03.1

Environmental Protection Agency
Southeast Water Laboratory
Athens, Georgia

September, 1971.

INDUSTRIAL WASTE SURVEY

DADE COUNTY, FLORIDA

ERRATA SHEET

Pg. 2, 2nd Para., line 5	(comma) should be . (period).
2nd Para., line 12	supplies should be supplied.
Pg. 10, next to last line	80,000 should be 80,000,000.
Pg. 23, 1st Para., line 3	quantitatives should be quantities.
Pg. 30, 2nd Para., line 4	(3) should be 3/.
Pg. 32, 2nd Para., line 3	perdict should be predict.
Pg. 33, 1st Para., line 5	over enrichment should be overenrichment.
Pg. 36, 2nd Para., line 1	Data should be Dade.
Pg. 37, 1st Para., line 1	detrius should be detritus.
Appendix A	Hunbert should be Humbert.

11-18-71

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

A conference in the matter of pollution of the navigable waters of Dade County, Florida, and tributaries, embayments, and coastal waters was held October 20-22, 1970, in Miami, Florida, on the basis of a written request from the Honorable Claude R. Kirk, Jr., then Governor of Florida, dated July 21, 1970. At this conference it was established that the inland waters of Dade County are severely polluted, and are in violation of the Dade County and Federally-adopted State of Florida Water Quality Standards. A second session of the conference was held on February 18-19, 1971, at Miami, Florida. At this conference initial reports of municipal treatment plant evaluations were presented. A third session of the conference was reconvened on July 2-3, 1971, in Miami, Florida, on the written request from the Honorable Reubin O'D. Askew, Governor of Florida, dated May 24, 1971. The conference was convened under the provisions of Section 10 of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1151 et seq.). At this conference the balance of the municipal treatment plant evaluation reports and a preliminary industrial inventory were presented.

Recommendation 8 of the third session of the conference states:

> "The Environmental Protection Agency shall complete its inventory and analyses of industrial sources and report its findings to the conferees and the Dade County Pollution Control Officer by September 1, 1971. The Dade County Pollution Control Officer shall immediately act on reported violations of State and County standards and report to the conferees his progress in correcting these violations by November 1, 1971."

The inventory phase of the Dade County Industrial Waste Study was presented to the conferees and the Dade County Pollution Control Officer on July 2, 1971. It is the purpose of this report to present the findings of the survey phase of the study to the conferees and the Dade County Pollution Control Officer. It is not the purpose of this report to recommend treatment methods to be used by industries.

The industrial waste survey was conceived, and has been executed, as a cooperative study. The State Department of Air and Water Pollution Control, working through their Southeast Regional office in Fort Lauderdale, provided professional and technician level personnel to assist in the field and at the Lower Florida Estuary Study laboratory, In addition, bacteriological determinations were performed at their laboratory. Dade County Pollution Control provided technician level personnel for field activities. The Water Programs Office, Technical Services Program, Southeast Water Laboratory, Athens, Georgia, provided professional personnel to inspect the industries under study, and also performed the analyses for mercury, metals, and cyanide in their laboratory. The Enforcement Office, Division of Field Investigation supplies professional personnel from both the Cincinnati Center and Denver Center. All field and laboratory activities were coordinated through the Lower Florida Estuary Study.

SUMMARY AND CONCLUSIONS

1. Thirty-six industries not connected to sewers were sampled during May and June 1971. Twenty-one industries discharge to the ground water by various means and 15 discharge to surface waters.

2. Industrial wastes are contaminating the inland waters of Dade County by the addition of oxygen demanding materials, petroleum derivatives, coliform bacteria and toxic substances.

3. Industries sampled contribute over half of the BOD load discharged into inland Dade County waters.

4. Many industries discharge cooling waters mixed with process waste waters.

5. To meet treatment requirements established by the Dade County Board of Commissioners, pretreatment will be required at most industries.

6. In-plant changes, recycling, and improved housekeeping techniques would substantially reduce waste discharges at many industries.

7. Inadequately disinfected discharges from eleven food processing and paper mill industries present a health hazard.

8. Of the 15 industries discharging to surface waters, those discharging to navigable waters are in violation of the 1899 Refuse Act.

RECOMMENDATIONS

The following actions are recommended to reduce the pollution of the waters of Dade County.

1. The cessation of all industrial waste discharges into the inland canal system of Dade County should be accomplished as rapidly as possible but not later than January 1, 1973.

2. All industrial waste sources should be connected to a regional collection and treatment system as soon as possible but not later than January 1, 1974.

3. A detailed process review should be undertaken by each industry to determine the "in-plant house cleaning" and waste recycling steps that could be taken to reduce the waste load discharged. A report on this review and implementation timetables should be presented to the Dade County Pollution Control Officer by January 1, 1972. The action necessary to reduce pollution by these means should be undertaken as soon as possible and before connection to a sewer system.

4. All industries should treat their waste to at least the degree necessary to comply with the Dade County Board of County Commissioners Rule 7 -- "Regulations of the Use of Sanitary and Storm Sewers and the Discharge of Waters and Wastes into Utilities Sewerage system." This pretreatment should be implemented within six months and before connection to a sewer system. This is not meant to preempt the Dade County Pollution Control Officer from determining that greater treatment is necessary in the interim between the present and the time of connection to a sewer system. In all cases, treatment less than presently provided will not be acceptable prior to connection to a secondary treatment plant.

5. All food processing and paper mill industries not currently disinfecting their waste should be required to disinfect. This practice should continue until the waste is discharged to a secondary treatment collection system.

6. The Dade County Port Authority should proceed immediately on the planning and construction of the Miami International Airport industrial waste collection system. Progress reports shall be submitted quarterly to the conferees.

DESCRIPTION OF STUDY

The Dade County Industrial Waste Study was accomplished in two phases. The first was the inventory phase, which encompassed the identification of waste sources. The second was the survey phase, in which the significant sources were characterized.

INVENTORY PHASE

Little was known of industrial wastes in Dade County when the inventory phase of the Industrial Waste Study was initiated in November 1970. The initial inventory was an industrial listing, obtained from several sources, that contained an estimated 1,800 entries of industrial and business firms together with their four digit Standard Industrial Code (SIC) index. The inventory was reduced to 583 potential sources of pollution by elimination of SIC listings of commercial and/or business establishments which produce no waste water. Further reduction of the inventory to 233 plants was accomplished by telephone interviews and detailed review. On-site visits were made to these 233 plants and 95 plants were found to produce significant amounts of waste. Inspection reports indicating the nature of the plant and the waste discharge were prepared for these industries. A summary report on the inventory was presented at the July 2, 1971 session of the Dade County Enforcement Conference. That report contains treatment needs based on information obtained during the inventory. The waste abatement procedures presented in this report supersede those presented in previous reports.

SURVEY PHASE

The survey phase of the industrial waste study was initiated in April 1971. Its purpose was to characterize the major sources of industrial waste in Dade County that discharge to ground and surface waters. The industries evaluated were chosen by examination of the inspection reports prepared during the inventory phase of the study.

After the industries to be sampled were determined, each plant was revisited to obtain information on plant operation, waste treatment, waste volumes, and sampling locations.

Sampling and analysis of the wastes were completed by July 2, 1971. Sampling and analytical procedures are described in the appendices.

STUDY FINDINGS

Industrial activity in Dade County consists largely of small plants engaged in light industry. This survey was concerned with significant industrial waste sources not connected to sewer systems. A total of 36 industries are in this category. These industries were divided into five major groups by type of product or service.

The groups are:

		SIC Code
I	Food Processing and Paper Mill Waste	20, 26
II	Aircraft Repair and Painting	37
III	Chemical and Film Processing	28
IV	Metal Plating	34
V	Paint Manufacturing.	28

All of the industries, with the exception of Homestead Air Force Base, are located in the northeastern section of Dade County which is in the metropolitan Miami area. Concentrations of industry occur in four areas within metropolitan Miami: 1) the Miami International Airport, 2) the unincorporated area between Miami and Hialeah, 3) the unincorporated area just west of Miami Springs, and 4) the section of Hialeah just north of Miami Springs.

Of the industrial waste sources evaluated during the survey, twenty-one discharged a total of 0.90 million gallons per day (mgd) to the ground water, and fifteen discharged a total of 0.87 mgd to the surface waters. Previous study showed that approximately 101 mgd of waste is discharged by all public and private municipal waste treatment plants in Dade County.

Information concerning significant unsewered industrial waste sources in Dade County is compiled by industrial group in Table 1, and the locations of these sources are shown on Figure 1. The industries are identified in Figure 1 by the code numbers presented in Table 1.

TABLE I

Inventory of Significant Unsewered Industrial Waste Sources in Dade County, Florida

Code	Industry	Major Product or Service	Water Use Type and Amount	Nature of Waste Discharged	Receiving Water	Present Treatment	Remarks
	GROUP I						
A1	Borden's Dairy 7103 NE 2nd Avenue Miami	Milk and dairy products, orange juice, fruit drinks	Waste water; 99,000 gpd	Organic loading, Bacteria	Ground water via disposal well	Process: Settling tank Sanitary: Septic tank	More frequent removal of solids from settling tanks necessary.
A2	Canada Dry Bottling Co. of Florida, Inc. 5900 NW 72nd Avenue Miami	Soft drinks	Water treatment, product makeup, wash water; 42,300 gpd	Organic loading	58th St. Canal	Settling tanks	1) More frequent removal of solids from settling tank. 2) Find more suitable method of water treatment plant sludge disposal. 3) DCPC case pending, industry agreed to construct aerated lagoon.
A3	Cott Bottling of Fla. 7130 NW 35th Avenue Miami	Soft drinks; 22,000 gallons per day	Product makeup, washing; 38,800 gpd	Syrup, rinse water, Bacteria	Ground water via drainfield	Septic tank	
A4	Dade County Dairies 7350 NW 30th Avenue Miami	Milk products; 11,000 gpd	Wash water, cooling; 141,500 gpd	Bacteria, organics, emulsifiers, odor control chemicals	Ground water via spray irrigation	Grease trap, settling tank	Slight odor noticeable at spray field.

TABLE I (Cont'd)

Inventory of Significant Unsewered Industrial Waste Sources in Dade County, Florida

Code	Industry	Major Product or Service	Water Use Type and Amount	Nature of Waste Discharged	Receiving Water	Present Treatment	Remarks
	GROUP I (Continued)						
A5	Economy Packing Co. 2419 West 3rd Court Hialeah	Butchering and packing about 40 cattle per day	Washing; 22,200 gpd	Grease, organic loading, Bacteria	Ground water via drainfield	Grease traps, septic tanks	
A6	Farm Stores, Inc. 5800 NW 74th Avenue Miami	Milk and ice cream; 31,000 gpd	Process, cooling, boiler from well; 45,700 gpd	Waste milk and products, Bacteria	58th Street Canal	Activated sludge plant	Find more suitable method of water treatment plant sludge disposal.
A7	Federal Packing Co. 330 W. 23rd Street Hialeah	Butchering and packing about 50 cattle per day	Washing; 62,200 gpd	Blood, paunch manure, grease, Bacteria	Ground water via rock filled seepage area	Rock filter, settling tank	1) More frequent sludge removal from settling tanks. 2) Rock filter should be cleaned out.
A9	Florida Processing Co. 6900 NW 69th Street Miami Springs	Rendering 110 tons/day	Rinse water, boiler feed; 10,100 gpd	Organic loading, grease, Bacteria	Trucked to Virginia Key Treatment Plant	Skimming, activated sludge plants, aerated lagoon	Discharge to FEC Canal pending approval by DCPC.
A10	Gotham Provision Co., Inc. 7301 NW 74th Street Medley	Butchers 140 cattle per day	Washing; 37,600 gpd	Blood, paunch manure, grease, Bacteria	Ground water via rock seepage bed	Settling, grease trap	1) Seepage of effluent into a low swampy area adjacent 2) DCPC issued notice of violation.

TABLE I (Cont'd)

Inventory of Significant Unsewered Industrial Waste Sources in Dade County, Florida

Code	Industry	Major Product or Service	Water Use Type and Amount	Nature of Waste Discharged	Receiving Water	Present Treatment	Remarks
	GROUP I (Continued)						
A12	Miami Board, Division of Simkins Ind., Inc. P. O. Box 1397 Miami	Cardboard, 100 tons/day from waste paper	Cooling, wash, process to pulp of 99% water by weight; 330,000 gpd process water	Organic loading, settleable solids, Bacteria	Tamaimi Canal	Clarification, chlorination	DCPC case pending, industry agreed to connect to sewer system.
A13	Pepsi Cola Bottling Co. of Miami, Inc. 7777 NW 41st Street Miami	Soft drink manufacture; 74,000 gpd	Process boiler feed, domestic use from wells; 200,000 gpd	Organic loading, Bacteria	Dressels Dairy Canal	Settling	1) More frequent sludge removal from settling tanks required. 2) DCPC case pending.
A14	Tallowmaster Scott Road Medley	Rendering 35 tons/day of soap, fertilizer and animal feed products from meat scraps	Wash, cooling; 100,000 gpd	Grease, Bacteria	Ground water via seepage pond	Skimming	1) Has purchased an air-cooled condenser. 2) Industry lost DCPC case.
	GROUP II						
B1	Test Cell Bldg 2120-DCPA Miami International Airport Miami	Aircraft engine testing	Wash down cells after test	Grease, oil and heavy metals, cyanide	Airport Drainage Canal to Tamiami Canal	Oil skimmer	DCPA constructing holding tank. Will truck waste to a treatment plant.

TABLE I (Cont'd)

Inventory of Significant Unsewered Industrial Waste Sources in Dade County, Florida

Code	Industry	Major Product or Service	Water Use Type and Amount	Nature of Waste Discharged	Receiving Water	Present Treatment	Remarks
	GROUP II (Continued)						
B2	Airlift, International Miami International Airport Miami	Air freight operator	Aircraft cleaning, striping, and painting; 7,000 gpd	Oil, solvents, acids, soaps	Airport Drainage Canal to Tamiami Canal	Oil seperator	1) Maintenance of the oil seperator should be improved. 2) Brought to court by DCPC.
B3	Butler Aviation of Miami, Inc. Miami International Airport Miami	Refurbishing of used aircraft	Aircraft stripping and cleaning; 1,600 gpd	Oil, caustic, acid, solvents, heavy metals, kerosene, soap mixture	Storm drain to Airport Drainage Canal to FEC Canal	Settling tank	1) Drainfield from septic tank goes to storm sewers. 2) Issued notice of violation by DCPC.
B5	Eastern Air Lines Miami International Airport Miami	Airline, refurbishing aircraft	Aircraft washing, metal plating; 160,000 gpd over flow discharged to Airport Drainage Canal; approx. 340,000 gpd to sewer system	Oil, solvents, paints, soaps, heavy metals	Port Authority Sewer System, excess discharged to Airport Drainage Canal to Miami River	Oil separator, metal precipitation, cyanide treatment prior to entering sewer system	Issued notice of violation by DCPC.
B6	Homestead Air Force Base Homestead	Air Force Base	Washing aircraft and vehicles; 8,900 gpd	Solvents, detergents, oil and grease	Tributary Canals to Military Canal	Oil separator	Issued notice of violation by DCPC.

TABLE I (Cont'd)

Inventory of Significant Unsewered Industrial Waste Sources in Dade County, Florida

Code	Industry	Major Product or Service	Water Use Type and Amount	Nature of Waste Discharged	Receiving Water	Present Treatment	Remarks
	GROUP II (Continued)						
B7	Miami Aviation Corp. Opa Locka Airport Opa Locka	Aircraft refurbishing and servicing	Aircraft stripping and cleaning; 12,500 gpd	Oil, solvents, acid, caustic, heavy metals	Biscayne Canal via Storm Drainage Canal	Waste oil segregated from other wastes	Waste should be removed from storm drainage system.
B9	Northeast Air Lines Miami International Airport Miami	Passenger and freight airline	Aircraft washing; 110 gpd	Oil, detergents, solvents, heavy metals	Airport Drainage Canal to Tamiami Canal	Waste oil to holding tank at Modern Air Transport	Issued notice of violation by DCPC.
B10	Propeller Service of Miami and Aero Facilities, Div. of Propeller Service Miami International Airport Miami	Aircraft maintanance, propeller rebuilding	Washing, stripping and painting; 115 gpd	Oil and grease, solvent, cleaners	Drainage Canal to FEC Canal	2 oil separators, retention tank, hauling service	
B11	Seaboard Coastline Railroad Miami	Freight transport	Washing of rail equipment; 33,600 gpd	Oil, solvents, biodegradable soap, paint	Drainage Canal to Little River Canal	Grit chamber, oil separator, Floatation-Floculation Unit	DCPC case pending.

TABLE I (Cont'd)

Inventory of Significant Unsewered Industrial Waste Sources in Dade County, Florida

Code	Industry	Major Product or Service	Water Use Type and Amount	Nature of Waste Discharged	Receiving Water	Present Treatment	Remarks
	GROUP II (Continued)						
B12	Air Carrier Service Miami International Airport Miami	Rebuilds aircraft engines	19,400 gpd	Oil, rust remover, solvents, detergents, heavy metals	Port Authority Sewer; drainage ditch to Tamiami Canal	Cleaning area wastes to drainage ditch to Tamaimi Canal; Plating area waste to Port Authority Sewer	1) Issued notice of violation by DCPC. 2) Received permission from DCPA to discharge cleaning area wastes to sanitary sewer system.
	GROUP III						
C2	G. Gertz Enterprises 3401 NW 73rd Street Miami	Knitting mill	Washing and dyeing; 14,400 gpd	Oil and water base disperse type dye	Ground water via a soakage pit	Process waters: carbon filters, settling tanks; Sanitary wastes: septic tank, leach field	1) Carbon filters were not in operation during the study. 2) Plant operating significantly below capacity.
C3	Kim Color (Tremendous Color, Monkey Color, Inc.	Photo processing	Rinse water; 100,800 gpd	Photo chemicals	Ground water via drainfield	Silver reclamation, bleach rejuvenation, septic tanks	Will discharge to sewer as soon as sewer connects to treatment plant.

TABLE I (Cont'd)

Inventory of Significant Unsewered Industrial Waste Sources in Dade County, Florida

Code	Industry	Major Product or Service	Water Use Type and Amount	Nature of Waste Discharged	Receiving Water	Present Treatment	Remarks
	GROUP III (Continued)						
C4	Miami Dye Works 355 NE 72nd Terrace Miami	Dyed fabrics	Wash water; 5,000 gpd	Dye, organics, detergents	Ground water (salt water) via 130 foot well	Process water: settling tank; Sanitary waste: City sewer	Plant operating significantly below capacity.
C6	Smith and Butterfield 3170 NW 36th Street Miami	Film developer	Rinse water; 15,500 gpd	Photo chemicals	Ground water, 150 foot well	Process: Silver precipitation, bleach reclamation; Sanitary: Septic tank	
	GROUP IV						
D1	Acme Plating & Finishing 651 West 18th Street Hialeah	Electroplating	Rinse water; 47,500 gpd	Heavy metals, acid, alkaline bases, organic, solvents, cyanide	Ground water via dry well	Treatment for Cn and Cr	Under requirement by DCPC to connect to sewer.
D2	Airco Plating 3636 NW 46th Street Miami	Electroplating	Rinse water; 30,000 gpd	Heavy metals, acids, alkaline rinse, cyanide	Ground water via soakage pits	Process: neutralization, detention, Cn and Cr treatment; Sanitary: septic tank	

TABLE I (Cont'd)

Inventory of Significant Unsewered Industrial Waste Sources in Dade County, Florida

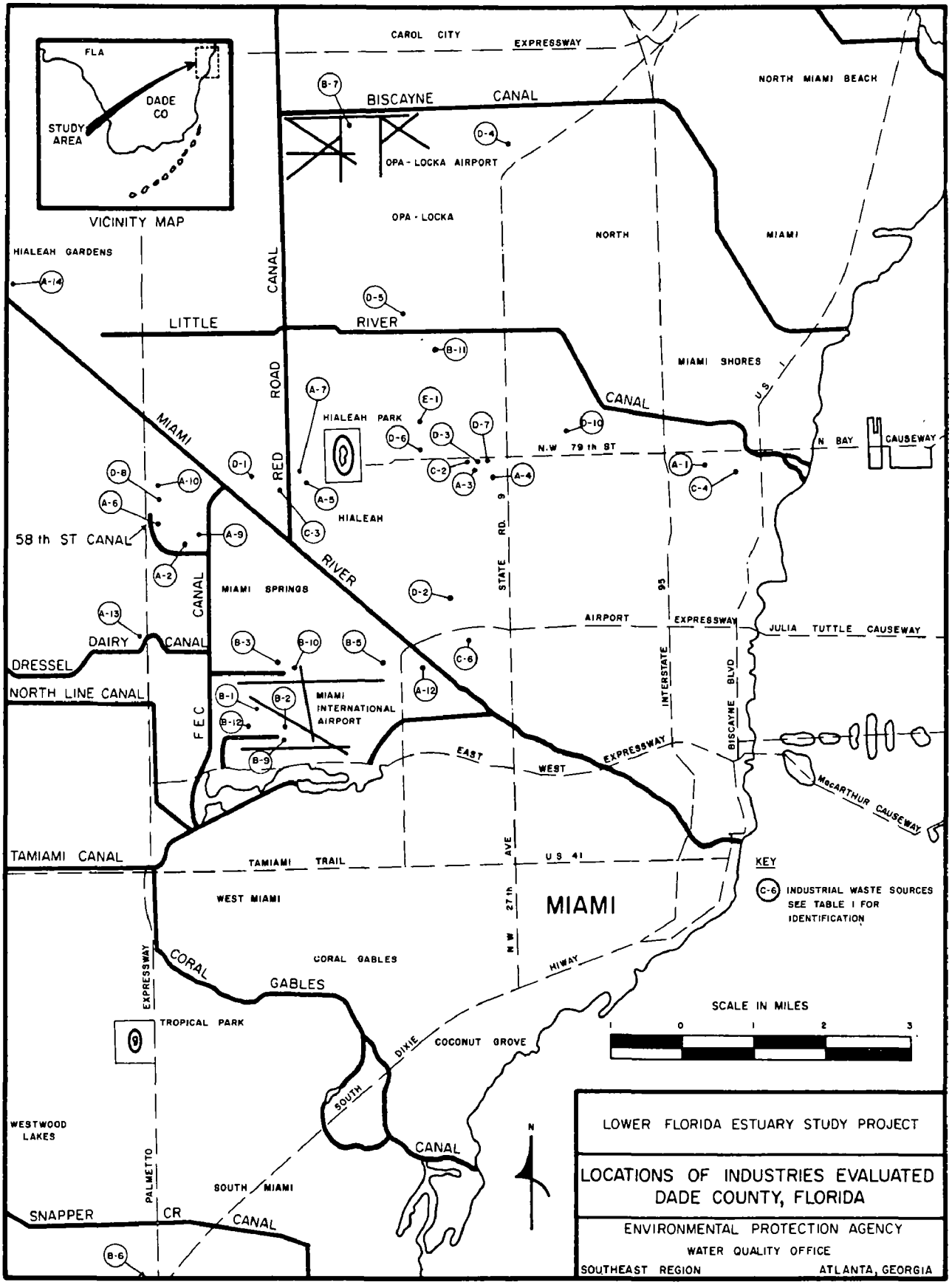
Code	Industry	Major Product or Service	Water Use Type and Amount	Nature of Waste Discharged	Receiving Water	Present Treatment	Remarks
	GROUP IV (Continued)						
D3	Aluminum Anodizing Co. 3630 NW 76th Street Miami	Anodyzed aluminum	Rinse water; 9,500 gpd	Aluminum, acid, caustic, dye	Ground water via seepage pond	Settling, neutralization	Industry has engaged consultant to improve waste treatment system.
D4	Aluminum Finishing Corp. of Florida 13464 NW 26th Avenue Opa Locka	Anodyzed aluminum	Rinse water; 46,300 gpd	Aluminum, acid, caustic, dye, heavy metals	Ground water via seepage pond	Settling	
D5	Continental Bumper Plating 4975 E. 10th Lane Hialeah	Bumper refinishing	Rinse water; 400 gpd	Cyanide, heavy metals, alkaline cleaners, acids	Ground water	Settling	Better maintenance of settling tanks required.
D6	London Platers 1080 E. 24th Street Hialeah	Decorative plating	Rinse water from well; 2,800 gpd	Heavy metals, cyanide	Ground water via dry well	None	
D7	Milgo Electronic Corp. 7620 NW 36th Avenue Miami	Electronic equipment manufacture, electroplating	Rinse water from chrome plating; 5,950 gpd	Chromium	Ground water via drainfield	Chromium reduction, settling, septic tank	

TABLE I (Cont'd)

Inventory of Significant Unsewered Industrial Waste Sources in Dade County, Florida

Code	Industry	Major Product or Service	Water Use Type and Amount	Nature of Waste Discharged	Receiving Water	Present Treatment	Remarks
	GROUP IV (Continued)						
D8	Modern Aluminum Coatings, Inc. 7295 NW 64th Street Miami	Anodyzed aluminum	Rinse water; 118,000 gpd	Aluminum, acid, caustic	Ground water via seepage pond	Process: settling, Sanitary: septic tank	
D10	Tropical Plating 1825 NW 79th Street Miami	Decorative metal plating	River water, wells; 400 gpd	Heavy metals, cyanide, acids, caustics	Ground water	Sanitary: septic tank	Wastes seep under shop into ground.
	GROUP V						
E1	Associated Plastics 1010 E. 31st Street Hialeah	Paints	Product make-up, washing; 630 gpd	Paint, solvent, mercury, lead	Ground water via drainfield	Septic tank	After samples analyzed, industry claimed it would recycle wastes, and eliminate the use of mercury.

