

Biological Assessment of

Florida Distillers Company

Polk County

NPDES #FL0003051

Sampled November 1991

March 1992

Biology Section
Division of Technical Services

Department of Environmental Regulation
Results of Fifth Year Inspections

Discharger: Florida Distillers Co.
County: Polk
NPDES Number: FL0003051
State Permit Expiration Date: 8-12-92

Toxics Sampling Inspection (**XSI**)	
Date Sampled:	4 November 1991
Results:	Metals analysis detected non-problem levels of aluminum (38 µg/L), iron (23 µg/L), and lead (1 µg/L). Analysis for organic compounds revealed the presence of di-n-octyl phthalate at 5.5 µg/L, a violation of Class III standards.

Compliance Biomonitoring Inspection (**CBI**)	
Date Sampled:	4 November 1991
Results:	Not toxic to *Ceriodaphnia dubia*.

Impact Bioassessment Inspection (**IBI**)	
Date Sampled:	4 November 1991
Results:	Benthic macroinvertebrate communities were improved at the test site, although both study areas had a low Florida Index and were dominated by the pollution tolerant dipteran, *Polypedilum illinoense*. Similarly, periphyton communities at both sites were dominated by the blue-green filament, *Lyngbya* sp., and the green alga, *Stigeocolonium* sp., both characteristic of polluted conditions. The downstream station was not as strongly dominated by these organisms and supported more taxa than the reference site, suggesting a trend toward recovery. Periphyton chlorophyll *a* was elevated at both sites, corresponding to the abundant algal growth.

Water Quality Inspection (**WQI**)	
Date Sampled:	4 November 1991
Results:	Total coliform concentrations were >6000 organisms/100 ml in the effluent, reference, and test site samples, in violation of Class III standards (17-302.560 FAC). Conversely, fecal coliforms were very low in all samples. Nutrient concentrations in the effluent were lower than those measured at the two Lake Lena Run sites. Moderate ammonia enrichment was apparent at both reference (0.17 mg/L) and test (0.22 mg/L) sites, probably the result of upstream sources. Nitrate-nitrite at the downstream site was 0.31 mg/L, higher than 80% of typical Florida streams. No phosphorus enrichment was noted.

These fifth year inspections provide the necessary information to evaluate the facility's impact on its receiving waters and to provide the basis for specific condition recommendations for permit renewal.

Introduction

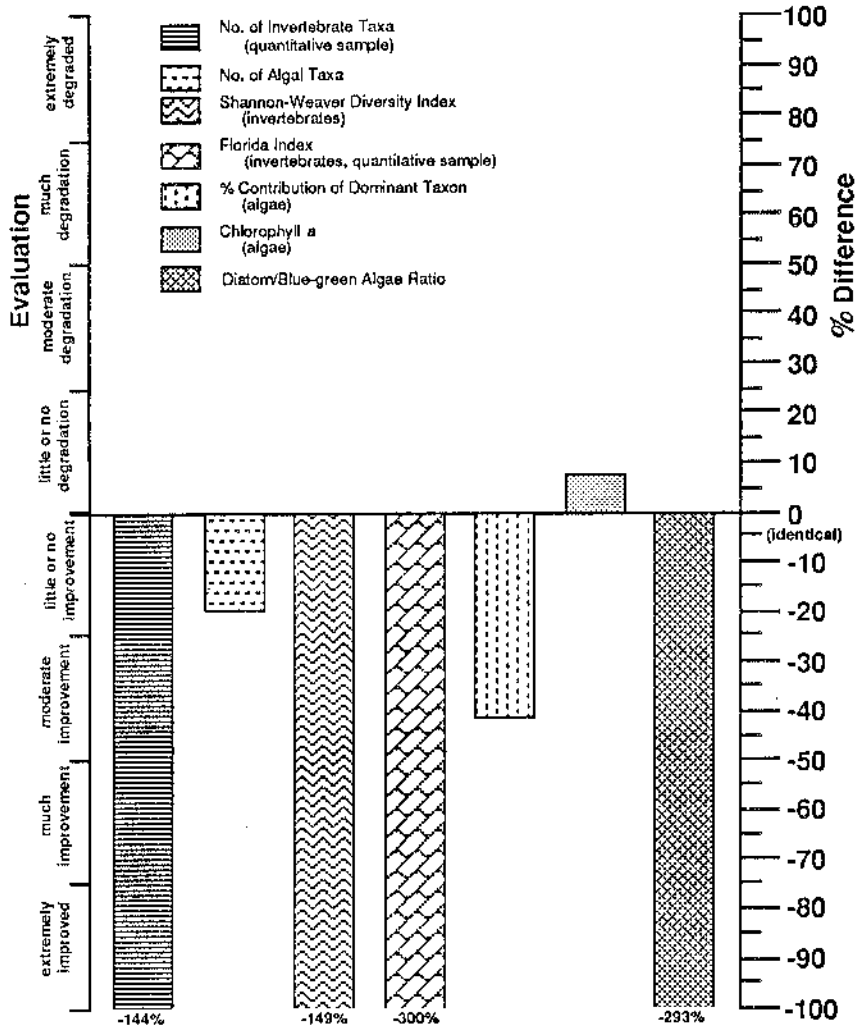
The Todd Hunter International, Inc., doing business as Florida Distillers Company, is located in Auburndale, Polk County, Florida (see map in Appendix). This facility, with an actual mean flow 2.6 MGD, produces alcoholic beverages from citrus molasses, sugar cane, and grain. The process residue is dried and sold as fertilizer or animal feed. The effluent is composed of evaporator condensate, non-contact cooling water, boiler blowdown, cleaning water from the area drains, stormwater, and sanitary wastewater. The permit does not allow process water to be discharged. In the treatment and disposal system, the water undergoes neutralization, flow equalization, aeration in two lagoons, clarification, chlorination, and polishing pond aeration prior to being discharged to Lake Lena Run, which flows into Lake Hancock. Effluent permit limits include total nitrogen, BOD, fecal coliforms, total and unionized ammonia, pH, dissolved oxygen, zinc, specific conductance, and total residual chlorine (see Facility Summary in Appendix for details).

During the month which sampling for the present study occurred (November, 1991), the average discharge flow was 1.6 MGD, somewhat less than the usual amount when the plant is under production. On the date that chemistry samples were taken (4 November 1991), the facility was not making its product. Two weeks into the incubation period for Hester-Dendy samples, the facility began processing. Therefore, water chemistry sample results may not represent the potential "worst case" situation for this discharger, but negative effects attributable to the effluent should have been evident in the Hester-Dendy macroinvertebrate samples.

Results of past bioassays of Florida Distillers Company (performed in 1982, 1987, and two in 1988), indicated no toxicity to *Daphnia pulex*, *Ceriodaphnia dubia*, *Pimephales promelas*, *Notropis leedsi*, or to the bacterium, *Photobacterium phosphoreum*. The only permit violation on record occurred in June 1991, when the permitted level of zinc was violated (at 0.5 µg/L).

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	18	37
Florida Index	2	4
% Contribution of Dominant Taxon	80.5	55.0
% Diptera	96.6	80.0
% Gastropoda	0.5	11.8
% Odonata	2.7	3.5
% Malacostraca	0.04	2.8
% Other	0.2	1.9
% Predators	25.7	21.8
% Collector-Gatherers	27.7	33.1
% Shredders	26.0	15.9
% Scrapers	0.5	14.2
% Collector-Filterers	20.1	14.9
% Other	0	0.1
Macroinvertebrate Hester-Dendy		
Number of Taxa	9	22
Florida Index	1	4
Shannon-Weaver Diversity	1.18	2.94
% Diptera	98.5	85.1
% Gastropoda	0.7	7.6
% Malacostraca	0	3.7
% Ephemeroptera	0	2.0
% Other	0.9	1.5
% Collector-Gatherers	31.2	54.5
% Shredders	28.9	13.7
% Collector-Filterers	19.1	12.8
% Predators	19.8	9.7
% Scrapers	0.7	9.0
% Parasites	0.3	0.3
Periphyton Algae		
Number of Taxa	15	18
% Contribution of Dominant Taxon	83.7	48.9
Chlorophyll a (mg/sq. m)	22.2	23.8
Diatom/Diatom + B-G Abundance Ratio	.057	.224
% Blue-green	87.3	51.6
% Green	7.5	33.5
% Diatoms	5.3	14.9



Effect of discharge on receiving stream
(measured as difference between control and test sites).

Immediately upstream of the distillery, Coca-Cola Foods discharges industrial wastewater into Lake Lena Run. In a 1991 bioassessment performed by the FDER, this facility was found to be toxic to Daphnia pulex (FDER 1991). While district biologists were retrieving artificial samplers for the present study, an unpermitted discharge (turbid, greenish-brown in color, possessing an oily surface sheen) was observed flowing into Lake Lena Run through a drainage ditch (upstream of the reference site). A Coca-Cola employee stated that the spill was the result of a broken pump, and that it was contained within an hour. The permitted discharge from Coca-Cola, as well as events such as this spill, are important factors influencing the water quality and biological communities in Lake Lena Run above the Jacquin Distillery.

Methods

The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a reference site (located in Lake Lena Run upstream of Florida Distiller's outfall, but below Coca-cola's discharge) and a test site (the area down gradient of the discharge) (see map in Appendix). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. An acute definitive toxicity bioassay, using *Ceriodaphnia dubia* as the test organism, was performed on an effluent sample (Weber 1991). The effluent was analyzed for metals and for organic constituents (base neutral and acid extractables, and pesticide extractables). Additionally, nutrient analyses were performed on effluent, reference, and test sites. Methods used for all chemical analyses are on file at the Tallahassee DER Chemistry Laboratory.

Benthic macroinvertebrate communities were evaluated at reference and test sites. Invertebrates were collected from multiple substrates (*e.g.*, snags, leaf packs, vegetation) using discrete dip net sweeps. Additional invertebrate collections were accomplished using Hester-Dendy multiplate samplers which were incubated for 28 days (Ross 1990). Periphyton was sampled at both reference and test sites by incubating glass microscope slides in a standard periphytometer for 28 days (Ross 1990). Chlorophyll *a* was also determined for periphyton communities (Ross 1990). Bacterial populations were analyzed for total and fecal coliforms following the methods of APHA (1989).