FIGURE 1


FLA
DADE CO
STUDY AREA
VICINITY MAP
CAROL CITY EXPRESSWAY
BISCAYNE CANAL
NORTH MIAMI BEACH
OPA-LOCKA AIRPORT
OPA-LOCKA
NORTH MIAMI
HIALEAH GARDENS
LITTLE RIVER CANAL
MIAMI SHORES
HIALEAH PARK
RED ROAD
MIAMI CANAL
N.W. 79 th ST
N BAY CAUSEWAY
HIALEAH
58 th ST CANAL
STATE RD. 9
95
MIAMI SPRINGS
AIRPORT EXPRESSWAY
JULIA TUTTLE CAUSEWAY
DAIRY CANAL
DRESSEL
NORTH LINE CANAL
F E C
MIAMI INTERNATIONAL AIRPORT
INTERSTATE
BISCAYNE BLVD
EAST WEST EXPRESSWAY
MacARTHUR CAUSEWAY
TAMIAMI CANAL
TAMIAMI TRAIL
U S 41
27 th AVE
WEST MIAMI
MIAMI
CORAL GABLES EXPRESSWAY
CORAL GABLES
N W HIWAY
TROPICAL PARK
DIXIE
COCONUT GROVE
SCALE IN MILES
0 1 2 3
WESTWOOD LAKES
PALMETTO
SOUTH MIAMI
SNAPPER CR CANAL
SOUTH CANAL
N
KEY
C-6 INDUSTRIAL WASTE SOURCES SEE TABLE I FOR IDENTIFICATION
LOWER FLORIDA ESTUARY STUDY PROJECT
LOCATIONS OF INDUSTRIES EVALUATED DADE COUNTY, FLORIDA
ENVIRONMENTAL PROTECTION AGENCY
WATER QUALITY OFFICE
SOUTHEAST REGION ATLANTA, GEORGIA

Average flows, concentrations and quantities of liquid waste discharged by significant unsewered industrial waste sources in Dade County are presented in this section.

The results of the individual analysis on all industrial waste sources and the dates they were sampled are presented in Appendix E.

GROUP I - FOOD PROCESSING AND PAPER MILL WASTES

This group consists of 12 industries that discharged 1.13 mgd or 64% of the total unsewered industrial discharge into surface and sub-surface waters of Dade County. Seven of the industries discharge a total of 0.50 mgd to the ground waters and five discharge a total of 0.63 mgd to the surface waters.

The average concentrations, flows, and waste loads discharged by industries in this group are presented in Table II. In some cases the names of the analyses have been abbreviated. An explanation of the abbreviations is presented in Appendix B.

The relative biochemical oxygen demand (BOD)* loads discharged by this group are illustrated in Figure 2. Dade County Dairies is the largest BOD discharger to the ground waters, and Pepsi Cola Bottling Company discharges the greatest BOD load to the surface waters. Figure 3 depicts the relative loads of total suspended solids (TSS) discharged. Gotham Provision Company and Pepsi Cola Bottling Company are the major dischargers to the ground and surface waters respectively. The total BOD load discharged by this group was > 6643 pounds/day and the load of TSS was 3314 pounds/day.

* 5 day, 20°C. biochemical oxygen demand

TABLE II

CHEMICAL DATA SUMMARY
GROUP I INDUSTRIES (UNSEWERED)
DADE COUNTY, FLA.

	Bordens Dairy	Canada Dry	Cott Bottling	Dade Co Dairies	Economy Packing	Farm Stores	Federal Packing	Florida Processing	Gotham Provision	Miami Board	Pepsi Cola	Tallow-master
Flow (gpd)	99,000	42,300	38,800	141,500	22,200	45,700	62,200	10,100	37,600	330,000	200,000	100,000
Temp (^{o}F)	82	83.5	78.5	81.0	79.0	83.5	84.5	78.0	82.8	107.5	84.3	83.0
Cond (mhos)	3607	-	-	-	-	-	-	2880	-	-	-	557
pH	7.6	10.5	6.4	7.3	6.4	7.5	6.8	8.4	6.8	3.6	8.7	7.2
Turbidity (JTU)	-	-	-	-	-	-	-	-	-	368	-	-
TSS (mg/l)	253	619	294	263	580	24.9	624	610	1210	141	708	50
(lbs/day)	209	218	95.1	310	107	9.49	324	51.4	379	388	1181	41.7
Settleable Solids (ml/l)	-	-	-	-	-	-	-	-	-	0.5	-	-
BOD_5 (mg/l)	930	>685	466	1070	1467	35	916	174	>1735	424	971	147
(lbs/day	768	>242	151	1263	272	13.3	475	14.7	> 544	1167	1620	123
COD (mg/l)	1364	2938	914	1675	3203	118	1770	1201	3687	897	1250	268
(lbs/day)	1126	1036	296	1977	593	45.0	918	101	1156	2469	2085	224
Organic-^{N}(mg/l)	27.3	14.6	7.6	25.2	121.0	4.3	47.7	62.5	88.9	7.2	4.7	0.7
(lbs/day)	22.5	5.15	2.46	29.7	22.4	1.64	24.7	5.26	27.9	19.8	7.84	0.584
NH_3-N (mg/l)	2.1	1.38	0.53	0.79	106	0.51	127.7	25.7	52.6	0.31	0.40	15.7
(lbs/day)	1.73	0.487	0.172	0.932	19.6	0.194	66.2	2.16	16.5	0.853	0.667	13.1
NO_2-NO_3-N(mg/l)	0.061	3.61	0.041	0.067	0.070	12.1	0.011	18.7	0.069	0.094	0.056	0.407
(lbs/day)	0.050	1.27	0.013	0.079	0.013	4.61	0.006	1.58	0.022	0.259	0.093	0.339
Total P (mg/l	35.1	45.2	3.9	12.8	8.6	37.2	21.7	65.3	16.2	1.44	1.18	0.35
(lbs/day)	29.0	15.9	1.26	15.1	1.59	14.2	11.3	5.50	5.08	3.96	1.97	0.292
Oil & Grease(mg/l)	-	-	-	-	-	-	-	10.3	-	-	-	99.1
(lbs/day)	-	-	-	-	-	-	-	0.868	-	-	-	82.6
Mercury (μg/l)	<0.21	-	-	0.24	-	0.72	-	-	-	-	-	-
(lbs/day)	<0.0002	-	-	0.0003	-	0.0003	-	-	-	-	-	-

TABLE II, continued

	Bordens Dairy	Canada Dry	Cott Bottling	Dade Co Dairies	Economy Packing	Farm Stores	Federal Packing	Florida Processing	Gotham Provision	Miami Board	Pepsi Cola	Tallow-master
Cl Residual(mg/l)	-	-	-	-	-	5.2	-	2.6	-	3.3	-	-
Total Coliform* (per 100 ml)	80,000	0	50,000	80,000	1,250,000	0.020	1,500,000	0	2,500,000	0.010	3,000	5,500
Fecal Coliform* (per 100 ml)	5,900	0	26	>6,000	23,000	0	6,000	0	8,000	0	5	3,250

* Median values in thousands.

"-" Indicates analysis was not performed.

FIGURE 2

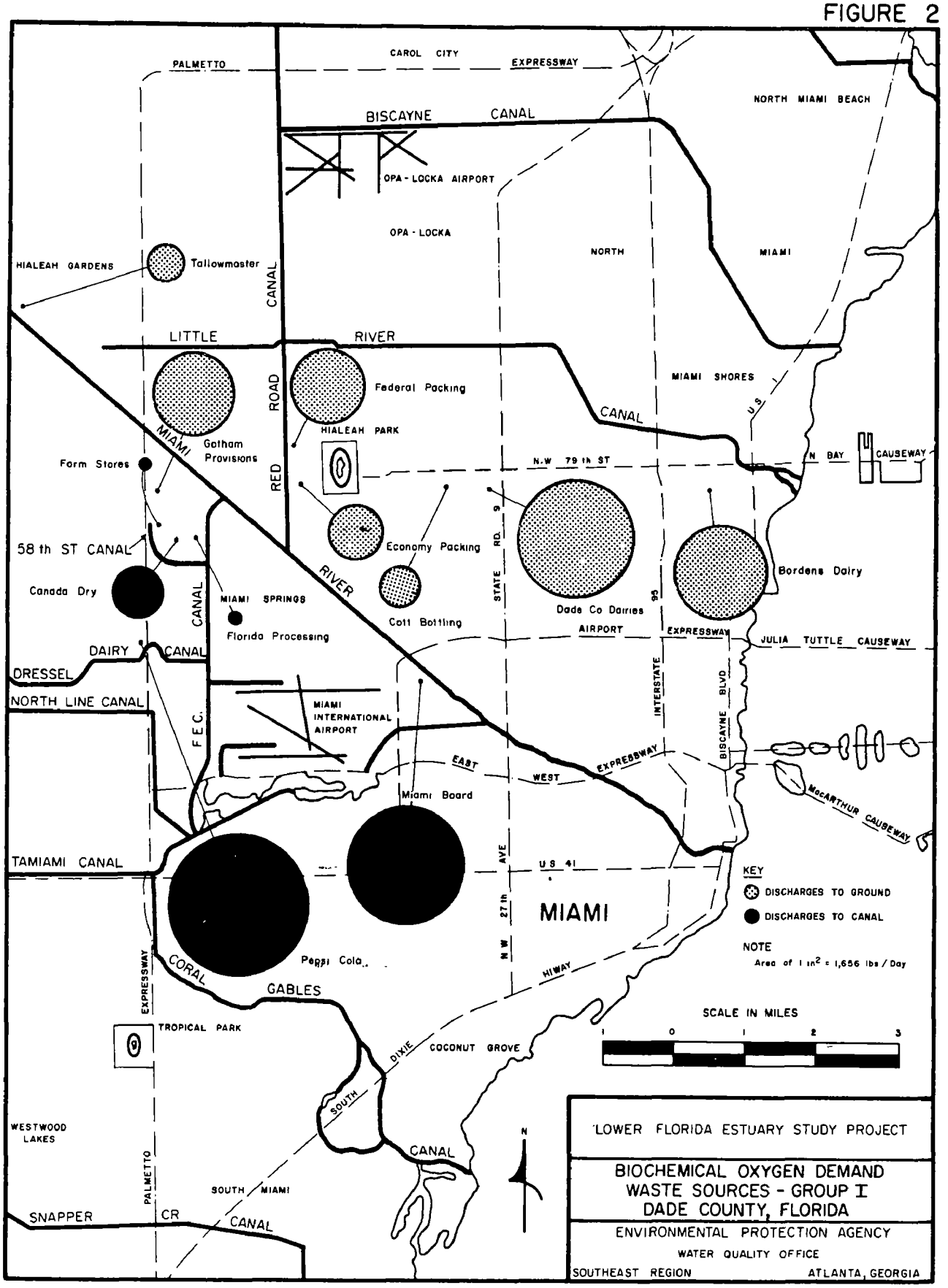
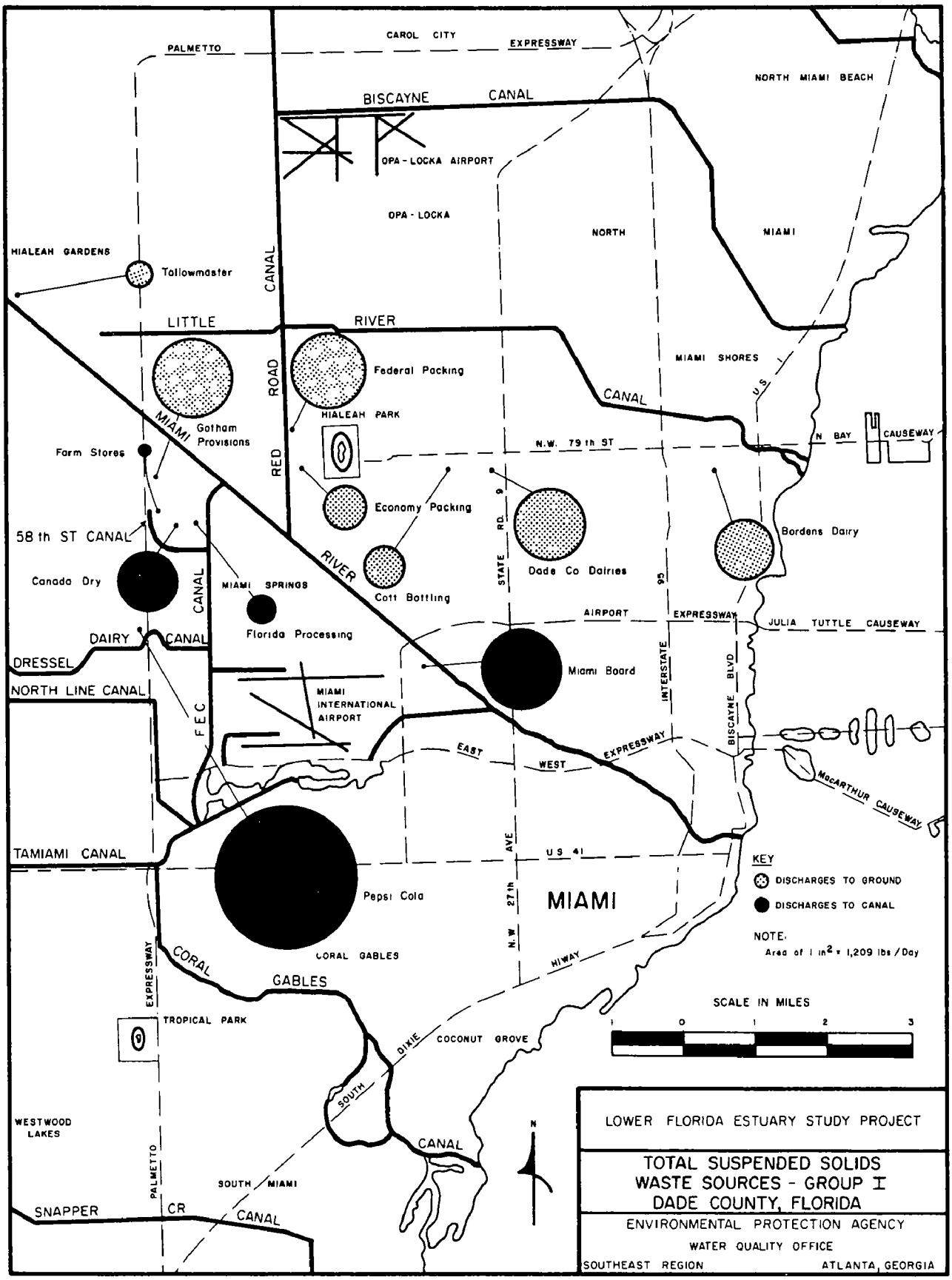

PALMETTO
CAROL CITY
EXPRESSWAY
BISCAYNE CANAL
NORTH MIAMI BEACH
OPA-LOCKA AIRPORT
OPA-LOCKA
NORTH MIAMI
HIALEAH GARDENS
Tallowmaster
CANAL
LITTLE RIVER
MIAMI SHORES
Federal Packing
HIALEAH PARK
ROAD
RED
MIAMI CANAL
Gotham Provisions
Farm Stores
N.W. 79 th ST
N. BAY CAUSEWAY
58 th ST CANAL
Economy Packing
STATE RD. 9
Bordens Dairy
Canada Dry
MIAMI SPRINGS
Florida Processing
Cott Bottling
Dade Co Dairies
AIRPORT EXPRESSWAY
JULIA TUTTLE CAUSEWAY
DAIRY CANAL
DRESSEL
NORTH LINE CANAL
F.E.C.
MIAMI INTERNATIONAL AIRPORT
INTERSTATE
BISCAYNE BLVD
EAST WEST EXPRESSWAY
MacARTHUR CAUSEWAY
Miami Board
TAMIAMI CANAL
U.S. 41
27th AVE
MIAMI
KEY
DISCHARGES TO GROUND
DISCHARGES TO CANAL
NOTE
Area of 1 in² = 1,656 lbs / Day
Pepsi Cola
CORAL GABLES
HIWAY
EXPRESSWAY
SCALE IN MILES
0 1 2 3
TROPICAL PARK
DIXIE
COCONUT GROVE
WESTWOOD LAKES
SOUTH CANAL
PALMETTO
SOUTH MIAMI
SNAPPER CR CANAL
N
LOWER FLORIDA ESTUARY STUDY PROJECT
BIOCHEMICAL OXYGEN DEMAND
WASTE SOURCES - GROUP I
DADE COUNTY, FLORIDA
ENVIRONMENTAL PROTECTION AGENCY
WATER QUALITY OFFICE
SOUTHEAST REGION
ATLANTA, GEORGIA

FIGURE 3


CAROL CITY EXPRESSWAY
PALMETTO
BISCAYNE CANAL
NORTH MIAMI BEACH
OPA-LOCKA AIRPORT
OPA-LOCKA
NORTH MIAMI
HIALEAH GARDENS
Tallowmaster
CANAL
LITTLE RIVER
ROAD
RED
Federal Packing
HIALEAH PARK
MIAMI SHORES
U.S. 1
CANAL
Gotham Provisions
MIAMI
Farm Stores
N.W. 79th ST
N. BAY CAUSEWAY
58th ST CANAL
Economy Packing
STATE RD. 9
Dade Co Dairies
Bordens Dairy
Canada Dry
CANAL
MIAMI SPRINGS
RIVER
Cott Bottling
95
AIRPORT EXPRESSWAY
JULIA TUTTLE CAUSEWAY
DAIRY CANAL
Florida Processing
DRESSEL
Miami Board
INTERSTATE
BISCAYNE BLVD
NORTH LINE CANAL
MIAMI INTERNATIONAL AIRPORT
F E C
EAST WEST EXPRESSWAY
McCARTHUR CAUSEWAY
TAMIAMI CANAL
U S 41
AVE
27th
N.W.
Pepsi Cola
MIAMI
CORAL GABLES
CORAL GABLES EXPRESSWAY
HIWAY
TROPICAL PARK
DIXIE
COCONUT GROVE
SOUTH
WESTWOOD LAKES
CANAL
PALMETTO
SOUTH MIAMI
SNAPPER CR
CANAL
KEY
DISCHARGES TO GROUND
DISCHARGES TO CANAL
NOTE:
Area of 1 in^2 = 1,209 lbs / Day
SCALE IN MILES
3 2 1 0 1 2 3
N
LOWER FLORIDA ESTUARY STUDY PROJECT
TOTAL SUSPENDED SOLIDS
WASTE SOURCES - GROUP I
DADE COUNTY, FLORIDA
ENVIRONMENTAL PROTECTION AGENCY
WATER QUALITY OFFICE
SOUTHEAST REGION
ATLANTA, GEORGIA

There are three dairies in this group -- Bordens Dairy, Dade County Dairies and Farm Stores. These dairy wastes contained high concentrations of organic material as shown by the range of BOD (930 to 1070 mg/1) and the chemical oxygen demand (COD) (1364 to 1675 mg/1). As shown in the tables, the nitrogen discharged by these industries was mainly in the organic form (25.2 to 27.3 mg/1). High concentrations of total phosphorus (12.8 to 37.2 mg/1) were also discharged. Low mercury concentrations (< 0.21 to 0.72 µg/1) were measured in the effluents of the dairies and the total load of mercury discharged was < 0.0008 pounds/day. Bordens Dairy has small settling tanks to treat its waste and discharges it to the ground water through a disposal well. Dade County Dairies discharges by spray irrigation with no prior treatment. Farm Stores utilizes a 0.06 mgd activated sludge waste treatment plant with final sand filters, which provided average removals of > 98.9 percent for BOD, 98.0 percent for chemical oxygen demand (COD), and 98.3 percent for TSS during the study period. The effluent from the treatment plant was highly nitrified, with an average nitrite-nitrate nitrogen concentration of 12.1 mg/1. The final treatment plant effluent was satisfactorily chlorinated and no fecal coliform were detected. Bordens Dairy and Dade County Dairies do not chlorinate their effluents. Although these discharges do not contain sanitary wastes, median total and fecal coliform densities were 80,000 and 6,000,000 per 100 ml respectively.