Explanation of Measurements of Community Health

Several different measurements of macroinvertebrate and algal community health have been employed. Many of these, such as the number of taxa, Shannon-Weaver Diversity Index, and chlorophyll *a* are well known. Others are briefly explained here. The Florida Index assigns points to stream-dwelling macroinvertebrates based on their sensitivity to pollution (see Ross 1990). A site with a high Florida Index score is considered healthy (*i.e.*, many clean-water organisms are present). Excessive numerical dominance of a single type of organism (a high % contribution of dominant taxon) is usually associated with disturbance. A decreased diatom to blue-green algae ratio (calculated by dividing the number of individuals in the Bacillariophyta by the number of individuals in the Bacillariophyta + Cyanophyta) is often indicative of nutrient enriched conditions. The determination of the Quantitative Stability Index (for taxonomic % composition) is a two step process. First, the relative proportions of major taxonomic groups are calculated for each site. Then, the lesser of the two percentages for each discrete taxonomic group is totaled. A QSI (% composition) of 100% means that the two sites being compared are identical. This same type of procedure is used for calculating the QSI (functional feeding groups).

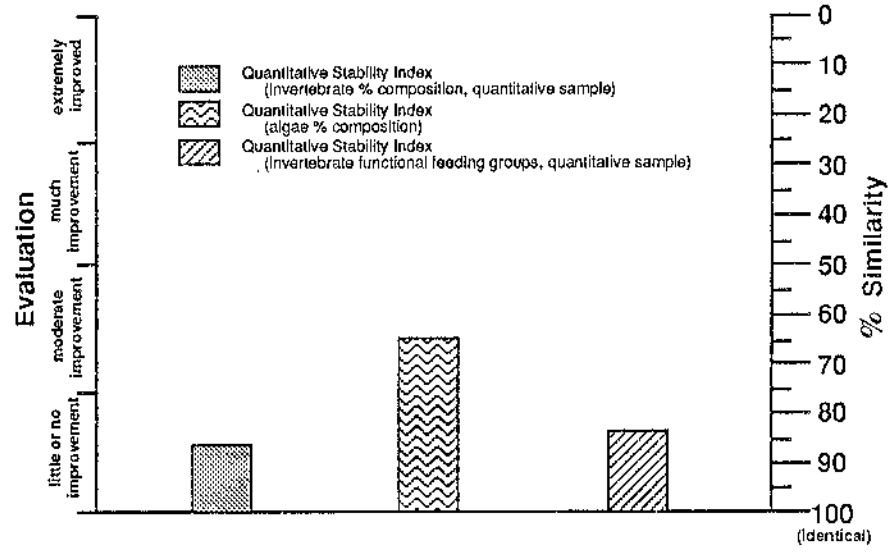
For graphical purposes, the percent differences between the reference and test sites involving the number of taxa, the diversity index, Florida Index and the diatom to blue-green algae ratio are measured as the reference site minus test site divided by the reference site. The percent differences between sites involving the percent contribution of dominant taxon and chlorophyll *a* are measured as the test site minus reference site divided by the reference site.

The following personnel were involved in this investigation: Pat Fricano, Peggy Morgan, Kathryn Hicks, Paula Noblitt, and Michelle Holton (DER Southwest District) and Lyn Burton, Russel Frydenborg, Kathleen Lurding, and Sandy McClure (Tallahassee Biology Laboratory).

Results and Discussion

Habitat quality was very similar at reference and test sites, with scores of 46 and 51, respectively. Both stations scored poorly with regard to bottom substrate characteristics, degree of channelization, and riparian zone vegetation quality. Water velocity was 0.66 m/s in both areas of Lake Lena Run, and dissolved oxygen was 7.8 mg/L and 6.6 mg/L at reference and test sites, respectively. Both sites were slightly above neutral in pH, and specific conductance was 219 µmhos/cm upstream and 227 µmhos/cm below Florida Distiller's outfall (Appendix). Although both areas scored the same for substrate characteristics, more varied habitat was available for sampling at the reference site, such as rock rubble, leaf packs, and undercut banks.

The static definitive acute bioassay showed no toxicity to *Ceriodaphnia dubia* (Appendix). Analysis for organic constituents revealed the presence of di-n-octyl phthalate at 5.5 µg/L. This concentration exceeds the Class III standard of 3 µg/L, a violation of 17-302.560(FAC). The following metals were detected in the effluent: aluminum (38 µg/L), iron (23 µg/L), and lead (1 µg/L). Although zinc was measured at 61 µg/L (which would be a violation of ambient standards and permit limits), a similar amount of zinc was found in the field blank, indicating sample contamination.



Effect of discharge on receiving stream
(measured as similarity between control and test sites).

With the exception of ammonia and nitrate-nitrite, most nutrient concentrations detected at both study sites were were typical of Florida streams. STORET data from 1617 Florida stream stations, for the period of 1980 to 1989, have been compiled into a percent distribution, found in the Appendix (Joe Hand, personal communication). Data from this present investigation were evaluated against these values. Total ammonia levels were a potential problem at reference (0.17 mg/L) and test (0.22 mg/L) sites, as they were higher than 74% and 83% of representative Florida streams, respectively. Nitrate-nitrite was also elevated at the downstream station, with 0.31 mg/L (80th percentile). Nutrient concentrations in Florida Distiller's effluent were lower than the above measured values at the study sites, suggesting other sources of enrichment in this system.