There are three soft drink manufacturers in Dade County -- Cott Bottling Company, Canada Dry Bottling Company, and Pepsi Cola Bottling Company -- that are not served by sewer systems. As shown on the table, these industries discharge wastes with an average TSS range of 294 to 708 mg/l and average BOD ranges from 466 to > 971 mg/l. Substantial concentrations of organic nitrogen (4.7 to 14.6 mg/l) were also discharged. Canada Dry Bottling Company discharged total phosphorus at a concentration of 45.2 mg/l or 15.9 pounds/day during the study. This was significantly more than quantities of total phosphorus measured in the effluents of the other soft drink manufacturers (3.23 pounds/day).

Cott Bottling Company discharges its process waste into a septic tank. Median total and fecal coliform densities of 50,000,000 and 26,000 per 100 ml were measured in the effluent. Sanitary waste from this plant is reported to be discharged to a separate septic tank.

Canada Dry Bottling Company provides settling, without automatic sludge removal, for its process wastes, and the effluent is discharged to the 58th Street Canal. Its water treatment plant waste is treated in a separate decantering tank that discharges to the ground.
Sanitary wastes are discharged to a separate septic tank. Only the characteristics of the process waste settling tank effluent were determined. Although this industry does not chlorinate its effluent, low total coliform densities and no fecal coliform organisms were detected. Canada Dry Bottling Company is currently under enforcement action by Dade County Pollution Control and has engaged a consultant to design an aerated lagoon to treat the waste.

Pepsi Cola Bottling Company also provides settling without automatic sludge removal for its process wastes and septic tanks for its sanitary wastes. Its process effluent was unchlorinated and a median of 3,000,000 per 100 ml of total coliform and a median of 5,000 per 100 ml of fecal coliform were discharged to Dressels Dairy Canal. Consulting engineers have been hired to design waste abatement facilities at this plant.

All three packing houses -- Economy Packing Company, Federal Packing Company, and Gotham Provisions Company -- evaluated during the study, discharge their effluents to the ground waters. The final effluents discharged by Economy Packing and Gotham Provisions contained the highest concentrations of oxygen demanding materials, averages of 1467 and > 1735 mg/l of BOD, respectively, measured during the study. Federal Packing Company discharged a slightly lower but still substantial concentration of BOD, an average of 916 mg/l. The packing houses discharged the highest concentrations of ammonia nitrogen (52.6 to 127.7 mg/l) measured and extremely high concentrations of organic nitrogen (47.7 to 121.0 mg/l). All of these plants have septic tanks to dispose of sanitary waste, and none of the plants chlorinate their effluent. As would be expected in waste from the slaughtering of warm-blooded animals, the bacterial concentrations were the highest measured during the study. The median total coliform densities for these industries ranged from 2,500 to 1,250 million per 100 ml and the median fecal coliform densities ranged from 23 to 6 million per 100 ml.

All the slaughter houses provide settling, without automatic sludge removal, and discharge to crushed rock seepage fields. In addition to this, Federal Packing Company provided a stone filter, which did not appear to be operating properly, to treat its effluent.

Two rendering plants were evaluated during the study -- Florida Processing Company and Tallowmaster, Inc. Florida Processing utilizes skimming, a contact stabilization package plant, and an aerated lagoon to treat its waste. During the survey, no waste was discharged into the adjacent FEC canal, because a Dade County Discharge Permit had not been issued. The waste was pumped from the aerated lagoon into a tank truck and shipped to the Virginia Key Treatment Plant. Analyses were performed on the raw waste and on the package plant effluent. The lagoon was not evaluated, because it discharges intermittently when the effluent is pumped out of it to a tank truck. Therefore, the detention time and treatment provided during the study would not be representative of conditions if the lagoon was discharging continuously to the FEC canal. The average removal efficiencies provided by the skimmer and treatment plant were > 93.5 percent for BOD, 92.5 percent for COD, and 96.0 percent for total suspended solids. The waste was chlorinated just before it was pumped into the tank truck and the median total and fecal coliform densities at this location were both zero. The raw waste from this plant was extremely concentrated, therefore, even after treatment an extremely high concentration of BOD (174 mg/l) was measured in the effluent.

Tallowmaster, Inc. skims its effluents and then discharges it to a seepage pond. The waste flow is made up of process waste water and spent cooling water. At the time of the survey, the plant was operating with water cooled condensers. Air-cooled condensers have been purchased and are expected to reduce the waste flow from 100,000 gpd to 5,000 gpd, but this does not mean the waste load will be reduced proportionally. Based on one grab sample, an extremely large waste load of oil and grease, 82.6 pounds per day, was discharged by Tallowmasters. Florida Processing discharged less than one pound per day of oil and grease, again based on only one grab sample.

Miami Board, Division of Simkins Industries, Inc. recycles waste paper to manufacture cardboard. The waste from this operation receives primary treatment followed by chlorination and dilution with cooling water. The plant effluent was sampled after chlorination but before dilution. Approximately two-thirds of the waste is recycled from the treatment plant settling basin for reuse in the process. During the survey, the treatment plant provided average removal efficiencies of 75.7 percent for BOD, 43.5 percent for COD, and 83.2 percent for TSS. Due to the large volume and highly concentrated nature of the waste, even after treatment substantial loads of BOD, 1167 pounds per day, and TSS, 388 pounds per day, were discharged to the Tamiami Canal. This industry was brought to court by Dade County Pollution Control and has agreed to connect to a sewer system.

GROUP II - AIRCRAFT REPAIRS AND PAINTING

This group consists of 10 industries, of which seven are located at the Miami International Airport. The industries in this group discharge a total of 0.243 mgd or 13.7% of the flow discharged by unsewered industrial waste sources in Dade County. All industries in this group discharge to surface waters.

Table III contains the average concentrations, waste loads, and flows discharged by industrial waste sources in this group.

TABLE III

CHEMICAL DATA SUMMARY
GROUP II INDUSTRIES (UNSEWERED)
DADE COUNTY, FLORIDA

	Test Cell Bldg. 2120-DCPA	Airlift International	Butler Aviation	Eastern Airlines	Homestead A.F.B.	Miami Aviation Corp.	Northeast Airlines	Propeller Services	Seaboard Coastline R.R.	Air Carrier
Flow (gpd)	-	7,000	1,600	160,000	8,900	12,500	110	115	33,600	19,400
Temp (°F)	85.4	83.7	84.4	79.8	83.0	82.0	78.7	83.3	83.1	84.4
Cond. (µmhos)	318	327	551	684	393	689	803	532	887	276
pH	7.1	8.9	5.2	6.8	7.3[1/]	8.1[1/]	7.1	7.9	7.6	7.8
Acidity (mg/l)	-	-	321	-	-	-	-	-	-	43
Alkalinity (mg/l)	102	91.2	111	187	137	188	208	143	175	52
Turbidity (JTU)	5.4	145	120	3.4	3.6	3.5	[2/]	120	26	42
Immiscible Liquid (% v/v)	-	-	-	-	-	-	-	11.4%	-	-
TSS (mg/l)	4.3	52.0	20.6	4.0	18.8	6.8	46.0	28.6	42.0	4.6
(lbs/day)	-	3.04	0.28	5.34	1.39	0.71	0.04	0.03	11.80	0.74
TDS (mg/l)	168	288	633	385	384	250	930	464	454	175
(lbs/day)	-	16.8	8.6	5.4	28.4	26.1	0.9	0.4	127	28.3
COD (mg/l)	57	320	1,580	47	570	48.2	2,771	1,525	203	220
(lbs/day)		18.7	21.5	62.7	42.1	5.0	2.5	1.5	56.9	35.6
Total P (mg/l)	0.09	3.10	30.9	0.52	6.50	0.63	56.8	2.0	1.45	0.12
(lbs/day)	-	0.18	0.42	0.69	0.48	0.07	0.05	0.002	0.41	0.02
Oil & Grease (mg/l)	15.5	41.9	11.6	87.9	20.2	0.4	204.6	10.0	16.5	10.3
(lbs/day)	-	2.45	0.16	117	1.49	0.05	0.19	0.01	4.62	1.67
Phenols (mg/l)	12.7	1,246	46,712	13.6	890	1.1	5,380	150,500	29.5	562
(lbs/day)	-	0.072	0.636	0.018	0.066	0.0001	0.005	0.144	0.008	0.091
Nickel (mg/l)	<0.05	<0.05	0.05	0.05	<0.05	-	0.27	0.05	<0.05	<0.05
(lbs/day)	-	<0.003	0.0007	0.067	<0.004	-	0.0002	0.00005	<0.014	<0.008

TABLE III - Continued

	Test Cell Bldg. 2120-DCPA	Airlift International	Butler Aviation	Eastern Airlines	Homestead A.F.B.	Miami Aviation Corp.	Northeast Airlines	Propeller Services	Seaboard Coast-line R.R.	Air Carrier
Copper (mg/l)	< 0.01	0.20	0.28	0.02	0.03	-	2.53	1.41	0.02	0.01
(lbs/day)	-	0.012	0.004	0.027	0.002	-	0.002	0.001	0.006	0.002
Zinc (mg/l)	0.10	0.33	2.76	0.15	0.26	-	2.15	2.57	0.13	0.10
(lbs/day)	-	0.019	0.038	0.200	0.019	-	0.002	0.002	0.036	0.016
T. Chromium(mg/l)	0.02	0.17	2.30	1.08	1.42	-	0.48	3.95	0.02	0.05
(lbs/day)	-	0.010	0.031	1.440	0.105	-	0.0004	0.004	0.006	0.008
Lead (mg/l)	0.20	1.06	1.23	0.16	0.41	0.14	1.72	29.60	0.18	0.44
(lbs/day)	-	0.062	0.017	0.214	0.030	0.015	0.002	0.028	0.050	0.071
Tin (mg/l)	-	-	-	1	-	-	-	-	-	<1
(lbs/day)	-	-	-	1.33	-	-	-	-	-	<0.16
Silver (mg/l)	-	-	-	<0.01	-	-	-	-	-	<0.01
(lbs/day)	-	-	-	<0.013	-	-	-	-	-	<0.002
Cadmium (mg/l)	0.01	0.04	0.34	< .01	0.05	-	0.64	3.40	< .01	0.04
(lbs/day)	-	0.002	0.005	< .013	0.004	-	0.0006	0.003	< .003	0.006
Cyanide (mg/l)	0.01	0.01	0.01	0.01	0.02	0.07	0.02	<.01	0.02	<.01
(ibs/day)	-	0.001	0.0001	0.013	0.001	0.007	0.00002	<.00001	0.006	<.002
NH_3-N (mg/l)	0.15	0.29	3.96	0.415	1.20	0.25	2.00	1.22	0.47	0.025
(lbs/day)	-	0.017	0.054	0.554	0.089	0.026	0.002	0.001	0.132	0.004
Organic-N (mg/l)	-	2.31	2.20	0.31	2.0	-	11.4	4.4	2.67	0.25
(lbs/day)	-	0.135	0.030	0.414	0.148	-	0.010	0.004	0.748	0.040
NO_2-NO_3-N (mg/l)	0.10	0.206	0.37	0.37	0.132	0.156	0.350	0.690	0.026	0.140
(lbs/day)	-	0.012	0.005	0.494	0.010	0.016	0.0003	0.0007	0.007	0.023

1/ pH reading taken at Lab.

2/ Black Colored Solution.

Figure 4 depicts the relative masses of chemical oxygen demand in the effluents of the waste sources. Eastern Airlines discharged the greatest mass of COD, 62.7 pounds per day, and the entire group discharged a total of 246 pounds per day. The relative masses of oil and grease in this group's effluents are depicted in Figure 5. Eastern Airlines discharged 92% of the total of 128 pounds per day of oil and grease discharged by this group. The relative masses of phenols discharged by this group are presented in Figure 6. Butler Aviation of Miami, Inc. accounted for 61% of the 1.04 pounds per day total discharge of phenols.

The discharges from aircraft repair and painting industries measured during the survey probably were not representative normal conditions. There was a severe drought in South Florida during the study period and water use was restricted. Due to this, washing of aircraft, railroad cars, and trucks was limited. In addition, due to adverse economic conditions most aircraft related industries were not utilizing their entire facilities.

The waste characteristics of the industries in this group varied considerably, making it necessary to discuss each industry separately.

Dade County Port Authority is responsible for pollution control at the Test Cell Building 2120. The building contains individual cells in which aircraft engines are tested, and waste discharges occur when the cells are washed down after the tests. It was not possible to measure flow at this location. Discharges to a drainage canal from this facility are expected to cease in the very near future, because the Port Authority has advertised for bids to construct a collection system and holding tank from which the wastes will be trucked away for disposal.

FIGURE 4

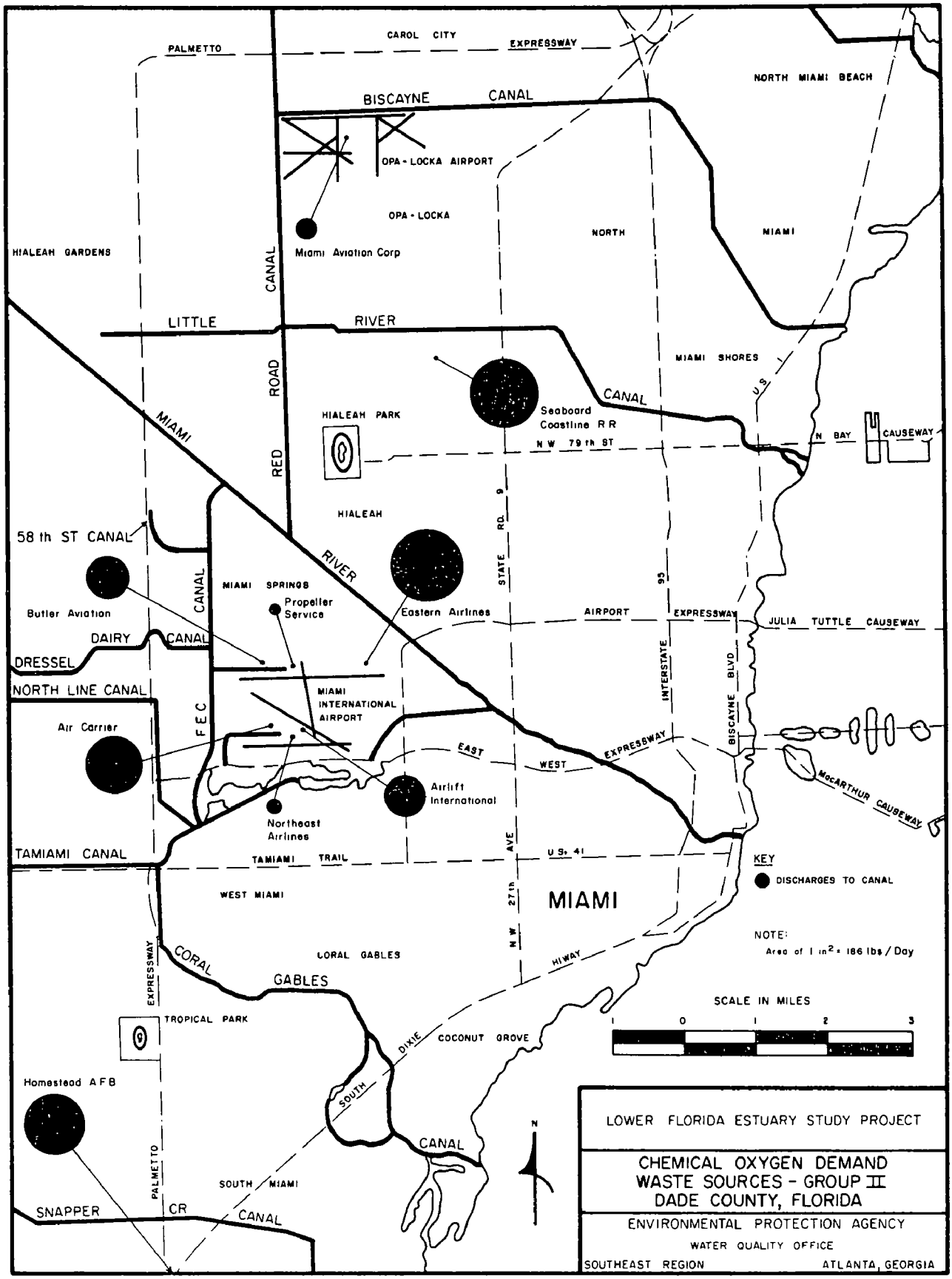

CAROL CITY
EXPRESSWAY
PALMETTO
NORTH MIAMI BEACH
BISCAYNE CANAL
OPA-LOCKA AIRPORT
OPA-LOCKA
Miami Aviation Corp
NORTH MIAMI
HIALEAH GARDENS
CANAL
LITTLE RIVER
ROAD
RED
MIAMI CANAL
MIAMI SHORES
Seaboard Coastline R R
HIALEAH PARK
NW 79th ST
N BAY CAUSEWAY
HIALEAH
STATE RD. 9
58th ST CANAL
MIAMI SPRINGS
Propeller Service
Butler Aviation
Eastern Airlines
AIRPORT EXPRESSWAY
JULIA TUTTLE CAUSEWAY
DAIRY CANAL
DRESSEL
NORTH LINE CANAL
F E C
MIAMI INTERNATIONAL AIRPORT
INTERSTATE 95
BISCAYNE BLVD
Air Carrier
EAST WEST EXPRESSWAY
MacARTHUR CAUSEWAY
Airlift International
Northeast Airlines
TAMIAMI CANAL
TAMIAMI TRAIL
U.S. 41
KEY
DISCHARGES TO CANAL
WEST MIAMI
MIAMI
NW 27th AVE
NOTE:
Area of 1 in² = 186 lbs / Day
CORAL GABLES
CORAL GABLES EXPRESSWAY
HIWAY
SCALE IN MILES
1 0 1 2 3
TROPICAL PARK
DIXIE
COCONUT GROVE
Homestead AFB
SOUTH CANAL
PALMETTO
SOUTH MIAMI
SNAPPER CR CANAL
N
LOWER FLORIDA ESTUARY STUDY PROJECT
CHEMICAL OXYGEN DEMAND
WASTE SOURCES - GROUP II
DADE COUNTY, FLORIDA
ENVIRONMENTAL PROTECTION AGENCY
WATER QUALITY OFFICE
SOUTHEAST REGION
ATLANTA, GEORGIA

FIGURE 5

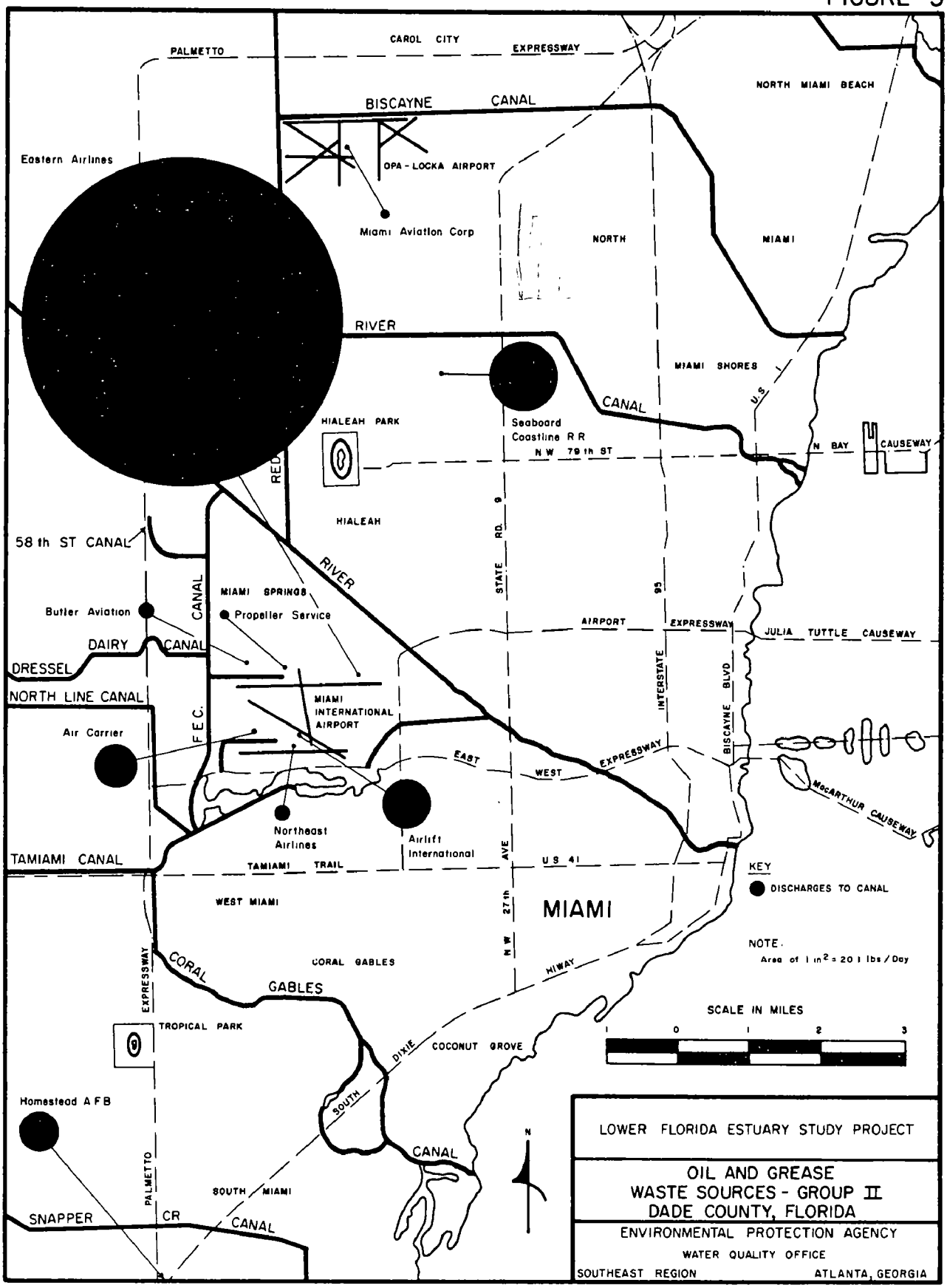
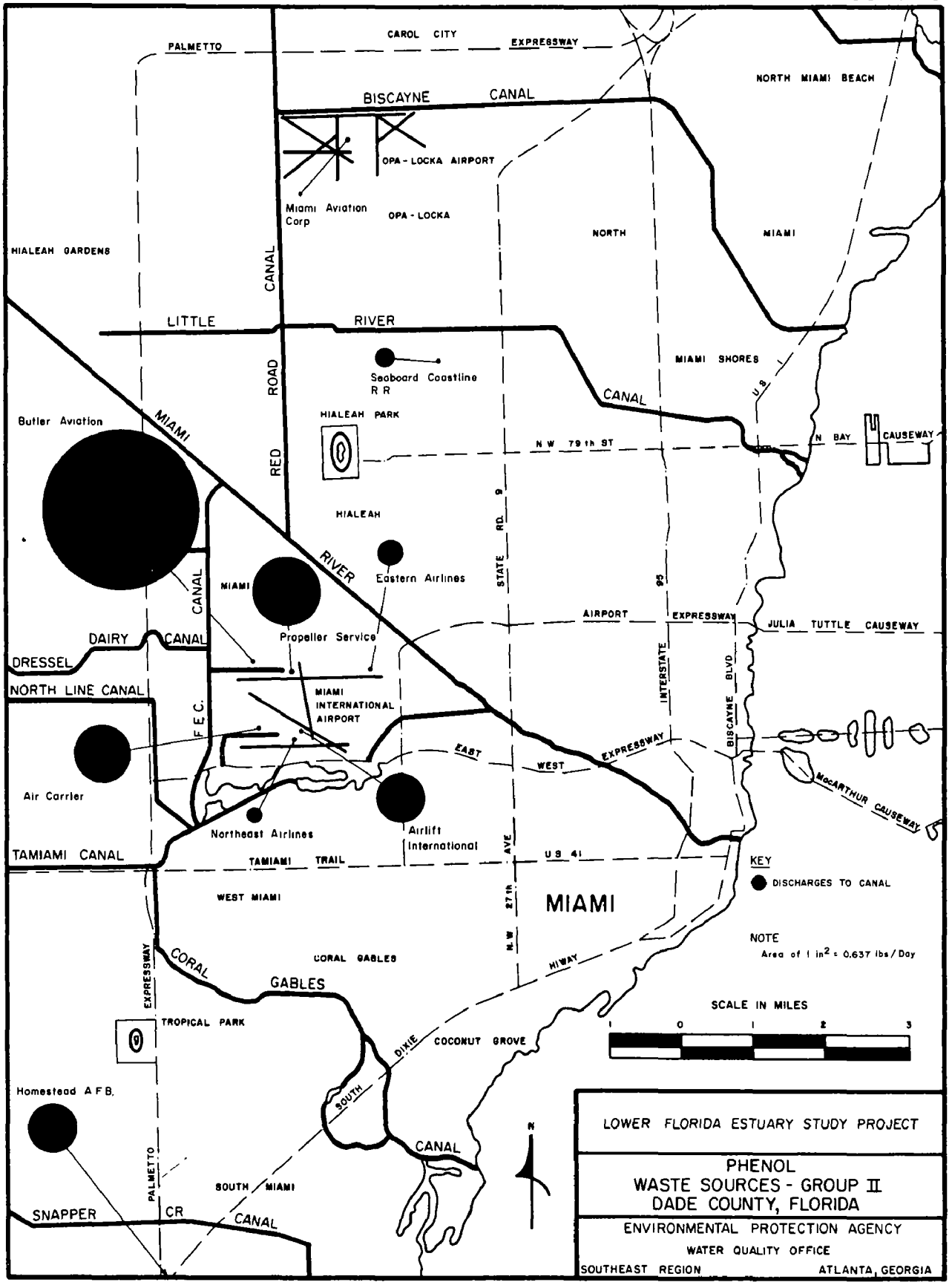

CAROL CITY
EXPRESSWAY
PALMETTO
BISCAYNE CANAL
NORTH MIAMI BEACH
Eastern Airlines
OPA-LOCKA AIRPORT
Miami Aviation Corp
NORTH MIAMI
RIVER
MIAMI SHORES
U.S.
CANAL
HIALEAH PARK
Seaboard Coastline R R
NW 79th ST
N BAY
CAUSEWAY
HIALEAH
58th ST CANAL
STATE RD. 9
95
RIVER
MIAMI SPRINGS
Butler Aviation
Propeller Service
AIRPORT EXPRESSWAY
JULIA TUTTLE CAUSEWAY
DAIRY CANAL
DRESSEL
NORTH LINE CANAL
MIAMI INTERNATIONAL AIRPORT
INTERSTATE
BISCAYNE BLVD
Air Carrier
EAST
WEST
EXPRESSWAY
MacARTHUR CAUSEWAY
Northeast Airlines
Airlift International
TAMIAMI CANAL
TAMIAMI TRAIL
U S 41
KEY
DISCHARGES TO CANAL
WEST MIAMI
MIAMI
NOTE:
Area of 1 in² = 20 1 lbs / Day
CORAL GABLES
HIWAY
CORAL GABLES
TROPICAL PARK
SCALE IN MILES
DIXIE
COCONUT GROVE
Homestead A F B
SOUTH
CANAL
SOUTH MIAMI
SNAPPER CR
CANAL
LOWER FLORIDA ESTUARY STUDY PROJECT
OIL AND GREASE
WASTE SOURCES - GROUP II
DADE COUNTY, FLORIDA
ENVIRONMENTAL PROTECTION AGENCY
WATER QUALITY OFFICE
SOUTHEAST REGION
ATLANTA, GEORGIA

FIGURE 6


CAROL CITY
EXPRESSWAY
PALMETTO
BISCAYNE CANAL
NORTH MIAMI BEACH
OPA-LOCKA AIRPORT
Miami Aviation Corp
OPA-LOCKA
NORTH MIAMI
HIALEAH GARDENS
CANAL
LITTLE RIVER
ROAD
RED
Seaboard Coastline R R
MIAMI SHORES
U S 1
CANAL
Butler Aviation
MIAMI
HIALEAH PARK
N W 79th ST
N BAY
CAUSEWAY
HIALEAH
STATE RD. 9
95
RIVER
Eastern Airlines
MIAMI
CANAL
AIRPORT
EXPRESSWAY
JULIA TUTTLE CAUSEWAY
DAIRY
CANAL
Propeller Service
DRESSEL
NORTH LINE CANAL
MIAMI INTERNATIONAL AIRPORT
F.E.C.
INTERSTATE
BISCAYNE BLVD
EAST
WEST
EXPRESSWAY
McARTHUR CAUSEWAY
Air Carrier
Northeast Airlines
Airlift International
TAMIAMI CANAL
TAMIAMI TRAIL
U S 41
AVE
KEY
DISCHARGES TO CANAL
WEST MIAMI
MIAMI
27th
N.W.
NOTE
Area of 1 in² = 0.637 lbs/Day
CORAL GABLES
HIWAY
EXPRESSWAY
CORAL
GABLES
SCALE IN MILES
0 1 2 3
TROPICAL PARK
DIXIE
COCONUT GROVE
Homestead A F B.
SOUTH
CANAL
N
PALMETTO
SOUTH MIAMI
SNAPPER
CR
CANAL
LOWER FLORIDA ESTUARY STUDY PROJECT
PHENOL
WASTE SOURCES - GROUP II
DADE COUNTY, FLORIDA
ENVIRONMENTAL PROTECTION AGENCY
WATER QUALITY OFFICE
SOUTHEAST REGION
ATLANTA, GEORGIA

Airlift International, a freight airline, produces waste in its aircraft maintenance operations and discharges the wastes into a Miami International Airport drainage canal. This industry was sampled by opening the effluent valve on an oil separator. Practically no waste was produced during the study period. The flow used to calculate the waste load was estimated from water-use records from non-drought conditions.

Butler Aviation of Miami, Inc. refurbishes aircraft. The effluent was sampled as it discharged into a storm drain that feeds into a Miami International Airport drainage canal. A high concentration of COD was discharged and the phenol concentration in the effluent was 46,700 µg/l resulting in the highest phenol load discharged, 0.636 pounds per day, by any industry in this group. An extremely high concentration of total phosphorus, 30.9 mg/l was also discharged. Zinc (2.76 mg/l), chromium (2.30 mg/l), cadmium (0.34 mg/l) and lead (1.23 mg/l) were detected in significant quantities.

Eastern Airlines' national aircraft maintenance facility is located in Miami International Airport. This effluent was sampled at a wet well where the Eastern Airlines effluent is pumped into the Port Authority collection system. At this location, approximately 160,000 gpd overflows to an airport drainage canal. Except for oil and grease , and chromium, concentrations of most parameters were relatively low but,due to the high volume of this waste,a significant portion of the waste loads discharged by this group can be attributed to Eastern Airlines.

Homestead Air Force Base is the only significant industrial waste source in south Dade County. One grab sample was collected from the oil separator serving the fighter wash rack. Similar wastes are expected from the other 5 smaller vehicle and aircraft wash racks, although at the time of sampling none of these wash racks were in use. Relatively high concentrations of phenol, 890 µg/l, were found in this waste, and the Air Force found phenol concentrations as high as 65 µg/l in the base perimeter canal system.[1/]

Miami Aviation Corp., located at Opa Locka Airport, refurbishes and services aircraft. One grab sample was collected from the storm drain that during dry weather only carries waste from Miami Aviation Corp. The highest concentration of cyanide, 0.07 mg/l, of any industry in this group was found in this waste. However, for other analyses, concentrations detected were generally lower than those detected at other industries in this group.

Northeast Airlines discharges to a drainage canal at Miami International Airport. Practically no waste was discharged during the study, since the average flow was 110 gpd. Water use records indicate average flows of 1,750 gpd at other times. This industry discharged the highest concentrations, within this group, of COD (2,771 mg/l) and of oil and grease (205 mg/l). High concentrations of copper (2.53 mg/l), zinc (2.15 mg/l), lead (1.72 mg/l), and cadmium (0.64 mg/l) were also detected.

[1/] Sample collected February 11, 1971, at Base Sample Control No. III.

Propeller Service of Miami discharged 115 gpd to a Miami Airport drainage canal during the study period. During other periods the waste discharge was estimated at 11,000 gpd based on water use records. The discharge contained an average of 11.4% by volume of an immiscible liquid. Based on the boiling range of this liquid, as determined by gas chromatography, it appears to be a low gravity naptha or similar petroleum solvent. Approximately 13 gallons of this liquid are discharged per day. All analyses on this waste were performed after the immiscible liquid was drawn off. The phenol concentration in this discharge, 150,000 µg/1, was the highest measured during the study. An extremely high concentration of lead (29.6 mg/1) and high concentrations of copper (1.41 mg/1), zinc (2.57 mg/1), chromium (3.95 mg/1) and cadmium (3.40 mg/1) were also detected.

Seaboard Coastline Railroad has three treatment units: a grit chamber, an oil separator, and a floculation-flotation tank. The floculation-flotation tank is only operated after 0800 hours. When this unit is not in operation the waste is treated by the grit chamber and oil separator and is then stored in a holding pond. When the floculation-flotation unit is in operation, raw water and partially treated waste from the holding pond are combined and treated by the oil separator and then the floculation-flotation unit and discharged to a drainage canal leading to the Little River Canal. The floculation-flotation unit is shut down when the waste level in the holding tank is sufficiently lowered to allow storage of the waste generated during the next night. At this plant, samples were collected from the effluent of the floculation-flotation unit. During the study the floculation-flotation unit was in operation for an average of 5.6 hours per day and 33,600 gpd of effluent was discharged. The flow appears low since the company has reported an average flow of 90,000 gpd on their discharge permit application.

Air Carrier Engine Service, Inc. discharges plating wastes, produced by rebuilding aircraft engines, to the Miami International Airport Sewer System. Wastes emaninating from an engine cleaning area go to a drainage canal. Permission has been received from Dade County Port Authority to discharge the cleaning area wastes into the existing airport sanitary sewer system.[2/]

Consulting engineers engaged by the Dade County Port Authority have completed the design stage of the Master Industrial Waste System for the westerly portion of Miami International Airport and a preliminary report on the eastern portion.[2/] The Port Authority expects to be in a position to obtain construction bids on the overall system by approximately February 1, 1972. When their system is completed all industrial waste discharges from Miami International Airport complex will have been eliminated.

GROUP III - CHEMICAL AND FILM PROCESSING

This group consists of two dye works and two film processers that discharge to the ground waters a total of 0.136 mgd or 7.7% of the waste produced by unsewered industrial waste sources in Dade County. The average flows, concentrations, and waste loads discharged by these industries are presented in Table IV.

The total average BOD discharged by this group was > 380 pounds per day, and the relative loads discharged are depicted in Figure 7. Kim Color Corp. discharged an average of 317 pounds per day or 83% of the total load. G. Gertz Enterprises discharged the greatest average quantity of total suspended solids (TSS), 17.8 pounds per day or 65% of the total load. The relative average waste load distribution for TSS is presented in Figure 8.

[2/] Mauch, C. W., Pollution Abatement, Miami International Airport, Report No. July 21, 1971.

TABLE IV
CHEMICAL DATA SUMMARY
GROUP III (UNSEWERED)

	Gertz Enterprises	Kim Color Corp	Miami Dye Works	Smith and Butterfield
Flow (GPD)	14,400	100,800	5,000	15,500
Temp (^{O}F)	113.5	82.0	102.2	79.4
Conductivity (μmhos)	824	1,466	649	642
pH	5.8	6.0	8.1	7.3
BOD_5 (mg/l)	>338	377	>266	87
(lbs/day)	>40.6	317	>11.1	11.2
COD (mg/l)	1,839	892	950	203.9
(lbs/day)	221	750	39.6	26.4
TSS (mg/l)	148	9.2	15.7	7.9
(lbs/day)	17.8	7.73	0.655	1.02
Organic -N (mg/l)	16.4	2.4	11.5	1.2
(lbs/day)	1.97	2.02	0.480	0.155
NH_3-N (mg/l)	0.93	72.2	0.29	11.80
(lbs/day)	0.112	60.5	0.012	1.53
NO_2-NO_3-N (mg/l)	1.69	0.487	1.375	2.96
(lbs/day)	0.203	0.409	0.057	0.383
Total P (mg/l)	31.2	1.31	1.69	0.21
(lbs/day)	3.75	1.10	0.070	0.027
CL Demand (mg/l)	--	--	--	92.8

TABLE IV, GROUP III - Page 2

	Gertz Enterprises	Kim Color Corp	Miami Dye Works	Smith and Butterfield
Cyanide (mg/l)	0.02	0.19	<0.01	0.20
(lbs/day)	0.002	0.160	<0.0004	0.026
Chromium (mg/l)	0.39	<0.01	<0.01	<0.01
(lbs/day)	0.047	<0.008	<0.0004	<0.001
Mercury (µg/l)	0.82	--	1.52	0.53
(lbs/day)	0.0001	--	0.00006	0.00007
Silver (mg/l)	--	3.20	--	3.90
(lbs/day)	--	2.69	--	0.504
Zinc (mg/l)	--	1.50	--	--
(lbs/day)	--	1.26	--	--

Note: "--" indicates analysis was not performed.

FIGURE 7

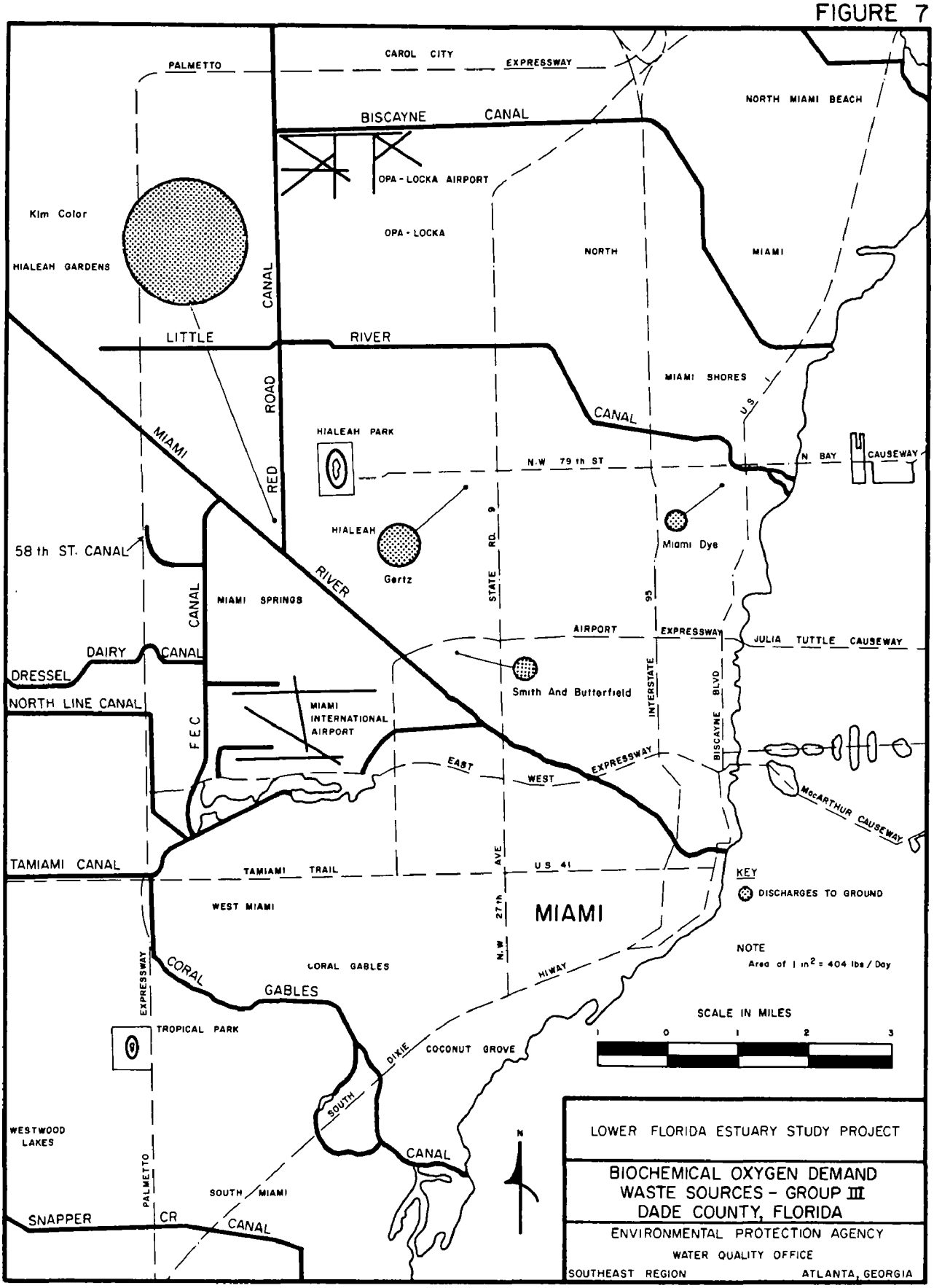
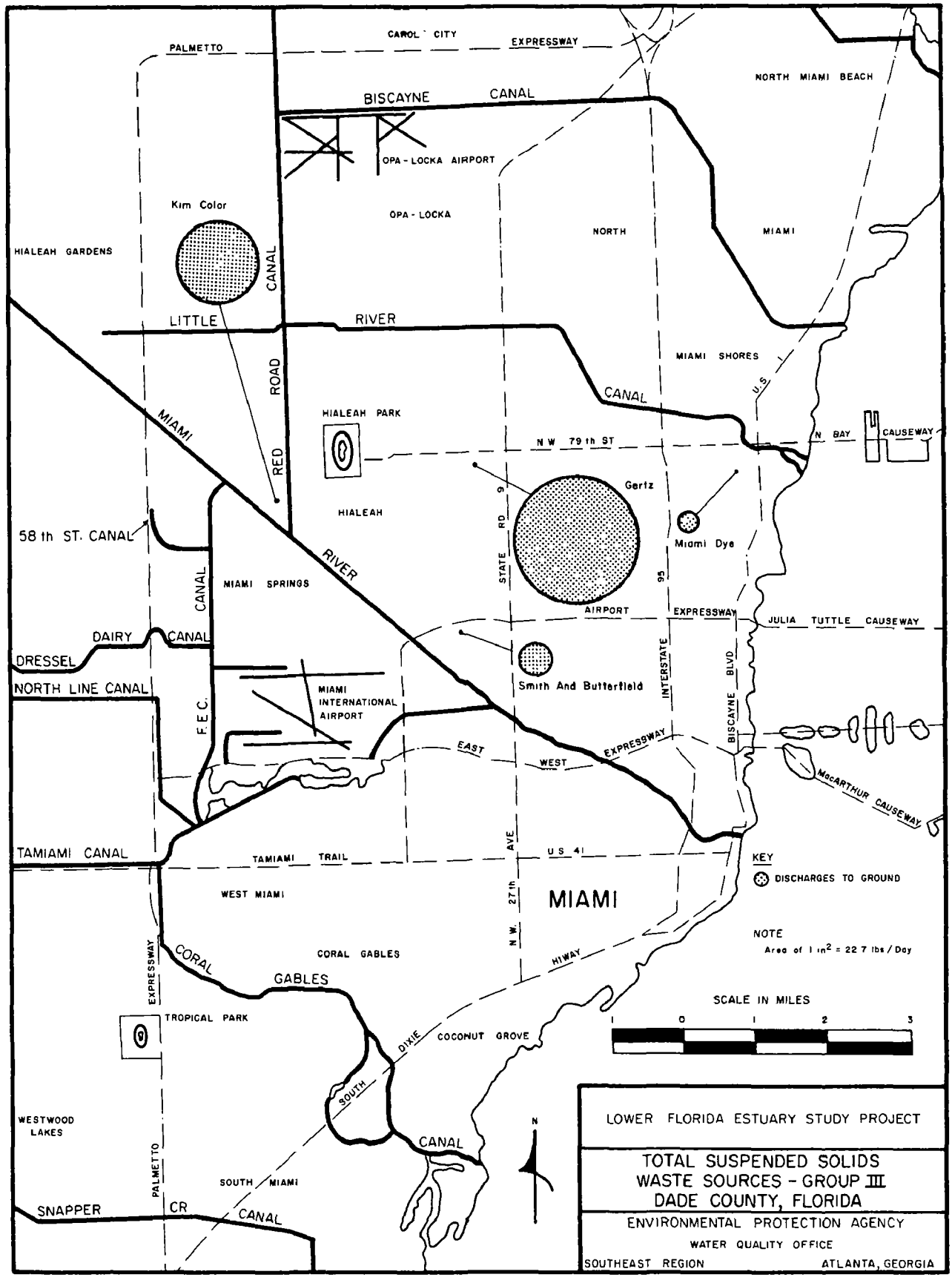