Total coliform bacteria were extremely high in the effluent, as well as at both study sites. Concentrations above 6000 organisms/100 ml were measured in waters from all three stations, violating ambient standards for Class III freshwaters. Conversely, fecal coliforms were below problem levels.

Both qualitative and quantitative measures of benthic macroinvertebrate community health indicated substantial improvements below the discharge (see table and figures). The figure on p. 2 indicates the degree of difference between the reference and test sites. Larger differences (that is, higher percentages) correspond with greater degrees of degradation. Negative values mean that the test site is better than the reference. The figure on p. 3 summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation.

Significant increases in taxa richness occurred between the reference and test sites for both macroinvertebrate data sets (see taxa lists in Appendix). Although both areas were strongly dominated by dipterans (particularly *Polypedilum illinoense*, which thrives in polluted conditions (Hudson *et al.* 1990)), a few somewhat pollution sensitive organisms such as the trichopteran, *Oecetis* sp., and the ephemeropteran, *Caenis* sp., were recovered from the test site. The Florida Index was higher at the test site, although it was far below what would be expected for an undisturbed system at both stations. The very poor Shannon-Weaver diversity exhibited by the reference site biota provided additional evidence that this site was more degraded than the test site. Quantitative stability indices for community structure and functional feeding groups show a small to moderate amount of improvement at the test site.

The periphyton community was slightly more degraded at the reference site, although the typical stream algal assemblage (dominated by diatoms) did not exist at either location. The cyanophyte filament, *Lyngbya* sp., and the chlorophyte, *Stigeocolonium* sp., made up 91% and 79% of the entire algal population at reference and test sites, respectively. Both of these organisms are considered pollution tolerant (Palmer 1960). The test site supported a few more types of organisms (see taxa list in Appendix) and was not as strongly dominated by *Lyngbya*, suggesting slightly improved conditions below the distillery outfall. Periphyton chlorophyll *a* was relatively high, 22.2 mg/m^2 and 23.8 mg/m^2 at reference and test sites, respectively. Given the abundant growth of *Lyngbya* and *Stigeocolonium* observed, these biomass levels are not surprising, and are higher than 83% of representative Florida streams (Appendix).

Conclusions

The sample of effluent collected from Florida Distillers Company was not toxic to *Ceriodaphnia dubia*, in the 48 hour static acute bioassay. The metals aluminum, iron, and lead were present in the sample, but concentrations were well below problem levels. Organics analysis revealed the presence of di-n-octyl phthalate at 5.5 µg/L, which is in violation of the 3 µg/L Class III standard (17-302.560 FAC).

Nutrient concentrations in the effluent were lower than those measured at the two study sites, suggesting sources of nutrients other than the discharge. Ammonia was moderately elevated at both stations in Lake Lena Run, and the nitrate-nitrite of 0.31 mg/L was higher than 80% of representative Florida streams. Concentrations of phosphorus containing compounds were in the 40-50% percentile range.

Total coliform concentrations were greater than 6000 organisms/100 ml in the effluent, the reference, and test sites. These levels are in violation of Class III standards, (FAC)17-302.560. Fecal coliforms were very low in all three of the above samples.

Although macroinvertebrate communities in both areas of Lake Lena Run were dominated by the pollution tolerant dipteran, *Polypedilum illinoense*, the benthic biota below the Florida Distiller's discharge appeared somewhat healthier. In-

creases in taxa richness, Shannon-Weaver diversity, and Florida Index occurred at the test site. A greater number of pollution sensitive trichopterans and ephemeropterans were found below the discharge.

The periphyton community was stressed both above and below the distillery discharge, and was composed of the blue-green filament, *Lyngbya* sp. and the green alga, *Stigeocolonium* sp. A lower number of taxa and greater dominance of *Lyngbya* indicate slightly worse conditions at the reference site. Periphyton chlorophyll *a* corresponded with the abundant algal growth, and was higher than 83% of typical Florida streams at both sites.

Literature Cited

American Public Health Assoc., American Water Works Assoc., and Water Pollution Control Federation. 1989. Standard Methods for the Examination of Water and Wastewater, 17th ed. New York, N.Y. 1268 p.

FDER. 1991. Biological assessment of Coca-Cola Foods, Auburndale, Polk County, NPDES #FL0000418. 59 p.

Hudson, P. L., D. R. Lenat, B. A. Caldwell, and D. Smith. 1990. Chironomidae of the Southeastern United States: A checklist of species and notes on biology, distribution, and habitat. U. S. Fish Wildl. Serv., Fish. Wildl. Res. 7. 46 p.

Palmer, C. M. 1960. Algae and other interference organisms in the waters of the south central United States. J. Amer. Water Works Assn. 52(7): 897-914.