PALMETTO
CAROL CITY
EXPRESSWAY
BISCAYNE CANAL
NORTH MIAMI BEACH
OPA-LOCKA AIRPORT
Kim Color
OPA-LOCKA
HIALEAH GARDENS
NORTH
MIAMI
CANAL
LITTLE
RIVER
MIAMI SHORES
ROAD
RED
MIAMI
CANAL
HIALEAH PARK
N.W 79th ST
N. BAY
CAUSEWAY
HIALEAH
Gertz
Miami Dye
58th ST. CANAL
STATE RD. 9
95
RIVER
MIAMI SPRINGS
CANAL
AIRPORT
EXPRESSWAY
JULIA TUTTLE CAUSEWAY
DAIRY
CANAL
DRESSEL
Smith And Butterfield
INTERSTATE
BISCAYNE BLVD
NORTH LINE CANAL
MIAMI
INTERNATIONAL
AIRPORT
F.E.C
EAST
WEST
EXPRESSWAY
MacARTHUR CAUSEWAY
TAMIAMI CANAL
TAMIAMI TRAIL
U.S. 41
AVE
KEY
DISCHARGES TO GROUND
WEST MIAMI
MIAMI
27th
N.W
CORAL GABLES
HIWAY
NOTE
Area of 1 in² = 404 lbs / Day
CORAL
EXPRESSWAY
GABLES
SCALE IN MILES
1 0 1 2 3
TROPICAL PARK
DIXIE
COCONUT GROVE
SOUTH
WESTWOOD
LAKES
CANAL
N
PALMETTO
SOUTH MIAMI
SNAPPER
CR
CANAL
LOWER FLORIDA ESTUARY STUDY PROJECT
BIOCHEMICAL OXYGEN DEMAND
WASTE SOURCES - GROUP III
DADE COUNTY, FLORIDA
ENVIRONMENTAL PROTECTION AGENCY
WATER QUALITY OFFICE
SOUTHEAST REGION
ATLANTA, GEORGIA

FIGURE 8


CAROL CITY
EXPRESSWAY
PALMETTO
BISCAYNE CANAL
NORTH MIAMI BEACH
OPA-LOCKA AIRPORT
OPA-LOCKA
Kim Color
HIALEAH GARDENS
NORTH
MIAMI
CANAL
LITTLE RIVER
MIAMI SHORES
ROAD
RED
U.S. 1
CANAL
HIALEAH PARK
N BAY
CAUSEWAY
NW 79th ST
MIAMI
RIVER
Gertz
HIALEAH
STATE RD 9
95
Miami Dye
58th ST. CANAL
CANAL
MIAMI SPRINGS
AIRPORT
EXPRESSWAY
JULIA TUTTLE CAUSEWAY
DAIRY
CANAL
DRESSEL
Smith And Butterfield
INTERSTATE
BISCAYNE BLVD
NORTH LINE CANAL
F.E.C.
MIAMI INTERNATIONAL AIRPORT
EAST
WEST
EXPRESSWAY
McARTHUR CAUSEWAY
TAMIAMI CANAL
TAMIAMI TRAIL
U.S. 41
AVE
KEY
DISCHARGES TO GROUND
WEST MIAMI
MIAMI
27th
N.W.
NOTE
Area of 1 in² = 22.7 lbs/Day
CORAL GABLES
HIWAY
EXPRESSWAY
CORAL GABLES
SCALE IN MILES
1 0 1 2 3
TROPICAL PARK
DIXIE
COCONUT GROVE
SOUTH
WESTWOOD LAKES
CANAL
N
PALMETTO
SOUTH MIAMI
SNAPPER CR
CANAL
LOWER FLORIDA ESTUARY STUDY PROJECT
TOTAL SUSPENDED SOLIDS
WASTE SOURCES - GROUP III
DADE COUNTY, FLORIDA
ENVIRONMENTAL PROTECTION AGENCY
WATER QUALITY OFFICE
SOUTHEAST REGION
ATLANTA, GEORGIA

Both dye works evaluated during the study were operating well below capacity. As shown in the table, the wastes from these plants contained high concentrations of biochemical oxygen demand (> 266 to >338 mg/1), chemical oxygen demand (950 to 1839 mg/1), and organic nitrogen (11.5 to 16.4 mg/1). Miami Dye Works, which uses low phosphate detergents, had an effluent that contained 1.69 mg/1 of total phosphorus, while G. Gertz Enterprises discharged total phosphorus at a concentration of 31.2 mg/1.

Both industries provide settling tanks to treat their wastes. The high average concentration of total suspended solids (148 mg/1) in the effluent of G. Gertz Enterprises indicates that their settling tanks are ineffective. G. Gertz Enterprises discharges to the ground water through a soakage pit and Miami Dye Works discharges to saline ground water through a 130 foot well.

Wastes from the two film processing plants evaluated during the study contained high average concentrations of BOD (87 to 377 mg/1) and COD (203.9 to 892 mg/1), and extremely high concentrations of ammonia nitrogen (11.8 to 72 mg/1).

Smith and Butterfield discharge to the ground waters through a 150 foot well. Kim Color discharged to the ground through a septic tank during the study, but their waste will be discharged to an available sewer as soon as the sewer is connected to a sewage treatment plant.

GROUP IV - METAL PLATING

This group consists of nine industries that discharge a total of 0.261 mgd to the ground waters, which is 14.8% of the total flow discharged by unsewered industries. The flows, concentrations, and waste loadings discharged by industries in the group are presented in Table V.

The relative distribution of chemical oxygen demand is presented in Figure 9. Modern Aluminum Coatings, Inc. discharged 63.3% of the total waste load for COD discharged by this group. The relative total suspended solids waste load distribution is presented in Figure 10. Aluminum Finishing Corp. accounted for 61% of the total waste load for total suspended solids discharged by the group.

The wastes discharged by the six electroplaters in the group were generally low in COD (39 to 155 mg/1) and total suspended solids (4.2 to 34.8 mg/1). Most wastes contained metals such as: nickel, copper, zinc, and chromium.

Acme Plating and Finishing and Airco Plating Company provide treatment for chromium and cyanide, and Milgo Electronic Corp. provides treatment for chromium. Continental Bumper Plating, London Platers, and Tropical Plating provide no treatment, but are small operations discharging low waste loads. For example, Continental Bumper Plating discharged chromium at a concentration of 19.8 mg/1, but the chromium waste load was 0.066 pounds per day.

TABLE V

CHEMICAL DATA SUMMARY
GROUP IV INDUSTRIES (UNSEWERED)
DADE COUNTY, FLORIDA

	Acme Plating & Finishing	Airco Plating	Aluminum Anodizing	Aluminum Finishing Corp.	Continental Bumper Plating	London Platers	Milgo Elect. Corp.	Modern Aluminum Coatings	Tropical Plating
Flow (gpd)	47,500	30,000	9,500	46,300	400	2,800	5,950	118,000	400
Temp (°F)	82.7	-	82.1	87.4	-	-	83.5	85.0	78.8
Cond. (μmhos)	671	2,830	4,570	3,400	591	567	600	5,140	887
pH	5.6*	7.4	6.8	7.1	6.5*	7.4*	7.6	11.6*	8.6*
Acidity (mg/l)	138	-	689	131	-	-	-	-	-
Alkalinity (mg/l)	132	94	206	274	33	184	85	2,492	304
Turbidity (J.T.U.)	45	12	54	115	10	13	8.5	9.8	10.0
Sulfate (mg/l)	16.2	442	2,430	1,420	143	55.2	56.4	312.5	35.6
COD (mg/l)	8.0	155	22.7	53.8	50.0	39.0	39.4	119	86
(lbs/day)	3.17	38.8	1.80	20.8	0.167	0.911	1.96	117	0.287
Oil & Grease (mg/l)	1.3	4.3	0.2	0.3	15.7	13.6	0.6	0.2	9.6
(lbs/day)	0.515	1.08	0.016	0.116	0.052	0.318	0.030	0.197	0.032
Phenol (μg/l)	3.0	1.2	0.4	0.3	NIL	4.95	1.6	0.6	5.5
(lbs/day)	0.001	0.0003	0.00003	0.0001	NIL	0.0001	0.00008	0.0006	0.00002
TSS (mg/l)	34.8	18.4	261	285	4.2	5.2	10.8	31.6	5.7
(lbs/day)	13.8	4.6	20.7	110	0.014	0.121	0.536	31.1	0.019
TDS (mg/l)	267	1,700	3,620	2,600	454	381	240	4,330	601
(lbs/day)	1,106	425	287	1,004	1.51	8.90	11.9	4,261	2.00
Organic-N (mg/l)	0.27	16.9	-	-	0.90	-	0.52	1.06	11.4
(lbs/day)	0.107	4.23	-	-	0.003	-	0.026	1.04	0.038
NH_3-N (mg/l)	1.19	7.9	40.0	61.6	0.3	1.31	0.21	4.60	3.70
(lbs/day)	0.471	1.98	3.17	23.8	0.001	0.031	0.010	4.53	0.012

TABLE V - Continued

	Acme Plating & Finishing	Airco Plating	Aluminum Anodixing	Aluminum Finishing Corp.	Continental Bumper Plating	London Platers	Milgo Elect. Corp.	Modern Aluminum Coatings	Tropical Plating
NO_2-NO_3-N (mg/l)	0.296	3.32	0.096	21.0	0.29	0.44	0.105	11.6	3.08
(lbs/day)	0.117	0.831	0.008	8.11	0.001	0.010	0.005	11.4	0.010
Total-P (mg/l)	0.41	0.61	0.09	3.02	1.40	1.40	1.01	133.0	0.17
(lbs/day)	0.162	0.153	0.007	1.17	0.005	0.033	0.050	131	0.0006
Aluminum (mg/l)	-	-	98.0	95.0	-	-	2.0	540	-
(lbs/day)	-	-	7.76	36.7	-	-	0.099	531	-
Cadmium (mg/l)	0.09	0.53	-	-	-	-	-	-	-
(lbs/day)	0.036	0.133	-	-	-	-	-	-	-
Copper (mg/l)	0.71	4.00	-	-	-	0.82	-	-	7.80
(lbs/day)	0.281	1.00	-	-	-	0.019	-	-	0.026
Chromium (mg/l)	0.80	0.34	-	-	19.8	3.65	0.17	-	-
(lbs/day)	0.317	0.085	-	-	0.066	0.085	0.008	-	-
Cyanide (mg/l)	1.0	0.50	<0.01	0.04	0.02	0.26	<0.01	<0.01	23.0
(lbs/day)	0.396	0.125	<0.0008	0.015	0.00007	0.006	<0.0005	<0.01	0.077
Gold (mg/l)	-	-	-	-	-	<0.05	-	-	<0.05
(lbs/day)	-	-	-	-	-	<0.001	-	-	<0.0002
Nickel (mg/l)	0.47	2.60	-	-	41.0	18.2	-	-	-
(lbs/day)	0.186	0.650	-	-	0.137	0.425	-	-	-
Silver (mg/l)	-	-	-	-	-	0.05	-	-	3.60
(lbs/day)	-	-	-	-	-	0.001	-	-	0.012
Tin (mg/l)	<1	2	-	-	-	-	-	-	-
(lbs/day)	<0.396	0.500	-	-	-	-	-	-	-
Zinc (mg/l)	8.90	18.5	-	-	-	-	-	-	2.28
(lbs/day)	3.53	4.63	-	-	-	-	-	-	0.008

NOTE: "-" indicates analysis was not performed.

* pH reading taken at Lab.

FIGURE 9

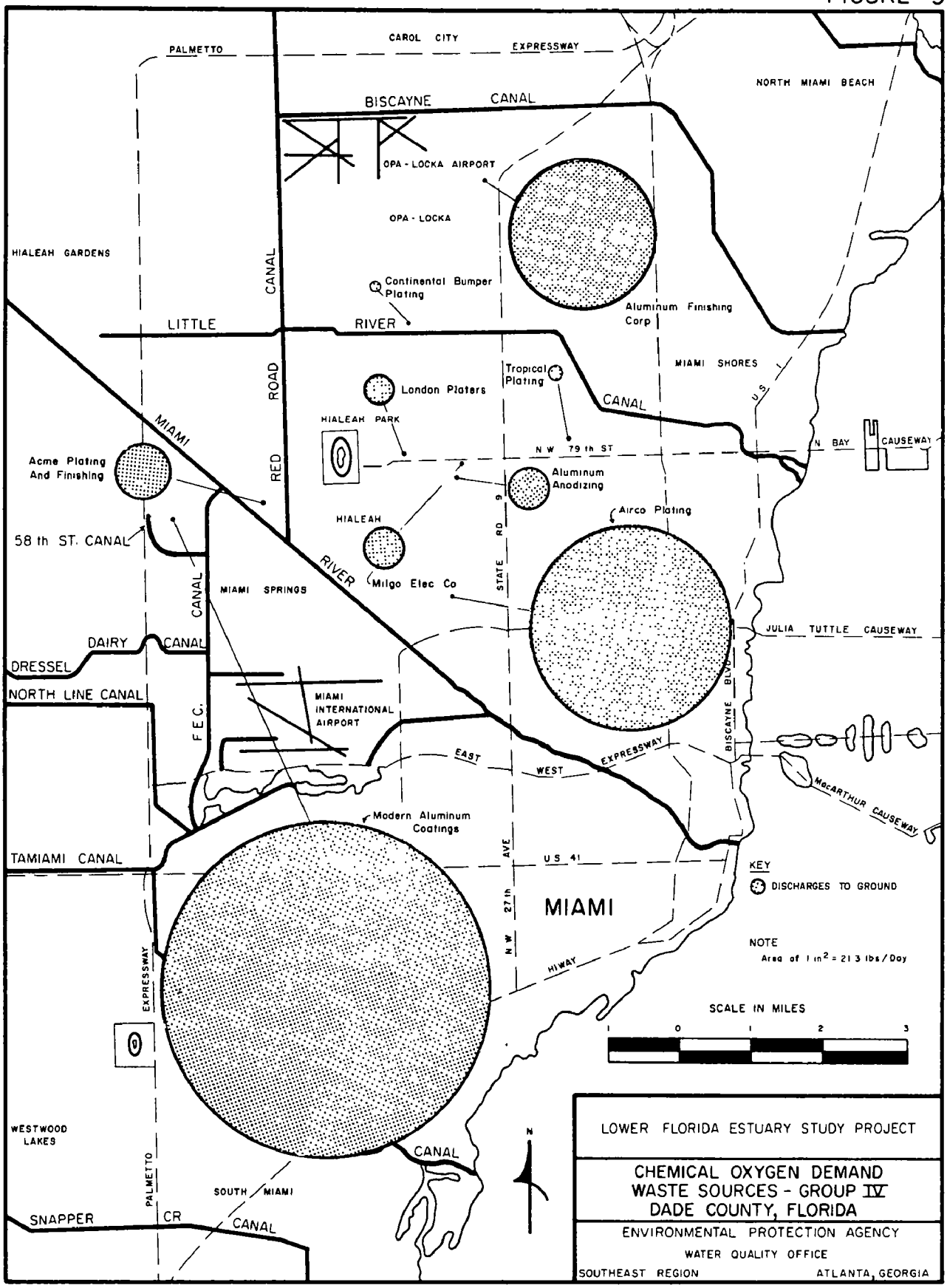
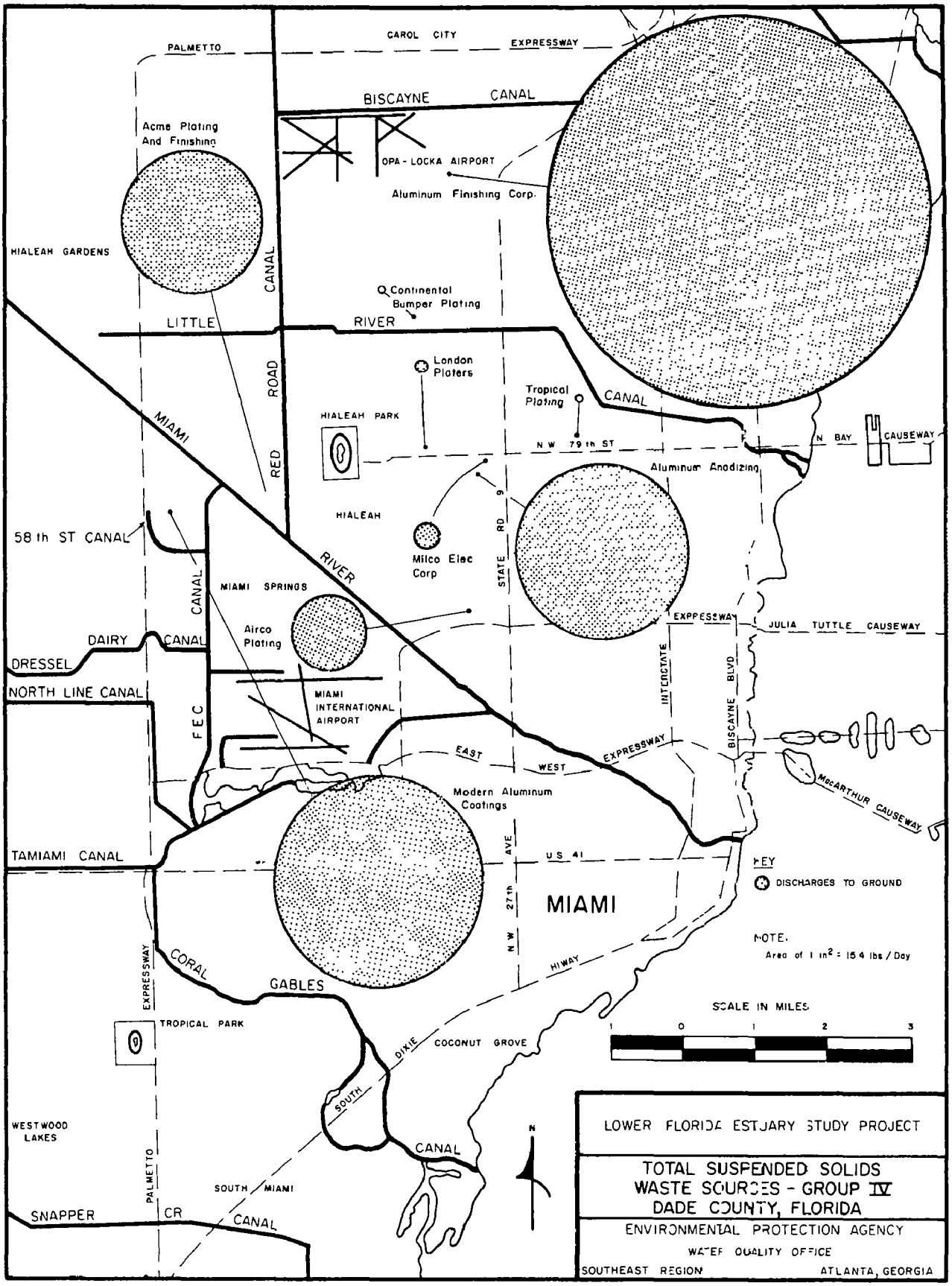

CAROL CITY EXPRESSWAY
PALMETTO
BISCAYNE CANAL
NORTH MIAMI BEACH
OPA-LOCKA AIRPORT
OPA-LOCKA
HIALEAH GARDENS
Continental Bumper Plating
Aluminum Finishing Corp
LITTLE RIVER CANAL
MIAMI SHORES
Tropical Plating
London Platers
HIALEAH PARK
N W 79 th ST
N BAY CAUSEWAY
Acme Plating And Finishing
Aluminum Anodizing
Airco Plating
HIALEAH
58 th ST. CANAL
Milgo Elec Co
MIAMI SPRINGS
DAIRY CANAL
DRESSEL
NORTH LINE CANAL
MIAMI INTERNATIONAL AIRPORT
JULIA TUTTLE CAUSEWAY
EAST WEST EXPRESSWAY
MacARTHUR CAUSEWAY
Modern Aluminum Coatings
TAMIAMI CANAL
U S 41
MIAMI
KEY
DISCHARGES TO GROUND
NOTE
Area of 1 in² = 21 3 lbs / Day
SCALE IN MILES
WESTWOOD LAKES
SOUTH MIAMI
SNAPPER CR CANAL
LOWER FLORIDA ESTUARY STUDY PROJECT
CHEMICAL OXYGEN DEMAND
WASTE SOURCES - GROUP IV
DADE COUNTY, FLORIDA
ENVIRONMENTAL PROTECTION AGENCY
WATER QUALITY OFFICE
SOUTHEAST REGION ATLANTA, GEORGIA

FIGURE 10


CAROL CITY EXPRESSWAY
PALMETTO
BISCAYNE CANAL
Acme Plating And Finishing
OPA-LOCKA AIRPORT
Aluminum Finishing Corp.
HIALEAH GARDENS
CANAL
Continental Bumper Plating
LITTLE RIVER
ROAD
RED
London Platers
Tropical Plating
CANAL
HIALEAH PARK
N.W. 79th ST
N. BAY CAUSEWAY
Aluminum Anodizing
MIAMI
HIALEAH
STATE RD. 9
58th ST CANAL
Milco Elec Corp
CANAL
MIAMI SPRINGS
RIVER
Airco Plating
EXPRESSWAY
JULIA TUTTLE CAUSEWAY
DAIRY CANAL
DRESSEL
NORTH LINE CANAL
F.E.C.
MIAMI INTERNATIONAL AIRPORT
INTERSTATE
BISCAYNE BLVD
EAST
WEST
EXPRESSWAY
MacARTHUR CAUSEWAY
Modern Aluminum Coatings
TAMIAMI CANAL
U.S. 41
AVE
27th
N.W.
MIAMI
KEY
DISCHARGES TO GROUND
NOTE:
Area of 1 in² = 154 lbs / Day
CORAL GABLES
HIWAY
EXPRESSWAY
SCALE IN MILES
1 0 1 2 3
TROPICAL PARK
DIXIE
COCONUT GROVE
SOUTH
CANAL
WESTWOOD LAKES
PALMETTO
SOUTH MIAMI
SNAPPER CR
CANAL
N
LOWER FLORIDA ESTUARY STUDY PROJECT
TOTAL SUSPENDED SOLIDS
WASTE SOURCES - GROUP IV
DADE COUNTY, FLORIDA
ENVIRONMENTAL PROTECTION AGENCY
WATER QUALITY OFFICE
SOUTHEAST REGION ATLANTA, GEORGIA

The three aluminum anodizing plants evaluated during the study were: Aluminum Anodizing Company, Aluminum Finishing Corporation, and Modern Aluminum Coatings, Inc. These plants all provide settling for their waste and discharge through seepage ponds. The treated effluent from these industries contained low concentrations of COD (22.7 to 119 mg/l) and high concentrations of aluminum (95 to 540 mg/l). Aluminum Anodizing Company and Aluminum Finishing Company had effluents containing high concentrations of ammonia-nitrogen (40.0 and 61.6 mg/l respectively). High concentrations of nitrite-nitrate nitrogen were detected in the effluents of Aluminum Finishing Company (21.0 mg/l) and Modern Aluminum Coatings Inc. (11.6 mg/l). In addition, an extremely high concentration of total phosphorus, 133 mg/l, was discharged by Modern Aluminum Coatings.

GROUP V - PAINT MANUFACTURERS

Associated Plastics was the only paint manufacturer evaluated during the study. Waste from this plant is discharged to the ground through a septic tank. Extremely high concentrations of titanium, 1439 mg/l and mercury, 3870 µg/l were detected in the septic tank. The waste flow at this plant was 630 gpd making the waste loads 7.56 pounds per day of titanium and 0.020 pounds per day of mercury. The effluent also contained 0.002 pounds per day of lead at a concentration of 0.33 mg/l.

After this industry was sampled, they indicated that they would soon recycle their waste water. In addition, they will eliminate the use of mercury as a fungicide in the paint and will use zinc instead.

DISCUSSION OF RESULTS

Some of the major tests used in this waste study are enumerated below with a brief explanation of its sanitary and/or ecological significance. The quantitatives of waste discharged by industries sampled, into inland waters are presented.

BIOCHEMICAL OXYGEN DEMAND (5-DAY)

The biochemical oxygen demand is the amount of oxygen utilized by a mixed micro-organism population while stabilizing decomposable and reactable materials at 20°C during a five day incubation period.

If the mass or concentration of biochemical oxygen demand of a waste discharge is excessive, a receiving water's oxygen content would be lowered, possibly to the point of zero dissolved oxygen content. As the concentration of oxygen is reduced below the toleration level of the various members of the ecological community, organisms die, species diversity becomes limited and finally anaerobic conditions could ensue with such recognizable extreme symptoms as foul odors and black waters.

The BOD levels in the Food Processing and Paper Industries and the Chemical and Film Processing wastes were measured directly in this study. However, because of the high probability of toxic materials being present in the wastes of the Metal Plating Industries and the Aircraft and Engine Repair Industries no attempt was made to determine their BOD's. However, COD's are almost always greater than BOD's, and moreover usually greater by 2-3 times. Using the COD values and 2:1 ratio COD/BOD of

these industries we can conservatively estimate the total BOD load discharged at 217 pounds/day for group II and IV. This does not include the effect of the insoluble, immiscible petroleum distillate of Propeller Services.

The BOD of each group discharging to the inland waters of Dade County are given below with their population equivalents:

		Pounds BOD Discharged/Day	Population[1]/ Equivalent
Group I	Food Processing and Paper	6,643	39,076
Group III	Chemical and Film Processing Wastes	380	2,235
Group II and IV (estimated)		217	1,276
	TOTAL	7,240	42,588

The load from the Major and Minor Wastewater Treatment Plants discharged to the inland areas of Dade County of approximately 5,837 pounds per day (2).

CHEMICAL OXYGEN DEMAND (COD)

While the biochemical oxygen demand (BOD) is a biological test designed to quantitate the oxygen demand of a waste, the COD is a purely chemical test aimed at assessing this same parameter.

1/ One five day BOD population equivalent = 0.17 pounds per day

2/ Completed from Table A-6 "Report of Waste Source Inventory and Evaluation, Data County, Florida". Environmental Protection Agency, Southeast Water Laboratory, Athens, Georgia June 1971.

The COD test is not subject to the variabilities and sensitivities of the biological test and its results are statistically more precise. At the same time its results are somewhat artificial in that natural conditions are not as extreme as test conditions.

The COD is used as an aid in the interpretation of BOD results. In the presence of toxic materials, or the absence of acclimated microbiological populations, or when applied to biologically resistant materials the BOD test may fail and the COD test may be advantageously employed within its limits.

The test results in terms of oxygen demand are approximately 2-4 times greater than BOD results in a municipal waste, with stability of ratio accompanying waste consistency. It is not unusual therefore to find COD results more or less paralleling BOD. The COD has the advantage in analytical time in that an analysis is complete within 4 hours while a BOD takes 5 days.

The COD is then used as a means of assessing organic loadings, treatment plant efficiencies, as another means of arriving at the oxygen demand of a waste, and as an aid in interpreting BOD data.

The loadings in pounds per day of significant unsewered Dade County industries by industrial group is given below.

	COD-Pounds/Day
Group I - Food Processing and Paper	12,026
Group II - Aircraft Engine Repair and Painting	248
Group III - Chemical and Film Processing	1,037
Group IV - Metal Plating Industries	185
TOTAL	13,496

The Food Processing and Paper Group discharge 89% of the measured COD load and the Chemical and Film Group is the next largest contributor.

The firms contributing COD loading of 750 pounds per day or larger are listed below with their percent contribution with reference to the industrial groups.

Firm	Pounds Per Day Discharged	Percent of Measured Industrial Waste Discharged
Miami Board	2,469	18.2
Pepsi Cola	2,085	15.4
Dade County Dairies	1,977	14.6
Gotham Provision	1,156	8.6
Bordens Dairy	1,126	8.3
Canada Dry	1,036	7.7
Federal Packing	918	6.8
Kim Color	750	5.6
TOTAL	11,517	85.2

COLIFORM, TOTAL AND FECAL

Waters receiving domestic, wildlife, livestock wastes, and/or urban runoff are characterized by the presence of bacteria which normally inhabit the intestinal tracts of warm-blooded animals, including man. The coliform group is the most prevelant group of bacteria found in domestic fecal discharges. Several genera with similar biochemical properties comprise this group. Some genera occur naturally outside the intestinal tract, a fact that has caused objections

to the use of this group as indicators of fecal pollution.

Most of the objections to the use of the coliform group as indicators of fecal pollution were overcome with the introduction of the fecal coliform determination. The fecal coliform group is presently the most reliable bacterial measure of fecal pollution.

Though generally considered non-pathogenic, coliforms are considered to indicate the probable presence of enteric pathogens. Some enteric pathogens found in polluted water, if ingested, cause gastroenterities, dysentery, typhoid fever and/or paratyphoid fever. Although not related to enteric pathogens, ear, eye, nose, throat, and skin infections and/or irritations are commonly contracted from contact with polluted waters. Viral diseases such as infectious hepatitis may also result from contact and ingestion of water receiving fecal wastes.

The bacterial quality of several Food and Paper Processing Industry discharges were monitored during the study. The following table demonstrates the quality of these effluents.

FIRM	MEDIAN BACTERIAL DENSITY/100 ML TOTAL COLIFORM	FECAL COLIFORM
Gotham Provision	2,500,000,000	8,000,000
Federal Packing	1,500,000,000	6,000,000
Economy Packing	1,250,000,000	23,000,000
Dade County Dairies	80,000,000	>6,000,000
Bordens Dairy	80,000,000	5,900,000
Cott Bottling Company	50,000,000	26,000
Tallowmaster	5,500,000	3,250,000
Pepsi Cola	3,000,000	5,000

The introduction of wastes containing high bacterial levels to environmental waters constitutes a serious pollutional problem. If waste contains high levels of indicator organisms, such as those shown above, discharge of such wastes to environmental waters renders those waters potentially dangerous for water contact activities.

Reduction of bacterial levels in process wastes can be accomplished only through effective waste treatment practices and disinfection.

CYANIDES

The term cyanide as used in sanitary chemistry refers collectively to all compounds that contain the cyanide (CN) group, without regard to chemical type. Cyanides exist in a variety of forms such as hydrogen cyanide (HCN), potassium cyanide (KCN), sodium nitro ferricyanide ($Na_2FE(CN)_5(NO).2H_2O$) and potassium cobalticyanide ($K_3Co(CN)_6$). The analytical method does not differentiate between cyanide types nor does it guarantee total estimation of cyanide in the sample.

Cyanides are of interest because of the potential toxicity of the cyanide ion. However, it must be recognized that all forms of cyanide are not equally toxic. Toxicity data usually express lethal concentrations in terms of the cyanide ion with 24-hr-TL_m values of 0.05 mg/l commonly found in the literature. However, if cyanide is present as a ferricyanide, TLM values are much greater (less toxic) and more variable as environmental conditions affect the release of cyanide from the compound. A 0.2 mg/l level is the 1962 US Public Health Service value that would result in a

water being rejected as unsuitable for drinking water.

Cyanides were determined on the wastes of the Aircraft Repair and Painting Industries, the Chemical and Film Processing Industries and the Metal Plating Industries. Of the 23 industrial effluents analyzed only the following five had cyanide concentrations greater than 0.05 mg/l. The firms discharging greater than this amount with the associated pounds per day are:

	CYANIDE	
FIRM	CONCENTRATION (mg/l)	LOAD (Pounds/Day)
Tropical Plating	23.0	0.077
Acme Plating and Finishing	1.0	0.396
Airco Plating	0.5	0.125
London Platers	0.26	0.006
Miami Aviation Corp	.07	0.072

METALS

Many metals are known to be toxic to humans and other organisms. Their presence in a waste discharge is not desirable even though a definite statement as to their effect cannot be readily made in all cases. Toxicities are variable due to such factors as the chemical form of the metal, the pH of the receiving water, the ultimate fate of the metal in the receiving water, and the synergistic and antagonistic effects of other electrolytes.

Mercury is a metal in which interest has been recently revived. Although the toxic qualities of mercury have been known for many years

increased industrial useage and environment accumulation have produced states of crisis in many areas of the world. At Minamata Bay in Japan, for instance 121 cases of blindness, deafness, neurologic damage, and death were related to mercury prior to 1970. New scientific investigations have shown previously considered, relatively non-toxic forms of mercury, convertible to the very toxic methyl mercury.

Without causing undue alarm, one might question the direct and indirect effects of other metals being discharged such as cadmium, arsenic, lead, and chromium into the waters of Dade County. The following quote (3) succinctly sums up the problem.

> "The most critical concern to public health experts today, however, is for subtle physiological changes caused by trace metals that may be completely undetected or, if detected, be attributed to other causes. How can scientists detect harmful responses to very low doses of trace metals? And once detected how can responses which are simply adaptive or homeostatic be differentiated from those which represent the first stages of disease? Also, synergistic and antagonistic relationships among trace metals must be defined, scientists active in trace metals believe... Until these questions and relationships are more thoroughly explored and answers found, ... water ... standards are likely to be based on little more than guesses."

The pounds of the various metals discharged to the inland waters of Dade County by the industries follow, with chemical form or valence not being determined.

3/ Chemical and Engineering News, July 10, 1971

	Discharged Pounds/Day	Projected * Pounds/Year
Aluminum	575	143,750
Cadmium	0.2	50
Chromium, (Total)	2.2	550
Copper	1.4	350
Gold	<0.001	<0.25
Lead	0.5	125
Mercury	0.02	5
Nickel	1.5	375
Silver	3.2	800
Tin	2.4	600
Titanium	7.6	1,900
Zinc	9.76	2,440

* 250 working days/year

The discharge of aluminum is due primarily to the Modern Aluminum Coatings Company which contributes approximately 92% of the aluminum loading. Moreover, the effluent concentration is 540 mg/l, a dangerously high level. Aluminum concentrations of 0.1 mg/l are known to cause eye irritations in water used for bathing and concentrations as low as 0.1 mg/l have been proved to cause death to certain species of aquatic life.[4]/ This discharge constitutes a potentially dangerous source of pollution.

The discharge of cadmium, chromium, lead, and mercury should not be condoned as the environmental buildup, persistance, organism concentration and long term effects are detrimental. Algae concentrate chromium by factors of 100-500. Lead is deposited in the human bone and is known to exist as a

---

4/ "Water Quality Criteria", Publication No 3-A Second Edition California State Water Quality Control Board, 1963.

cumulative poison. Cadmium concentrates in the liver, kidneys, and pancreas of humans and once it enters the body through any source is likely to remain. Mercury, recently discovered to be environmentally converted to methylmercury could constitute low level chronic long term effects, although these effects are just beginning to be investigated.

Other metals discharged similarly constitute potential pollution hazards, although exact effects as previously stated are difficult to perdict.

NITROGEN

Nitrogen is considered to be one of the major elements of importance in sanitary and ecological studies, because it enters into the life processes of all plants and animals.

Nitrogen exists in many forms because of its natural electronic structure. Fortunately there are certain forms and groupings which do predominate and which have been quantitated in this study. These groupings are nitrogen existing as free ammonia or ammonium ion, in the form of nitrate and nitrite ions, or in a trinegative organically combined state.

The major nitrogen forms are all related and interconvertible and best understood through the nitrogen cycle. This report will not go into the nitrogen cycle but assume that in an undisturbed environment a healthy and beneficial ecological balance exists. As stress is applied to this balance in terms of additions of nitrogen, the system will react producing such phenomena as algal blooms, stimulated bacterial growths, changes in species diversity, and populations.

In addition, depressed oxygen levels, resulting from the increased synthetic activity of the microbiological community as well as the chemical oxidative stabilization requirements of the waste might also result. Water turbidity often increases as the flora and fauna thrive, and the other symptoms of over enrichment quite often occur.

The pounds of nitrogen and the form in which it is discharged by each industrial group is given below.

	Pounds NO_3-NO_2-N Pounds/Day	Pounds NH_3-N Pounds/Day	Pounds Organic Nitrogen Pounds/Day	Total Nitrogen Pounds/Day
Group I - Food Processing & Paper	8	123	170	301
Group II - Aircraft Engine Repair	1	1	2	4
Group III - Chemical and Film Processing	1	62	5	68
Group IV - Metal Plating	21	34	5	60
TOTAL	31	220	182	433

The largest discharges are the Food Processing and Paper industries, when 6 out of the 12 firms of the group contribute (84%) of the total nitrogen discharged by the sampled industries. Those firms, all groups considered discharging greater than 12 pounds of nitrogen per day are compiled in the following list.

Firm	Total Nitrogen Pounds/Day
Federal Packing	90.9
Kim Color	62.9
Gotham Provision	44.4
Economy Packing	42.0
Aluminum Finishing Corp.	32.0

Firm	Total Nitrogen Pounds/Day
Dade County Dairies	30.7
Bordens Dairy	24.3
Miami Board	20.9
Modern Aluminum Coatings	17.0
TOTAL	365.0

The amount of nitrogen discharged by industries sampled is 3 times greater than the amount of nitrogen discharged by the Minor Wastewater Treatment Plants, but is only 11% of the total discharged by the Major Wastewater Treatment Plants.

PHOSPHORUS

Phosphorus, like nitrogen, is an essential ingredient regulating biological productivity. The elemental form is not found in nature, but rather combined as orthophosphate, various inorganic polyphosphates and organic compounds such as phospholipids which would be a part of an organism's biomass or sometimes a free dissolved molecule. The method employed during the study measured all forms of phosphorus in a waste without differentiation as to form.

Mackenthun[5]/ suggests that a concentration of total phosphorus above 0.1 mg/l in streams produces biological nuisances. This level should be considered a guideline.

The measured industrial phosphorus load is 4.6 times greater than phosphorus load contributed by all the Minor Wastewater Treatment Plants in Dade County but is only 12.4% of the total discharged by the Major Wastewater

---

5/ Mackenthun, K. M. "The Phosphorus Problem" Journal American Water Works Association, 60, pp 1047-1054 (September 1968)

Treatment Plants.

Modern Aluminum Coating Company discharges 131 pounds or 53.5% of the industrial poundage, while only five more companies contribute the next 34.9%. These six companies and percent contribution to the measured industrial loading are given below:

FIRM	PHOSPHORUS POUNDS/DAY	PERCENT CONTRIBUTION TO INDUSTRIAL LOAD
Modern Aluminum Coatings	131.0	53.5
Bordens Dairy	29.0	11.8
Canada Dry	15.9	6.5
Dade County Dairies	15.1	6.2
Farm Stores	14.2	5.8
Federal Packing	11.3	4.6
TOTAL	216.5	88.4

PHENOLS

Phenolic compounds refer collectively to a class of chemical compounds derived from benzene. Their usage is as varied as is their chemical behavior. Characteristic phenols are the general disinfectant carbolic acid (phenol), the photographic developer pyrogallol, the tanning agent resorcin (resorcinol), the ingredient of explosives picric acid (2, 4, 6, - Trinitrophenol).

The analytical method used in the study does not identify or distinguish between the types of phenols present nor unfortunately does it include all phenols present. The result expressed should therefore be interpreted as a minimum value of all phenolic compounds present.

Although not particularly toxic to larger animal life, phenols do exhibit toxicity to certain fish species at sub parts per million level. Chlorophenols added directly to waste discharges or produced by the action of chlorine on phenolics, are malodorous and objectionable tasting compounds which taint fish flesh at the sub part per billion level. Phenols are not desirable in waste discharges.

The pounds of phenol discharged to the inland waters of Data County is a small amount even though the phenol concentrations of some effluents were high. The mass of phenol discharged, Group II industries, the Aircraft Repair and Painting and the Group IV industries, the Metal Plating, was quantitated during the study. The total phenol discharged per day to the inland waters of Dade County is 1.04 pounds. The largest discharges in terms of concentration are given below with their associated poundage.

FIRM	PHENOLS CONCENTRATION mg/l	POUNDS/DAY	PROJECTED POUNDS/YEAR*
Propeller Services	150,500	0.144	36
Butler Aviation	46,712	0.636	159
Northeast Airlines	5,380	0.005	1
Airlift International	1,246	0.072	18

*250 working days/year.

SUSPENDED SOLIDS

Suspended are those solids suspended in water with an analytically defined diameter of greater than 0.8 microns. They might be plankton

organic detrius, soil particles, or material discharged by industrial processes such as metal powders, insoluble organic by-products, or coagulating soluble organic material.

The suspended particle is not toxic, unless it is by nature a toxic substance. Damage and pollutional effects are produced by such actions as the decay of a receiving water's esthetic properties, the reduction of the euphotic zone correspondingly reducing the area of photosynthetic activity, the possible destruction of aquatic life through such action as the abrasive action on gills, and the eventual deposition producing bottom mucks and muds which can destroy spawning areas.

The suspended solids test in conjunction with the BOD test is advantageously used in sewage treatment plant evaluation. A properly designed and operated secondary plant which is not hydraulically overloaded, can routinely remove up to 90%.

Of the measured industrial discharges, 1,674 pounds per day of total suspended solids is discharged to ground water and 1,871 pounds per day is discharged to the canal system. The Food Processing and Paper industries are the major dischargers to the canals with the Pepsi Cola Company producing 1,181 pounds. All measured industries discharging significant amounts are shown below.

FIRM	TOTAL SUSPENDED SOLIDS POUNDS/DAY	PERCENT OF MEASURED INDUSTRIAL LOADING TO CANALS
Pepsi Cola	1,181	63.1
Miami Board	388	20.8
Canada Dry	218	11.6
TOTAL	1,787	95.5

APPENDICES

APPENDIX A

Project Personnel

Dade County Industrial Waste Study EPA personnel:

Name	Title
L. W. Olinger	Sanitary Engineer
M. V. Polito	Chemist
W. R. Davis	Chemist
D. T. Cafaro	Sanitary Engineer
D. R. Hopkins	Sanitary Engineer
B. M. Mullins	Chemist
L. A. Wise	Technician
G. C. Kunselman	Chemical Technician
K. L. Vathauer	Chemical Technician
D. W. Lawhorn	Technician
R. N. Hemphill	Chemist
R. L. King	Sanitary Engineer
F. S. Perlmutter	Typist
R. A. Wiemert	Draftsman
R. F. Holm	Chemical Technician
R. P. Lawless	Chemist

Florida Department of Air & Water Pollution Control Personnel:

G. Hunbert	Chemist
T. Davis	Technician
A. Townsend	Technician
N. White	Microbiologist

Dade County Pollution Control Personnel:

R. Rau	Technician

APPENDIX B

Explanation of Abbreviations

Dade County Industrial Waste Study

ABBREVIATION	MEANING
BOD	Biochemical Oxygen Demand (5-Day, 20°C)
COD	Chemical Oxygen Demand
TSS	Total Suspended Solids
NH_3-N	Ammonia Nitrogen
Organic-N	Organic Nitrogen
NO_2-NO_3	Nitrite-Nitrate Nitrogen
TDS	Total Dissolved Solids
O & G	Oil and Grease
T-P	Total Phosphorus
Temp	Temperature
Cl. Res.	Chlorine Residual
Cl. Dem.	Chlorine Demand
Ni	Nickel
Cu	Copper
Zn	Zinc
Cr	Chromium
Pb	Lead
Cd	Cadmium
Ag	Silver
Au	Gold
Sn	Tin
Al	Aluminum
CN	Cyanide
Hg	Mercury
J.C.U.	Jackson Candle Units
Ti	Titanium

APPENDIX C

SURVEY METHODS

SAMPLING

Most effluents evaluated during the study were sampled after the waste received the final treatment process provided by the industry. In the case of industries discharging to the ground through wells, or seepage ponds, samples were collected from the influent to these units. Effluent samples from industries using septic tanks were collected from the septic tank. When an effluent was chlorinated, samples were collected before chlorination for all analyses except coliform bacteria. Exceptions to the above are included in the discussion of waste characteristics.

Various sampling techniques were used on the different types of wastes, therefore, the sampling procedures will be discussed for each group.

GROUP I

This group consisted of dairies, packing houses, soft drink manufacturers, rendering plants and a plant that manufacturers paper from used paper. Influent and effluent samples were collected at Farm Stores, Miami Board, and Florida Processing, and effluent samples were collected at the other industries. All industries were sampled using automatic samplers, for at least four days. The type of automatic sampler most frequently used was the Serco sampler, which collected a grab sample every hour for 24 hours. Each grab sample was stored in a separate container.

The grab samples collected when the plant was discharging were manually composited once each day and returned to the Lower Florida Estuary Study for analysis. The other type of automatic sampler used was a Protech sampler which collected a smaller sample every six minutes. These samples were automatically composited and were returned daily to the Lower Florida Estuary Study for analysis.

A grab sample for bacteriological analysis was collected daily when the automatic samplers were serviced. These samples were returned to the Florida Department of Air and Water Pollution Control Laboratory in Hallandale for analysis.

Temperature, chlorine residual (when applicable), and pH were measured once on a grab sample when the automatic samplers were serviced.

GROUP II

This group consisted of industries washing, striping, painting, repairing and testing aircraft and aircraft parts. In addition, it included one railroad car washing waste. Sampling at Test Cell Building-Dade County Port Authority, Butler Aviation, Eastern Airlines, Propeller Service, and Air Carrier was accomplished by manually collecting a grab sample approximately every hour from 8:00 a.m. to 4:00 p.m. for four days. The samples were composited for the four days with the exception of daily compositing for phenols and acidity/alkalinity. In addition, on one day, a set of grab samples was collected at these industries every 15 minutes, and composited samples for that day were analyzed for all parameters.

Airlift International, Northeast Airlines and Seaboard Coastline Railroad were sampled by collecting a grab approximately every hour from 8:00 a.m. to 4:00 p.m. for five days. These samples were composited for the five days with the exception of daily compositing for phenols and acidity/ alkalinity. Miami Aviation and Homestead Air Force Base were known to have small discharges and were sampled with one grab.

Temperature and pH were measured in the field when each grab was collected.

GROUP III

This group consisted of dye works and photo processors. Grab samples were manually collected at these industries. G. Gertz Enterprises was sampled twice on the first sampling day and once a day for the next three days. Miami Dye was sampled approximately six times a day for four days and Smith and Butterfield was sampled six times a day for three days. One grab sample was collected at Kim Color, since their wastes will be discharged to the sewers in the very near future.

When more than one grab was collected, the samples were composited daily. All samples were analyzed daily for each parameter. Temperature and pH were measured in the field when each grab was collected.