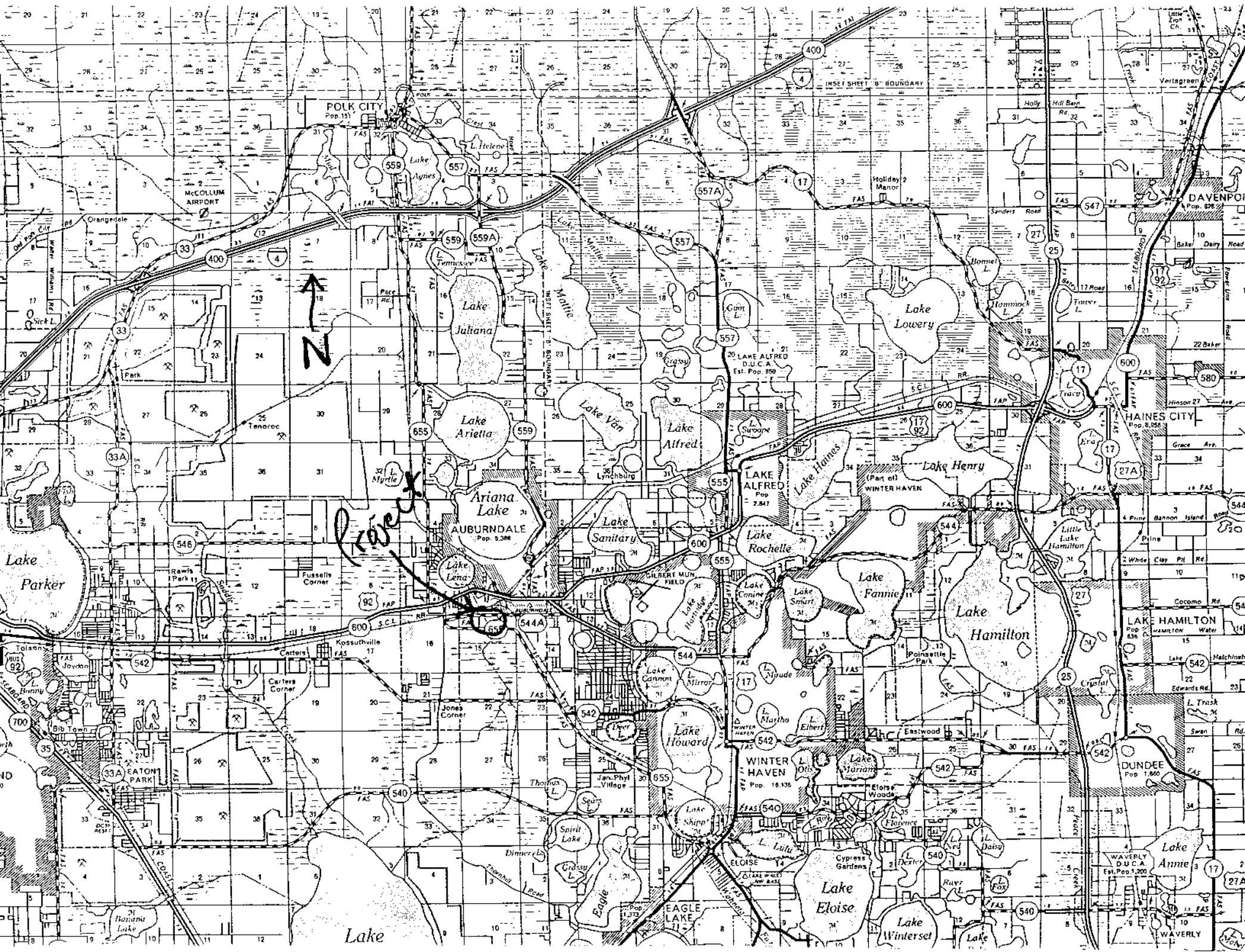
Ross, L. T. 1990. Methods for aquatic biology. Fla. Dept. Environ. Reg. Tech. Ser. 10(1): 1-47.

Weber, C. I. 1991. Methods for measuring the acute toxicity of effluents to freshwater and marine organisms. 4th edition. EPA/600/4-90/027. U. S. EPA, Cincinnati, Ohio. 216 p.

Chemistry summary table for

Florida Distillers	Effluent	Reference Site	Test Site
Organic Constituents (ug/L)			
Di-n-octyl phthalate	5.5 T		
Metals (ug/L)			
Aluminum	38 T		
Antimony	15 U		
Arsenic	20 U		
Cadmium	0.07 U		
Copper	5 U		
Chromium	10 U		
Iron	23 A		
Lead	1 T		
Mercury	0.1 U		
Nickel	5 U		
Selenium	1 U		
Silver	0.14 U		
Zinc (blank had 63)	61 A		
Nutrients (mg/L)			
Ortho-phosphorus	0.042 A	0.055 A	0.086 A
Total phosphorus	0.10 K	0.10 K	0.10
Ammonia	0.06 A	0.17 A	0.22 A
Nitrate+Nitrite	0.23 A	0.065 T	0.31 A
TKN	0.23 A	0.40	0.44
Other Parameters			
Habitat Assessment		46	51
D.O. (mg/L)	7.6	7.8	6.6
pH (SU's)	7.8	7.3	7.1
Conductivity (µmhos/cm)	225	219	227
Temperature (°C)	23.4	27.8	25.2
BOD (mg/L)	3.9		
TSS (mg/L)	3.0		
Bioassay Invertebrate	Not Toxic		
Fecal coliform (org/100 ml)	4	16	86
Total coliform (org/100 ml)	>6000	>6000	>6000

A - Value reported is the mean of two or more determinations
K - Actual value is known to be less than value given
T - Value reported is less than the practical quantitation limit
U - Material analyzed for but not detected; value reported is the min. detection limit


POLK CITY
Pop. 151
McCOLLUM AIRPORT
Orangedale
Lake Juliana
Lake Arietta
Lake Van
Lake Alfred
Lake Lowery
Lake Henry
Lake Haines
Lake Rochelle
Lake Fannie
Lake Hamilton
Lake Sanitary
Lake Howard
Lake Eloise
Lake Winterset
Lake Parker
Lake Annie
Lake Mattie
Lake Agnes
Lake Helene
Lake Tennessee
Lake Lena
Lake Ariana
Lake Myrtle
Lake Suzanne
Lake Gum
Lake Tracy
Lake Era
Lake Hummingbird
Lake Conine
Lake Smart
Lake Cannon
Lake Mirror
Lake Maude
Lake Martha
Lake Elbert
Lake Mariam
Lake Shipp
Lake Otis
Lake Lulu
Lake Fox
Lake Daisy
Lake Dexter
Lake Florence
Lake Hammock
Lake Bonnet
Lake Tower
Lake Crystal
Lake Trask
Lake Swan
Lake Little Hamilton
Lake Spirit
Lake Thonotosassa
Lake Eagle
Lake Banana
AUBURNDALE
Pop. 5,388
LAKE ALFRED
Pop. 2,847
(Part of) WINTER HAVEN
LAKE ALFRED D.U.C.A.
Est. Pop. 850
WINTER HAVEN
Pop. 18,635
LAKE HAMILTON
Pop. 636
HAINES CITY
Pop. 8,054
DUNDEE
Pop. 1,660
EAGLE LAKE
Pop. 1,373
WAVERLY
WAVERLY D.U.C.A.
Est. Pop. 1,200
DAVENPORT
Pop. 826
ELOISE
Lynchburg
Tenoroc
Fussells Corner
Kossuthville
Carters
Carters Corner
Jones Corner
Jan-Phyl Village
Eloise Woods
Cypress Gardens
Holiday Manor
Eastwood
Polnsettia Park
Rawls Park
Tolson
Bib Town
EATON PARK
GILBERT MUN. FIELD
INSET SHEET B BOUNDARY
INSET SHEET A BOUNDARY
N
Peace Creek
Saddle Creek
Thornhill Road
Old Polk City Rd.
Sanders Road
Baker Dairy Road
Hinson Ave.
Grace Ave.
Bannon Island Road
Cocoma Rd.
Edwards Rd.
Hillcrest Rd.
Holly Hill Barn Rd.
Vertsgreen
Little Zion Ch.
Powerline Road
SEABOARD
S.C.L.
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STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name:	Prepared by: Kathryn A. Hicks Date: 11-7-91	
Location (attach detailed map): 425 Recker Highway, Auburndale 28°03'30" 81°48'10"	County Polk	District Southwest - Tampa
Federal Permit # FL0[illegible] and expiration date: 10-31-91 Application to be submitted 11-92	State GMS # and HO53P20087 State expiration date: 8-12-92	Facility Type: (Industrial) Municipal Federal Agricultural Other (list):

Function of facility:
Alcoholic Beverage Distillery: wastewater treatment & disposal

Description of treatment process: Raw materials, such as fruit, grain, or cane molasses are mashed during water addition, pasteurized, fermented, concentrated, and subsequently distilled, blended, and bottled as product. The process bottoms are then evaporated, and the remaining residual is sold as fertilizer or animal feed. The liquid stream from the plant consists of evaporator condensate, cleaning water from the area drains and sanitary wastewater. In the treatment and disposal system, the water undergoes neutralization, flow equalization, aeration in two series-oriented lagoons, clarification with activated sludge recycle, chlorination and polishing pond aeration prior to being released through the Outfall 002 discharge weir with subsequent cascading into Lake Lena Run.

Receiving waters: Lake Lena Run	Classification: III
Design Flow: Unknown	Actual Mean Flow: 2.6 MGD

Discharge is: Continuous Intermittent (Seasonal) Rainfall dependent
Other (describe)

therefore, the best time to sample is: Nov. 15 - Jan. 31 (coincides with citrus season)

If facility has a mixing zone, give details (size, parameters affected, etc.):
N/A.

List effluent limits:

Parameter	Limit (units)
total nitrogen	5.0 mg/L/day Nov 1 - Mar 31: 22 mg/L (30 day avg) 44 mg/L/day Apr 1 - Oct 31: 13 mg/L (30 day avg) 26 mg/L/day
B.O.D.5	20/100 ml (monthly avg) 400/100 ml in 10%, 800/100 ml any day
Fecal coliform	1.0 mg/L (30 day avg) 2.0 mg/L/day
Total Ammonia	0.02 mg/L/day
Unionized Ammonia	6.0 daily minimum
pH	4.0 mg/L daily minimum
D.O.	0.05 mg/L/day
Zinc	1275 umhos/cm/day
Specific Conductivity	0.01 mg/L/day
Total Residual Chlorine	

Describe special permit conditions and permit modifications:
(#6) Pond B must have capacity to contain spills.

Permit modification 12-21-87. Changed Specific Conditions No. 3, 4, 5, 9, 12, 13, 14, 16, 22.

Florida Distillers (Jacquins)
(Facility)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Description of permitted outfall(s):
V-notch effluent weir and cascade aeration.