GROUP IV

This group consisted of metal plating and aluminum anodizing wastes. Grab samples were collected at most plants approximately seven times per day for five days. Weekly composites were analyzed for all parameters except for the analysis of daily composites for phenols and acidity/alkalinity. One grab sample was collected at Continental Bumper Plating, London Platers, and Tropical Plating, which have small discharges. One grab sample was also collected at Airco Plating since the wastes were automatically composited in soakage ponds.

Temperature and pH were measured in the field when each grab was collected.

GROUP V

This group consists of one paint manufacturer, and one grab sample was collected at this plant.

FLOW MEASUREMENTS

Various techniques were used to determine flow at the industries evaluated during the study. Due to the number of plants evaluated each week and the limited time spend at any industry, the flow measured during the study is an approximation. These flow measurements were compared to water use records and flow data provided by the industry when possible. Flow values obtained from water use records are also approximations, because in most cases sanitary water use and water used in product make-up had to be estimated and subtracted from the water meter readings. A brief description of the method used to evaluate flow at each industry is presented in Appendix D.

PRESERVATION OF SAMPLES

The following preservation techniques were employed in the waste survey. All analyses were performed at the chemistry laboratory of the Lower Florida Estuary Study unless otherwise indicated.

ACIDITY

ALKALINITY

BIOCHEMICAL OXYGEN DEMAND

CHLORINE DEMAND

Samples that were analyzed for the above four parameters were kept in iced coolers until receipt by the lab where they were refrigerated at $4^{o}C$ until analysis. Analysis was initiated as soon as possible after receipt by the laboratory, but not later than 12 hours.

CHEMICAL OXYGEN DEMAND

CHLORIDE

CONDUCTIVITY

SOLID DETERMINATIONS (ALL)

SULFATE

TURBIDITY

Samples for the above six parameters were kept in iced coolers until receipt by the laboratory where they were then kept at ambient temperature until analysis.

COLIFORM, TOTAL AND FECAL

Samples were collected in distilled water rinsed and sterilized bottles to which was added 0.1 milliliter of a 10% solution of sodium thiosulfate before sterilization. Samples were stored in iced coolers for transport to the laboratory (always less than 6 hours) and processed within 2 hours of receipt. All analyses were conducted at the State Water Pollution Control Laboratory, Hallandale.

CYANIDE

Samples were immediately brought to pH 10 by the addition of 1 N NaOH. The samples were kept in disposable polyethylene plastic bottles until analysis, which was performed at the Southeast Water Laboratory in Athens, Georgia.

NITROGEN SERIES (TOTAL KJELDAHL NITROGEN, AMMONIA NITROGEN, AND NITRATE-NITRITE NITROGEN)

Samples were placed in a disposable polyethylene quart container and kept refrigerated at 4^{o} Centigrade. Samples were analyzed within 24 hours after compositing by the laboratory.

METALS (EXCLUDING MERCURY)

Samples were collected in rigid, disposable polyethylene containers. Upon return to laboratory, samples were preserved by the addition of five milliliters of nitric acid and a pH of less than 2. Analysis was performed at the Southeast Water Laboratory, Athens, Georgia.

MERCURY

Samples were placed in special borosilicate pint glass bottles which had been previously washed with nitric acid. When the samples were returned to the laboratory, two milliliters of nitric acid were added to each sample. Samples were usually analyzed within two weeks of sample collection. Analysis was performed at the Southeast Water Laboratory, Athens, Georgia.

OIL AND GREASE

The sample was collected in wide mouth quart glass bottles with metal caps. Five milliliters of sulfuric acid were added to the empty bottles before sampling so that initial sample additions were immediately made acid. The acidified samples were kept in iced coolers until receipt by the lab and then refrigerated at $4^{o}C$ until analysis. Samples were processed within 48 hours after compositing by the laboratory.

PHENOL

To empty brown glass quart bottles, one gram of Copper Sulfate and 10 milliliters of 10 percent phosphoric acid were added. Upon addition of sample, sampling crews checked the pH and adjusted if necessary to maintain the pH at approximately 4. The preserved samples were kept in iced coolers until receipt by the lab and then refrigerated at $4^{o}C$ until analysis.

PHOSPHORUS

Samples were placed in a disposable polyethylene quart container and kept in iced coolers until receipt by the laboratory and then refrigerated at $4^{o}C$. Samples were analyzed within 24 hours after compositing by the laboratory.

pH AND RESIDUAL CHLORINE

These determinations were made in the field.

METHODS

CHEMICAL AND BACTERIAL ANALYSIS

ACIDITY

Method - FWPCA Methods for Chemical Analysis of Water and Wastes, November 1969, p. 11, Potentiometric Procedure.

Comment - End point was taken at pH 8.3.

ALKALINITY

Method - 1969 Book of ASTM Standards, Part 23, p. 154, Potentiometric Procedure.

Comment - End point was taken at pH 4.5.

BIOCHEMICAL OXYGEN DEMAND (5 DAY)

Method - Standard Methods for the Examination of Water and Wastewater, 13th Edition, pp. 489-494.

Comments - All sample dilutions were made by direct sample measurement into 300 ml BOD incubator bottles utilizing Fisher 1970 Catalog number 2-926 bottles or equivalent and volumetric pipets. The dilution water was seeded with trickling filter effluent taken from the secondary clarifier of the Port Everglades Sewage Treatment Plant. The quality of the seed was verified by the glucose-glutamic acid check procedure. All results were seed corrected.

The dissolved oxygen was determined as per FWPCA Methods for Chemical Analysis of Water and Wastes, November 1969, p. 55, full bottle technique employing the Alsterberg modification of the Winkler Procedure, 0.0370 N sodium thiosulfate being employed.

Where samples were chlorinated and a chlorine residual remained, dechlorination was accomplished utilizing sodium sulfite and sulfuric acid.

CHEMICAL OXYGEN DEMAND

Method - FWPCA Methods for Chemical Analysis of Water and Wastes, November 1969, p. 25.

Comments - Because of the extremely high COD values, aliquots of the samples were diluted to 50 ml to accommodate COD values greater than 900 mg/l. A potassium acid phthalate standard was run daily to monitor the test.

CHLORIDE

Method - Standard Methods for the Examination of Water and Wastewater, 12th Edition, p. 370, Mercuric Nitrate Method.

CHLORINE DEMAND

Method - Standard Methods for the Examination of Water and Wastewater, 12th Edition, p. 381.

Comment - Iodometric end point employed.

CHLORINE RESIDUAL

Method - Standard Methods for the Examination of Water and Wastewater, 13th Edition, p. 385, Orthotolidine Method.

Comments - Comparison of the yellow orthotolidine color with permanent color discs was made utilizing a Wallace and Tiernan comparator.

COLIFORM, FECAL

Method - Standard Methods for the Examination of Water and Wastewater, 13th Edition, pp. 684-685, Membrane Filter Technique.

COLIFORM, TOTAL

Method - Standard Methods for Examination of Water and Wastewater, 12th Edition, pp. 610-615, Membrane Filter Technique.

CONDUCTIVITY

Method - Standard Methods for the Examination of Water and Wastewater, 13th Edition, p. 323.

Comment - The cell constant was determined for standard potassium chloride solutions at 25°C. All conductivities of sample solutions are reported at 20°C. To convert 20° conductivity to 25° conductivity, a factor of 1.1 may be approximately applied at the 1400 umho/cm level.

CYANIDE

Method - FWPCA Methods for Chemical Analysis of Water and Wastewater, November 1969, p. 41.

METALS

Method - All metals with the exception of Titanium were treated as per FWPCA Methods for Chemical Analysis of Water and Wastes, November 1969, p. 87, Atomic Absorption Methods.

Titanium was run polarographically after an alkaline flux and subsequent solution. No EPA, Standard Method or ASTM method exists for this element.

Comment - Detection limits by Atomic Absorption were set by direct aspiration of sample. No concentration of metals was attempted.

NITROGEN, AMMONIA

Method - FWPCA Methods for Chemical Analysis of Water and Wastes, November 1969, p. 137.

Comments - A slightly modified manifold was employed. Also 10% sodium potassium tartrate was used in place of 5% E.D.T.A.

NITROGEN, NITRATE-NITRITE

Method - FWPCA Methods for Chemical Analysis of Water and Wastewater, November 1969, p. 171.

Comment - Manifold diagrammed was simplified omitting acid wash system. All samples were filtered utilizing the on-line continuous filter. New working standards were made daily and a standard curve prepared each day.

NITROGEN, TOTAL KJELDAHL

Method - FWPCA Methods for Chemical Analysis of Water and Wastes, November 1969, p. 145.

Comments - A micro steam distillation unit was employed (Fisher Catalog 1970, 21-150, or equivalent) with absorption into boric acid and titrimetric determination with 0.02N sulfuric acid to the mixed indicator endpoint.

OIL AND GREASE

Method - FWPCA Methods for Chemical Analysis of Water and Wastewater, November 1969, p. 205.

Comments - Hexanes (Fisher Chemical Catalog 67-C, H-300) was substituted for n-hexane because of cost difference. Unbleached muslin was used to make the muslin filter discs.

pH

Method - Standard Methods for the Examination of Waters and Wastewaters, 13th Edition, p. 276, Glass electrode method.

Comment - Meters were calibrated at pH values 4.01 and 6.87 immediately before use. Buffers were made from prepackaged buffer salts (Fisher Chemical Catalog B78 and B79) for pH values 6.86 and 4.01, respectively. The 6.86

buffer is a potassium phosphate monobasic-disodium phosphate mixture each 0.025M when diluted to volume. The 4.01 buffer is a potassium biphthate buffer, 0.05M when diluted to volume.

PHENOLS

Method - Standard Method for the Examination of Water and Wastewater, 12th Edition, pp. 515-520.

Comments - All samples were subjected to distillation and subsequently run as per Method A, Chloroform Extraction Method.

In instances where the phenol range exceeded method limits, appropriately diluted aliquots of the distillate were used in the extraction. The calibration curve was obtained by using procedural standards.

PHOSPHORUS, TOTAL

Method - FWPCA Methods for Chemical Analysis of Water and Wastes, November 1969, p. 236.

Comment - Manifold diagram on page 245 modified for sampler II and continuous filtration. Disposable glassware used throughout analysis. Calibration curves were prepared daily.

POLYCHLORINATED BIPHENYLS

Method - Gas chromotographic analysis of concentrated 15% methylene chloride in hexane extract using a Ni-63 electron capture detector.

Conditions of Analysis: 6' x 1/4" pyrex column packed with 5% O.V.-210 on Chromasorb W-HP, 120 mesh, oven temperature 195°C., injection port temperature 235°C., detector temperature 285°C.

SETTLEABLE SOLIDS (SETTLEABLE MATTER)

Method - Standard Methods for the Examination of Water and Wastewater, 12th Edition, p. 426.

Comments - All results reported in ml/l.

SOLIDS, NON-FILTRABLE (TOTAL SUSPENDED SOLIDS)

Method - FWPCA Methods for Chemical Analysis of Water and Wastewater, November 1969, p. 265.

Comments - 4.7 cm glass fiber filter discs are employed.

SOLIDS FILTRABLE RESIDUE (TOTAL DISSOLVED)

Method - Standard Methods for the Examination of Water and Wastewater, 13th Edition, p. 539.

Comments - The pH control of paragraph 4, Method A, was not followed. 103°C was the final drying temperature.

SULFATE

Method - Standard Methods for the Examination of Water and Wastewater, 13th Edition, p. 334, Turbidimetric Method.

TURBIDITY

Method - FWPCA Methods for Chemical Analysis of Water and Wastes, November 1969, p. 275.

APPENDIX D

Methods Used to Evaluate Flows During the
Dade County Industrial Waste Study

CODE	INDUSTRY	METHOD
	Group I	
A1	Bordens Dairy	Water use records June, July 1971 subtracted sanitary use and product make-up water.
A2	Canada Dry Bottling Co.	Flow provided by H. J. Ross Associates, Miami, Florida.
A3	Cott Bottling Co.	Read water meter during sampling period subtracted sanitary and product make-up water.
A4	Dade County Dairies	Continuously measured the water level in a sump with a gravity flow outlet pipe.
A5	Economy Packing Co.	Read water meter during sampling period subtracted sanitary water use.
A6	Farm Stores, Inc.	Read timers on treatment plant pumps and multiplied time by pump rating provided by industry.
A7	Federal Packing Co.	Average flow from application for State Permit to operate a water pollution source.
A9	Florida Processing Co.	Estimated water use provided by industry.
A10	Gotham Provision Co.	Flow from application for State Permit to operate a water pollution source.
A12	Miami Board	Continuously measured flow through wier into chlorination tank.
A13	Pepsi Cola Bottling Co.	Flow provided by Montgomery Engineering, Fort Lauderdale, Florida
A14	Tallowmaster, Inc.	Estimated water used provided by industry.
	Group II	
B1	Test Cell Building 2120 - Dade County Port Authority	Determination of water use was not possible.
B2	Airlift International	Estimated average water use provided by industry. (Practically no discharge during study period).
B3	Butler Aviation of Miami, Inc.	Measured time discharge required to fill a given volume each time a grab sample was collected.

APPENDIX D (Continued)

Methods Used to Evaluate Flows During the
Dade County Industrial Waste Study

CODE	INDUSTRY	METHOD
	Group II (Continued)	
B5	Eastern Air Lines	Calculated the average overflow from the hydraulics of wet well No. 2, and determined the total daily flow from the number of times overflow occurred on 05-18 & 19-71.
B6	Homestead Air Force Base	Measured time discharge required to fill a given volume when the grab sample was collected.
B7	Miami Aviation Corp.	Water use records subtracted sanitary use.
B9	Northeast Air Lines	Measured time discharge required to fill a given volume each time a grab sample was collected.
B10	Propeller Service of Miami	Measured time discharge required to fill a given volume each time a grab sample was collected.
B11	Seaboard Coastline Railroad	Multiplied time treatment plant in operation by treatment plant flow rating provided by industry.
B12	Air Carrier Engine Service	Measured time discharge required to fill a given volume each time a grab sample was collected.
	Group III	
C2	G. Gertz Enterprises	Read water meter during sampling period subtracted sanitary water use.
C3	Kim Color Corp.	Flow from Industrial Waste Water Questionnaire Department of Water and Sewers, City of Hialeah, provided by industry.
C4	Miami Dye Works	Estimated flow provided by industry.
C6	Smith and Butterfield	Average flow from application for State Permit to operate a water pollution source.
	Group IV	
D1	Acme Plating and Finishing	Waste stream cross-sectional area multiplied by velocity measured with pitot tube to determine flow. Area and velocity measured each time a grab sample was collected.

APPENDIX D (Continued)

Methods Used to Evaluate Flows During the
Dade County Industrial Waste Study

CODE	INDUSTRY	METHOD
	Group IV (Continued)	
D2	Airco Plating Co.	Average flow from application for State Permit to operate a water pollution source.
D3	Aluminum Anodizing Co.	Measured time discharge required to fill a given volume each time a grab sample was collected.
D4	Aluminum Finishing Corp.	Measured time discharge required to fill a given volume each time a grab sample was collected.
D5	Continental Bumper Plating	Estimated flow provided by industry.
D6	London Platers	Estimated flow provided by industry.
D7	Milgo Electric	Estimated flow provided by industry.
D8	Modern Aluminum Coatings, Inc.	Average flow from application for State Permit to operate a water pollution source.
D10	Tropical Plating	Flow estimated based on other electro-platers in Dade County.
	Group V	
E1	Associated Plastics	Estimated flow provided by industry.

APPENDIX E

COMPILATION OF DATA - DADE COUNTY INDUSTRIAL WASTE STUDY

GROUP I

INDUSTRY	PEPSI COLA					TALLOWMASTERS				
DATE	6/14	6/15	6/16	6/17	6/18	6/1	6/2	6/3	6/4	6/8
PARAMETER										
BOD mg/l	--	1123	680	720	>1359	--	78	191	245	74
COD mg/l	--	1420	1130	1330	1120	--	224	267	425	155
TSS mg/l	--	172	1274	648	738	--	44	68	57	32
O&G mg/l	--	--	--	--	--	--	99.1	--	--	--
NH_3-N mg/l	--	1.03	0.29	0.02	0.27	--	21.5	16.4	13.6	11.2
Organic-N mg/l	--	3.4	6.5	3.2	5.7	--	0.8	0.5	0.8	0.7
NO_2-NO_3 mg/l	--	0.111	0.061	0.004	0.047	--	0.031	0.960	0.610	0.027
T-P mg/l	--	1.36	1.03	1.71	0.62	--	0.35	0.36	0.23	0.46
pH Std. units	--	8.7	8.8	8.3	8.9	--	7.1	7.2	7.2	7.3
Temp. ^{o}F	--	84	83	85	85	--	83	--	--	--
Total Col. cells/100 ml	7.5×10^4	6.8×10^7	1.3×10^7	3.0×10^6	0	No Result	4.0×10^5	3.0×10^6	8.0×10^6	$>4.0 \times 10^7$
Fecal Col. cells/100 ml	5000	$>1.2 \times 10^4$	5.2×10^4	2000	0	No Result	2.5×10^5	4.0×10^5	6.4×10^4	$>8.0 \times 10^5$
Conductivity umhos @ $20^{o}C$	--	--	--	--	--	--	660	510	500	--

APPENDIX E

COMPILATION OF DATA - DADE COUNTY INDUSTRIAL WASTE STUDY

GROUP I

INDUSTRY		GOTHAM PROVISION CO.					MIAMI BOARD				
DATE		6/7	6/8	6/9	6/10	6/11	6/7	6/8	6/9	6/10	6/11
PARAMETER											
BOD mg/l	Inf.	--	--	--	--	--	--	1004	853	558	4570
	Eff.	--	>1298	1880	1720	2040	--	392	514	373	417
COD mg/l	Inf.	--	--	--	--	--	--	1290	--	1620	1850
	Eff.	--	4820	2690	3550	--	--	943	938	930	778
TSS mg/l	Inf.	--	--	--	--	--	--	412	1080	800	1060
	Eff.	--	1240	680	1710	--	--	123	149	164	129
Set. Solids mg/l		--	--	--	--	--	--	0.5	0.3	1.0	0.0
NH_3-N mg/l		--	57.5	60.0	48.0	45.0	--	0.35	0.32	0.27	0.31
Organic-N mg/l		--	112.1	81.7	82.6	79.0	--	7.8	7.4	6.4	7.3
NO_2-NO_3 mg/l		--	0.160	0.040	0.027	0.048	--	0.280	0.027	0.030	0.037
T-P mg/l		--	25.4	15.3	10.9	13.2	--	2.20	2.30	0.64	0.60
pH	Inf.	--	--	--	--	--	--	7.0	6.8	6.5	6.7
	Eff.	--	6.7	6.7	7.2	6.4	--	3.2	4.6	3.0	3.9
Temp. °F	Inf.	--	--	--	--	--	--	117	114	109	109
	Eff.	--	83	82	84	82	--	111	111	105	103
Total Col. cells/100 ml		$>8.0\times10^7$	8.0×10^6	1.0×10^9	8.0×10^9	2.5×10^9	6.0×10^4	--	0	0	20
Fecal Col. cells/100 ml		2.5×10^5	7.5×10^7	2.7×10^6	8.0×10^6	6.7×10^7	0	--	0	0	0
Turbidity J.C.U.		--	--	--	--	--	Inf.	1500	--	--	--
							Eff.	272	400	500	300

APPENDIX E

COMPILATION OF DATA - DADE COUNTY INDUSTRIAL WASTE STUDY

GROUP I

INDUSTRY		FARM STORES					FLORIDA PROCESSING CO.				
DATE		6/7	6/8	6/9	6/10	6/11	6/1	6/2	6/3	6/4	6/11
PARAMETER											
BOD mg/l	Inf.	--	>2145	4510	2580	3650	--	>1250	>1336	>1332	>6780
	Eff.	--	4	24	56	56	--	505	71	20	101
COD mg/l	Inf.	--	6550	6510	4230	6160	--	9830	10,300	10,070	33,500
	Eff.	--	84	121	142	126	--	3670	485	280	368
TSS mg/l	Inf.	--	1620	1520	1080	1540	--	37,020	2900	10,120	11,040
	Eff.	--	9.0	16.5	42.0	32.0	--	2050	210	64	117
Hg ug/l		--	0.73	0.53	0.43	1.20	--	--	--	--	--
O&G mg/l		--	--	--	--	--	--	10.3	--	--	--
NH_3-N mg/l		--	0.43	0.53	0.46	0.62	--	2.9	6.4	8.2	85.3
Organic-N mg/l		--	2.4	3.1	4.0	7.6	--	198.5	13.2	14.8	23.3
NO_2-NO_3 mg/l		--	16.4	11.0	16.0	5.0	--	31.0	24.7	18.6	0.4
T-P mg/l		--	39.8	33.6	38.8	36.4	--	103.9	66.0	57.0	34.4
pH	Inf.	--	6.3	6.1	6.9	9.6	--	--	--	--	--
	Eff.	--	7.4	7.5	7.5	7.4	--	8.2	8.2	9.1	8.1
Temp. ^{o}F	Inf.	--	84	83	80	83	--	--	--	--	--
	Eff.	--	85	84	83	82	--	72	78	81	81
Cl. Res.mg/l		--	5.0	10.0	0.5	--	--	--	--	--	--
Total Col. cells/100 ml		2.5×10^5	0	0	20	8000	0	0	3.2×10^4	0	1.8×10^4
Fecal Col. cells/100 ml		0	0	0	0	0	0	0	1300	0	5000
Conductivity umhos @ $20^{o}C$		--	--	--	--	--	Inf.	2830	3460	3090	--
							Eff.	2820	2870	2950	--

APPENDIX E

COMPILATION OF DATA - DADE COUNTY INDUSTRIAL WASTE STUDY

GROUP I

INDUSTRY	ECONOMY PACKING					FEDERAL PACKING CO.				
DATE	6/14	6/15	6/16	6/17	6/18	6/14	6/15	6/16	6/17	6/18
PARAMETER										
BOD mg/l	--	1006	1790	1030	2040	--	00	802	780	1166
COD mg/l	--	2760	3480	3060	3510	--	--	1930	1570	1810
TSS mg/l	--	480	772	326	740	--	--	628	680	563
NH_3-N mg/l	--	97.0	100.0	118.0	108.0	--	--	151.5	75.5	156.0
Organic-N mg/l	--	103.7	131.6	115.2	132.7	--	--	25.0	90.1	28.1
NO_2-NO_3 mg/l	--	0.222	0.046	0.006	0.006	--	--	0.012	0.011	0.009
T-P mg/l	--	9.2	9.8	7.6	7.8	--	--	17.4	23.4	24.2
pH Std. units	--	6.4	6.4	6.5	6.4	--	6.7	6.9	6.6	7.0
Temp ^{o}F	--	72	81	80	83	--	84	85	84	85
Total Col. cells/100 ml	1.8×10^{9}	2.0×10^{8}	6.0×10^{8}	1.25×10^{9}	1.3×10^{9}	2.0×10^{8}	5.2×10^{9}	1.5×10^{9}	7.0×10^{8}	1.9×10^{9}
Fecal Col. cells/100 ml	2.5×10^{7}	2.3×10^{7}	2.4×10^{7}	8.0×10^{6}	7.0×10^{6}	6.0×10^{6}	3.3×10^{7}	2.2×10^{7}	1.0×10^{6}	2.0×10^{6}