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: No specific temperature limit is set in permit, however, in April 1991 the discharge temperature was 93.1 °F.
Zinc .50 ug/l max in June 91'

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:
There are no present enforcement actions
This is the first IBI performed

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set:
Chemical analyses have not been performed by DER.
Fl. Distillers has had past problems with acute toxicity, however DER bioassay of Aug. 3, 1989 showed no acute toxicity. Bioassay results have been satisfactory since then

Additional information:

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y): 11/4/91	RECEIVING BODY OF WATER: Lake Lena Run

REMARKS: Many fish seen incl. Gambusia affinis + Poecilia latipinna.	LOCATION: Jacquins - Florida Distillers - Upstream	FIELD ID/NAME: Station 001

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 8	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs, undercut banks, rubble, or other stable habitat. **23-30 points**	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. **16-22 points**	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat. **8-15 points**	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious. **0-7 points**
Water Velocity 25	Max. observed; >0.3 m/sec. **23-30 points**	Max. observed; 0.1 to 0.3 m/sec **16-22 points**	Max. observed; 0.05 to 0.1 m/sec **8-15 points**	Max. observed; <0.05 m/sec **0-7 points**
Artificial Channel/ Flow Alteration 4	No artificial channelization. Little activity (impervious surface) in watershed which would cause scouring during spates. **12-15 points**	—	—	Artificially channelized, or scouring present during spates because of excess impervious surface in watershed. **0-3 points**
Bank Stability 6	Stable. No evidence of erosion or bank failure. Little potential for future problems. **9-10 points**	Moderately stable. Infrequent or small areas of erosion, mostly healed over. **6-8 points**	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. **3-5 points**	Unstable. Many raw, eroded areas. Obvious bank sloughing. **0-2 points**
Riparian Zone Vegetation Quality 3	Over 80% of streambank surfaces consist of native plants, classified as: bottomland hardwoods, understory shrubs, or non-woody macrophytes. **9-10 points**	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. **6-8 points**	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. **3-5 points**	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture) present. **0-2 points**

Adjustments —	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	**TOTAL SCORE** 46

COMMENTS: Colocasia esculenta, Ludwigia sp., Hydrocotyl sp., Brachiaria mutica + Castor bean (Ricinus sp) = Dominant vegetation present.

ANALYSIS DATE: 11/4/91	ANALYST: P. Ficano	SIGNATURE: Pat Ficano

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME: SW. District	STORET STATION NUMBER:	DATE (M/D/Y): 11/4/91	RECEIVING BODY OF WATER: Lake Lena Run

REMARKS: Not much submerged vegetation in middle. Only on sides of creek (2, 4, 6).	LOCATION: Jacquins-Florida Distillers Downstream	FIELD ID/NAME: Station 002

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 8	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs, undercut banks, rubble, or other stable habitat. **23-30 points**	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. **16-22 points**	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat. **8-15 points**	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious. **0-7 points**
Water Velocity 25	Max. observed; >0.3 m/sec. **23-30 points**	Max. observed; 0.1 to 0.3 m/sec **16-22 points**	Max. observed; 0.05 to 0.1 m/sec **8-15 points**	Max. observed; <0.05 m/sec **0-7 points**
Artificial Channel/ Flow Alteration 4	No artificial channelization. Little activity (impervious surface) in watershed which would cause scouring during spates. **12-15 points**	—	—	Artificially channelized, or scouring present during spates because of excess impervious surface in watershed. **0-3 points**
Bank Stability 6	Stable. No evidence of erosion or bank failure. Little potential for future problems. **9-10 points**	Moderately stable. Infrequent or small areas of erosion, mostly healed over. **6-8 points**	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. **3-5 points**	Unstable. Many raw, eroded areas. Obvious bank sloughing. **0-2 points**
Riparian Zone Vegetation Quality 3	Over 80% of streambank surfaces consist of native plants, classified as: bottomland hardwoods, understory shrubs, or non-woody macrophytes. **9-10 points**	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. **6-8 points**	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. **3-5 points**	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture) present. **0-2 points**

Adjustments 5	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	**TOTAL SCORE** 51

COMMENTS: Plant Species seen include Colocasia esculenta, Ludwigia sp., Panicum sp., Hydrilla a little Sawgrass + alot of Castor Bean.

ANALYSIS DATE: 11/4/91	ANALYST: P. Fricano	SIGNATURE: Pat Fricano

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
		11/4/91	1:30 PM	Lake Lena Run

REMARKS:	LOCATION:	FIELD ID/NAME:
No vegetation in middle. Only on sides of creek-ditch	Jacquenot - Florida Distillers (Upstream (Lake Lena Run)	Station 001

RIPARIAN ZONE/INSTREAM FEATURES

Predominant Surrounding Land-Use (specify relative percent in each category):

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
					100%	

Local Watershed Erosion (check box): None ☑ Moderate ☐ Heavy ☐

Local Watershed NPS Pollution (check box): No evidence ☐ Some potential sources ☐ Obvious sources ☑

Point-Source Pollution (list location and describe): Coca Cola Auburndale - Immediately Upstream

Estimated Stream Width (range, m): 3	Estimated Stream Depth (range, m): .3		yes
High Water Mark (m above bed): 1	Velocity (range, m/s): 0.66	Impounded ☐ Channelized ☑	

Canopy Cover % (check box): Open: ☑ Lightly Shaded: ☐ Moderately Shaded: ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☑ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☐