APPENDIX E

COMPILATION OF DATA - DADE COUNTY INDUSTRIAL WASTE STUDY

GROUP I

INDUSTRY	COTT BOTTLING					DADE COUNTY DAIRIES				
DATE	6/14	6/15	6/16	6/17	6/18	6/14	6/15	6/16	6/17	6/18
PARAMETER										
BOD mg/l	--	131	202	413	588/1650	--	835	820	1070	1556
COD mg/l	--	950	896	800	1010	--	1990	1120	1430	2160
TSS mg/l	--	352	336	112	376	--	385	270	230	168
Hg ug/l	--	--	--	--	--	--	0.35	<0.20	<0.20	<0.20
NH_3-N mg/l	--	0.08	0.12	1.08	0.82	--	0.20	0.17	0.63	2.14
Organic-N mg/l	--	10.2	13.2	3.6	3.2	--	24.0	19.8	20.8	36.1
NO_2-NO_3 mg/l	--	0.137	0.013	0.009	0.004	--	0.122	0.040	0.044	0.062
T-P mg/l	--	5.5	4.9	2.1	3.2	--	16.0	11.2	8.0	16.0
pH Std. units	--	6.4	6.1	6.3	6.8	--	7.2	7.2	7.4	7.4
Temp ^{o}F	--	79	78	78	79	--	80	82	81	81
Total Col. cells/100 ml	>1600	7.8×10^{7}	4.2×10^{7}	5.0×10^{7}	1.0×10^{8}	1.6×10^{5}	$>8.0\times10^{7}$	1.36×10^{8}	$>8.0\times10^{7}$	2.6×10^{8}
Fecal Col. cells/100 ml	>1200	46,000	84,000	26,000	0	>2000	$>3.0\times10^{5}$	$>6.0\times10^{6}$	2.75×10^{7}	3.5×10^{7}

APPENDIX E

COMPILATION OF DATA - DADE COUNTY INDUSTRIAL WASTE STUDY

GROUP I

INDUSTRY	BORDENS DAIRY					CANADA DRY				
DATE	6/14	6/15	6/16	6/17	6/18	6/2	6/3	6/4	6/9	6/10
PARAMETER										
BOD mg/l	--	878	888	524	928/1920	>253	>630	52	>1178	>1310
COD mg/l	--	1750	1470	805	1430	4400	2430	1360	3490	3008
TSS mg/l	--	303	267	254	188	2530	328	60	79	100
Hg ug/l	--	<0.20	0.25	<0.20	<0.20	--	--	--	--	--
O&G mg/l	--	--	--	--	--	--	--	--	--	--
NH_3-N mg/l	--	0.21	0.64	7.0	0.60	3.60	0.36	0.45	1.19	1.31
Organic-N mg/l	--	31.7	33.6	14.7	29.0	30.8	9.1	4.5	15.0	13.6
NO_2-NO_3 mg/l	--	0.048	0.052	0.070	0.072	0.52	8.20	7.90	0.81	0.64
T-P mg/l	--	26.0	49.0	26.0	39.5	180.9	23.5	5.0	9.7	6.8
pH Std. units	--	7.2	9.2	7.1	7.0	10.5	10.7	11.6	9.3	9.1
Temp ^{o}F	--	81	87	79	81	81	83	88	83	79
Cl.Res. mg/l	--	--	--	--	--	--	--	--	--	--
Total Col. cells/100 ml	$>1.6x10^5$	$>8.0x10^7$	$1.56x10^8$	$>8.0x10^7$	$1.01x10^9$	0	0	0	230	3300
Fecal Col. cells/100 ml	$>1.2x10^3$	$>6.0x10^5$	$5.9x10^6$	$7.0x10^6$	$>1.6x10^7$	0	0	0	0	0
Turbidity J.C.U.	--	--	--	--	--	--	--	--	--	--
Conductivity umhos @ $20^{o}C$	--	--	--	--	--	1450	1890	7480	--	--

APPENDIX E

COMPILATION OF DATA - DADE COUNTY INDUSTRIAL WASTE STUDY

GROUP II

INDUSTRY	Eastern Airlines		Propeller Service	
DATE	5/19/71	Composite 5/17-5/21/71	5/19/71	Composite 5/17-5/21/71
PARAMETER				
1. COD mg/l	256	47	1660	1525
2. TSS mg/l	11.2	4.0	37.7	28.6
3. TDS mg/l	421	385	346	464
4. O & G mg/l	8.2	87.9	31.3	10.0
5. Ni mg/l	<.05	0.05	<.05	0.5
6. Cu mg/l	0.02	0.02	0.32	1.41
7. Zn mg/l	0.17	0.15	0.78	2.57
8. Cr mg/l	1.57	1.08	0.76	3.95
9. Pb mg/l	0.10	0.16	8.85	29.6
10. Cd mg/l	0.01	<.01	1.30	3.40
11. CN mg/l	0.02	0.01	<.01	<.01
12. NH_3-N mg/l	0.43	0.415	0.44	1.22
13. Organic-N mg/l	--	0.31	--	4.4
14. NO_2-NO_3-N mg/l	0.56	0.37	0.47	0.69
15. T-P mg/l	1.2	0.52	1.30	2.00
16. Conductivity umhos @ 20°C	769	684	451	532
17. pH Std. units	7.0	6.8	7.7	7.9
18. Turbidity J.C.U.	9.5	3.4	120	120
19. Sn mg/l	2	1	--	--
20. Ag mg/l	<.01	<.01	--	--
21. Immiscible Liquid	--	--	21%	11.4%

APPENDIX E

COMPILATION OF DATA - DADE COUNTY INDUSTRIAL WASTE STUDY

GROUP II

INDUSTRY	Butler Aviation		Airlift Internat'l	Homestead A. F. B.
DATE	5/20/71	Composite 5/17-5/21/71	Composite 5/17-5/21/71	5/21/71
PARAMETER				
1. COD mg/l	1900	1580	320	570
2. TSS mg/l	138.5	20.6	52	18.8
3. TDS mg/l	253	633	288	384
4. O & G mg/l	133	11.6	41.9	20.2
5. Ni mg/l	<.05	0.05	<.05	<.05
6. Cu mg/l	0.11	0.28	0.20	0.03
7. Zn mg/l	1.38	2.76	0.33	0.26
8. Cr mg/l	3.55	2.30	0.17	1.42
9. Pb mg/l	0.38	1.23	1.06	0.41
10. Cd mg/l	1.35	0.34	0.04	0.05
11. CN mg/l	<.01	0.01	0.01	0.02
12. NH_3-N mg/l	8.90	3.96	0.29	1.2
13. Organic-N mg/l	--	2.2	2.31	2.0
14. NO_2-NO_3-N mg/l	0.42	0.37	0.206	0.132
15. T-P mg/l	17.0	30.9	3.1	6.5
16. Conductivity umhos @ 20°C	445	551	327	393
17. pH Std. units	7.9	5.2	8.9	7.3*
18. Turbidity J.C.U.	215	120	145	36
19. Sn mg/l	--	--	--	--
20. Ag mg/l	--	--	--	--
21. Immiscible Liquid	--	--	--	--

* pH measured at LFES laboratory.

APPENDIX E

COMPILATION OF DATA - DADE COUNTY INDUSTRIAL WASTE STUDY

GROUP II

INDUSTRY	Seaboard Coastline Railroad	Northeast Airlines	Miami Aviation Corp.
DATE	Composite 5/24-5/28/71	Composite 5/17-5/21/71	5/28/71
PARAMETER			
1. COD mg/l	203	2771	48.2
2. TSS mg/l	42	46	6.78
3. TDS mg/l	454	930	250
4. O & G mg/l	16.5	204.6	0.45
5. Ni mg/l	<.05	0.27	--
6. Cu mg/l	0.02	2.53	--
7. Zn mg/l	0.13	2.15	--
8. Cr mg/l	0.02	0.48	--
9. Pb mg/l	0.18	1.72	0.14
10. Cd mg/l	<.01	0.64	--
11. CN mg/l	0.02	0.02	0.07
12. NH_3-N mg/l	0.47	2.00	0.25
13. Organic-N mg/l	2.67	11.4	--
14. NO_2-NO_3-N mg/l	0.026	0.350	0.156
15. T-P mg/l	1.45	56.8	0.63
16. Conductivity umhos @ 20°C	887	803	689
17. pH Std. units	7.6	7.1	8.1*
18. Turbidity J.C.U.	26	Black	3.5
19. Sn mg/l	--	--	--
20. Ag mg/l	--	--	--
21. Immiscible Liquid	--	--	--

* pH measured at LFES laboratory.

APPENDIX E

COMPILATION OF DATA - DADE COUNTY INDUSTRIAL WASTE STUDY

GROUP II

INDUSTRY	Test Cell Bldg 2120--DCPA		Air Carrier	
DATE	5/18/71	Composite 5/17-5/21/71	5/18/71	Composite 5/17-5/21/71
PARAMETER				
1. COD mg/l	120	57	301	220
2. TSS mg/l	2.4	4.3	10.8	4.6
3. TDS mg/l	129	168	534	175
4. O & G mg/l	11.3	15.5	17.4	10.3
5. Ni mg/l	<.05	<.05	<.05	<.05
6. Cu mg/l	0.01	<.01	0.02	0.01
7. Zn mg/l	0.12	0.10	0.09	0.10
8. Cr mg/l	<.01	0.02	0.06	0.05
9. Pb mg/l	<.05	0.20	0.27	0.44
10. Cd mg/l	0.01	0.01	0.10	0.04
11. CN mg/l	<.01	0.01	<.01	<.01
12. NH_3-N mg/l	0.44	0.15	0.02	0.025
13. Organic-N mg/l	--	--	--	0.25
14. NO_2-NO_3-N mg/l	0.02	0.10	0.12	0.14
15. T-P mg/l	0.09	0.09	0.11	0.12
16. Conductivity umhos @ 20°C	456	318	252	276
17. pH Std.units	7.2	7.1	8.3	7.8
18. Turbidity J.C.U.	6.3	5.4	28	42
19. Sn mg/l	--	--	<1	<1
20. Ag mg/l	--	--	<.01	<.01
21. Immiscible Liquid	--	--	--	--

APPENDIX E

COMPILATION OF DATA - DADE COUNTY INDUSTRIAL WASTE STUDY

GROUP II

INDUSTRY	ACIDITY						ALKALINITY					
	5/17/71	5/18/71	5/19/71	5/20/71	5/21/71	Composite	5/17/71	5/18/71	5/19/71	5/20/71	5/21/71	Composite
Test Cell Bldg 2120 -- DCPA	--	--	--	--	--	--	53	154	153	68	83	102
Airlift Int'l	--	--	--	--	--	--	92	91	90	91	92	91.2
Butler Aviation	424	217	--	--	--	321	--	--	63	104	167	111
Eastern Airlines	--	--	--	--	--	--	176	180	189	194	198	187
Homestead A.F.B.	--	--	--	--	--	--	--	--	--	--	137	--
Air Carrier	--	--	--	43	--	--	47	65	45	--	49	52
Northeast Airlines	--	--	--	--	--	--	49	104	222	284	380	208
Propeller Service	--	--	--	--	--	--	162	179	103	151	119	143
	5/24/71	5/25/71	5/26/71	5/27/71	5/28/71	Composite	5/24/71	5/25/71	5/26/71	5/27/71	5/28/71	Composite
Miami Aviation Corp.	--	--	--	--	--	--	--	--	--	--	188	
Seaboard Coastline R.R.	--	--	--	--	--	--	138	161	150	212	213	175

APPENDIX E

COMPILATION OF DATA - DADE COUNTY INDUSTRIAL WASTE STUDY

GROUP II

INDUSTRY	PHENOLS (ug/l)						TEMPERATURE (^{O}F)					
	5/17/71	5/18/71	5/19/71	5/20/71	5/21/71	Composite	5/17/71	5/18/71	5/19/71	5/20/71	5/21/71	Average
Test Cell Bldg 2120 -- DCPA	50	2.0	5	5.5	1.06	12.71	85.8	85.5	86.9	84.5	84.9	85.4
Airlift Int'l	1050	1260	1332	890	1700	1246	83.3	83.5	85.4	83.2	83.4	83.7
Butler Aviation	100,000	100,000	30,000	1060	2500	46,712	86.0	85.0	83.0	86.2	84.2	84.4
Eastern Airlines	4.5	40	10	9	4.5	13.6	80.6	80.6	79.3	78.9	79.2	79.8
Homestead A.F.B.	--	--	--	--	890	--	--	--	--	--	83.0	--
Air Carrier	420	800	506	85	1000	562	87.0	81.9	83.3	83.9	83.6	84.4
Northeast Airlines	650	1250	5000	10,000	10,000	5380	81.8	77.1	75.7	78.2	81.0	78.7
Propeller Service	200,000	275,000	195,000	52,500	30,000	150,500	84.8	84.4	85.3	81.0	82.8	83.3
	5/24/71	5/25/71	5/26/71	5/27/71	5/28/71	Composite	5/24/71	5/25/71	5/26/71	5/27/71	5/28/71	Average
Miami Aviation Corp.	--	--	--	--	1.1	--	--	--	--	--	82.0	--
Seaboard Coastline R.R.	27	38	24.5	35	23	29.5	81.8	82.3	82.3	83.8	85.2	83.1

APPENDIX E

COMPILATION OF DATA - DADE COUNTY INDUSTRIAL WASTE STUDY

GROUP III

INDUSTRY	GERTZ				KIM COLOR
DATE	6/1	6/2	6/3	6/4	6/18
PARAMETER					
BOD mg/l	165	320	>609	259	377
COD mg/l	1170	1980	2242	1962	911-873
TSS mg/l	203	134	211	42	10.4-8.0
Hg ug/l	1.78	0.30	0.85	0.35	--
Cr mg/l	--	--	--	--	<0.01
CN mg/l	--	--	--	--	0.19
Ag mg/l	--	--	--	--	3.20
Zn mg/l	--	--	--	--	1.50
NH_3-N mg/l	0.61	2.4	0.47	0.25	72.0
Organic N mg/l	10.8	22.9	19.1	13.0	2.4
NO_2-NO_3 mg/l	0.258	0.146	4.65	1.72	0.487
T-P mg/l	14.5	28.9	53.0	28.5	1.31
pH Std. units	5.9	5.7	4.8	6.9	6.0
Conductivity umhos @ 20°C	464	1540	610	680	1282-1650
Temp. °F	109	114	111	120	82

APPENDIX E

COMPILATION OF DATA - DADE COUNTY INDUSTRIAL WASTE STUDY

GROUP III

INDUSTRY	MIAMI DYE WORKS				SMITH AND BUTTERFIELD			
DATE	6/1	6/2	6/3	6/4	6/2	6/3	6/4	6/5
PARAMETER								
BOD mg/l	>321	150	336	256	116	119	27	--
COD mg/l	1090	493	1183	1033	277	277	57.6	--
TSS mg/l	24	11.8	8	19	9.6	2	12	--
Hg ug/l	1.73	0.88	2.80	0.68	.20	1.00	0.40	--
NH_3-N mg/l	0.40	0.27	0.23	0.26	13.0	20.0	2.5	--
Organic N mg/l	14.2	5.8	13.2	12.9	1.7	1.3	0.6	--
NO_2-NO_3 mg/l	0.313	0.068	2.60	2.52	0.746	5.82	2.32	--
T-P mg/l	1.75	1.72	1.57	1.70	0.24	0.22	0.17	--
pH Std. units	8.9	7.2	7.8	8.5	6.6	7.3	8.1	--
Conductivity umhos @ 20°C	638	589	912	457	716	783	428	--
Temp. °F	105.1	98.5	102.0	103.3	80.1	79.5	78.5	--
Cl. Demand mg/l	--	--	--	--	--	--	--	92.8

APPENDIX E

COMPILATION OF DATA - DADE COUNTY INDUSTRIAL WASTE STUDY

GROUP IV

INDUSTRY	London Platers	Milgo Electronics Corp.	Modern Aluminum Coatings
DATE	5/21/71	Composite 5/24-5/28/71	Composite 5/24-5/28/71
PARAMETER			
1. COD mg/l	39	39.4	119
2. TSS mg/l	5.2	10.8	31.6
3. TDS mg/l	381	240	4330
4. O & G mg/l	13.6	0.6	0.2
5. NH_3-N mg/l	1.31	0.21	4.60
6. Organic-N mg/l	--	0.52	1.06
7. NO_2-NO_3-N mg/l	0.44	0.105	11.6
8. T-P mg/l	1.4	1.01	133.0
9. Conductivity umhos @ 20°C	567	600	5140
10. pH Std. units	7.4*	7.6	11.6*
11. Ni mg/l	18.2	--	--
12. Cu mg/l	0.82	--	--
13. Zn mg/l	--	--	--
14. Cr mg/l	3.65	0.17	--
15. CN mg/l	0.26	<.01	<.01
16. Cd mg/l	--	--	--
17. Sn mg/l	--	--	--
18. Al mg/l	--	2.0	540
19. Au mg/l	<.05	--	--
20. Ag mg/l	0.05	--	--
21. Turbidity J.C.U.	13	8.5	9.8
22. Sulfate mg/l	55.2	56.4	312.5

* pH measured at LFES laboratory.

APPENDIX E

COMPILATION OF DATA - DADE COUNTY INDUSTRIAL WASTE STUDY

GROUP IV

INDUSTRY	Tropical Plating	Aluminum Finishing Corp.
DATE	5/21/71	Composite 5/24-5/28/71
PARAMETER		
1. COD mg/l	86	53.8
2. TSS mg/l	5.7	285
3. TDS mg/l	601	2600
4. O & G mg/l	9.6	0.3
5. NH_3-N mg/l	3.7	61.6
6. Organic-N mg/l	11.4	--
7. NO_2-NO_3-N	3.08	21.0
8. T-P mg/l	0.17	3.02
9. Conductivity umhos @ 20°C	887	3400
10. pH Std. units	8.6*	7.2
11. Ni mg/l	--	--
12. Cu mg/l	7.80	--
13. Zn mg/l	2.28	--
14. Cr mg/l	--	--
15. CN mg/l	23.0	0.04
16. Cd mg/l	--	--
17. Sn mg/l	--	--
18. Al mg/l	--	95.0
19. Au mg/l	<.05	--
20. Ag mg/l	3.60	--
21. Turbidity J.C.U.	10	115
22. Sulfate mg/l	35.6	1420

* pH measured at LFES laboratory.

APPENDIX E

COMPILATION OF DATA - DADE COUNTY INDUSTRIAL WASTE STUDY

GROUP IV

INDUSTRY	Acme Plating & Finishing	Airco Plating	Aluminum Anodizing	Continental BumperPlating
DATE	Composite 5/24-5/28/71	5/28/71	Composite 5/24-5/28/71	5/21/71
PARAMETER				
1. COD mg/l	8.0	155	22.7	50.0
2. TSS mg/l	34.8	18.4	261	4.2
3. TDS mg/l	267	1700	3620	454
4. O & G mg/l	1.3	4.3	0.2	15.7
5. NH_3-N mg/l	1.19	7.9	40.0	0.3
6. Organic-N mg/l	0.27	16.9	--	0.9
7. NO_2-NO_3-N mg/l	0.296	3.32	0.096	0.29
8. T-P mg/l	0.41	0.61	0.09	1.4
9. Conductivity umhos @ 20°C	671	2830	4570	591
10. pH Std. units	5.6*	7.4	6.8	6.5*
11. Ni mg/l	0.47	2.60	--	41.0
12. Cu mg/l	0.71	4.0	--	--
13. Zn mg/l	8.90	18.5	--	--
14. Cr mg/l	0.80	0.34	--	19.8
15. CN mg/l	1.0	0.50	<.01	0.02
16. Cd mg/l	0.09	0.53	--	--
17. Sn mg/l	<1.0	2.0	--	--
18. Al mg/l	--	--	98.0	--
19. Au mg/l	--	--	--	--
20. Ag mg/l	--	--	--	--
21. Turbidity J.C.U.	45	12	54	10
22. Sulfate mg/l	16.2	412.0	2430	143

* pH measured at LFES laboratory.

APPENDIX E

COMPILATION OF DATA - DADE COUNTY INDUSTRIAL WASTE STUDY

GROUP IV

INDUSTRY	PHENOL (ug/1)						TEMPERATURE (^{o}F)					
	5/24/71	5/25/71	5/26/71	5/27/71	5/28/71	Composite	5/24/71	5/25/71	5/26/71	5/27/71	5/28/71	Composite
Acme Plating & Finishing	1.1	12.0	1.1	1.0	Nil	3.0	81.7	82.2	83.7	84.1	81.9	82.7
Airco Plating	--	--	--	--	1.2	--	--	--	--	--	--	--
Aluminum Anodizing	1.1	Nil	Nil	0.5	0.5	0.4	78.2	81.0	83.3	84.6	83.4	82.1
Aluminun Finishing Corp.	1.2	Nil	0.5	Nil	Nil	0.3	85.2	83.5	87.1	90.6	89.1	87.4
Milgo Elec. Corp.	5.5	1.1	1.1	0.5	Nil	1.6	82.3	82.4	83.7	85.1	84.1	83.5
Modern Aluminum Coatings	1.1	Nil	1.0	Nil	1.0	0.6	82.7	84.7	84.7	86.0	86.7	85.0
	5/21/71						5/21/71					
Continental Bumper	Nil						--					
London Platers	4.95						--					
Tropical Plating	5.5						78.8					

APPENDIX E

COMPILATION OF DATA - DADE COUNTY INDUSTRIAL WASTE STUDY

GROUP IV

INDUSTRY	ACIDITY						ALKALINITY					
	5/24/71	5/25/71	5/26/71	5/27/71	5/28/71	Composite	5/24/71	5/25/71	5/26/71	5/27/71	5/28/71	Composite
Acme Plating & Finishing	119	156	--	--	--	138	--	--	72	190	135	132
Airco Plating	--	--	--	--	--	--	--	--	--	--	94	--
Aluminum Anodizing	257	--	1120	--	--	689	--	45	--	254	320	206
Aluminum Finishing Corp.	--	--	131	--	--	131	49	233	--	94	720	274
Milgo Elec. Corp.	--	--	--	--	--	--	84	139	99	56	48	85
Modern Aluminum Coatings	--	--	--	--	--	--	2080	3660	3800	1820	1100	2492
	5/21/71						5/21/71					
Continental Bumper	--						33					
London Platers	--						184					
Tropical Plating	--						304					