Sediment Oils: Absent: ☑ Slight: ☐ Moderate: ☐ Profuse: ☐

Sediment Deposits: Sludge: ☐ Paper Fiber: ☐ Mud: ☑ Sand: ☑ Shell: ☑ Other: ☐

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Rock or Shell Rubble	1	1	Direct	Woody Debris (Snags)			
Aquatic Vegetation	40	10	"	Leaf Packs/Roots	1	1	Direct
Sand	50	4	"	Undercut Banks	8	4	"
Other:				Mud/Muck			

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top	27.8	7.3	Secchi Depth (m):	
Mid-depth	—	—	pH (SU):	7.23
Bottom	—	—	Conductivity (µmho/cm):	219
			Other Parameters:	Salinity 0

Stream Type (check box): Blackwater: ☐ Deep Aquifer Fed: ☐ Surficial Aquifer Fed: ☐ Alluvial: ☐ Other: ☑ Effluent

Water Odors (check box): Normal: ☑ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☐

Water Surface Oils (check box): Slick: ☐ Sheen: ☐ Globs: ☐ None: ☑

Clarity (check box): Clear: ☑ Slightly turbid: ☐ Turbid: ☐ Opaque: ☐

Color (check box): Tannic: ☐ Green (algae): ☐ Clear: ☑ Other: ☐

Weather Conditions: Cloudy - 65°

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☑	☐	☐	☐
Fish	☐	☑	☐	☐
Aquatic Macrophytes	☐	☐	☑	☐
Iron/sulfur Bacteria	☐	☐	☐	☑

ANALYSIS DATE:	ANALYST:	SIGNATURE:
11/4/91	P. Fricano	Pat Fricano

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
		11/4/91	11:35	Lake Lena Run

REMARKS:	LOCATION:	FIELD ID/NAME:
Only fish seen were Gambusia affinis. Ducks also seen near P.O.D. # Tricolor Heron.	Jacquins - Florida Distillers Downstream	Station 002

RIPARIAN ZONE/INSTREAM FEATURES

Predominant Surrounding Land-Use (specify relative percent in each category):

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
					100%	

Local Watershed Erosion (check box): None ☐ Moderate ☑ Heavy ☐

Local Watershed NPS Pollution (check box): No evidence ☐ Some potential sources ☐ Obvious sources ☑

Point-Source Pollution (list location and describe): Jacquins Distillery
Coca Cola Auburndale

Estimated Stream Width (range, m): 5	Estimated Stream Depth (range, m): 1	yes
High Water Mark (m above bed): 1	Velocity (range, m/s): 0.66	Impounded ☐ Channelized ☑

Canopy Cover % (check box): Open: ☑ Lightly Shaded: ☐ Moderately Shaded: ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☑ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☑ H_2S

Sediment Oils: Absent: ☐ Slight: ☑ Moderate: ☐ Profuse: ☐

Sediment Deposits: Sludge: ☐ Paper Fiber: ☐ Mud: ☑ Sand: ☑ Shell: ☐ Other: ☐

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Rock or Shell Rubble				Woody Debris (Snags)			
Aquatic Vegetation	25	14	dip net	Leaf Packs/Roots			
Sand	75	6	"	Undercut Banks			
Other:				Mud/Muck			

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top	25.2	6.6	Secchi Depth (m): bottom	2.5'
Mid-depth	25.2	6.7	pH (SU):	7.8
Bottom	25.2	6.1	Conductivity (µmho/cm):	227
			Other Parameters: Salinity 0	

Stream Type (check box): Blackwater: ☐ Deep Aquifer Fed: ☐ Surficial Aquifer Fed: ☐ Alluvial: ☐ Other: ☑ Effluent

Water Odors (check box): Normal: ☑ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☐

Water Surface Oils (check box): Slick: ☐ Sheen: ☐ Globs: ☐ None: ☑

Clarity (check box): Clear: ☑ Slightly turbid: ☐ Turbid: ☐ Opaque: ☐

Color (check box): Tannic: ☐ Green (algae): ☐ Clear: ☑ Other: ☐

Weather Conditions: Cloudy 65°

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☐	☑	☐	☐
Fish	☐	☑	☐	☐
Aquatic Macrophytes	☐	☐	☑	☐
Iron/sulfur Bacteria	☑	☐	☐	☐

ANALYSIS DATE:	ANALYST:	SIGNATURE:
11/4/91	P. FRICANO	Pat Fricano

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: JACQUIN FL DISTILLERS
Address/City:
County: POLK
Contact/District: PAT FRICANO / SW
NPDES Permit #: FL0003051 Outfall #:

Sample Collection: Date 11/4/91 Time 1000
Test Beginning: Date 11/5/91 Time 1400
Test Ending: Date 11/7/91 Time 1400
Test Organism: C. DUBIA
Life Stage/Age: <24 HRS

Test Number: 1 of 1 Test Type: Screening (Definitive) (Static) Static Renewal | Flow-through

Remarks:

25203 91-NOV-05-12-04

BIOLOGY Matrix: W-EFFLUENT
Date Collected: 4-NOV-1991 10:00
Field ID:
BSY-DF-ACT

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7@7,9@9	8.8@22.0	22.0@21.6	1323@21.8
24 hr	7@7,9@9	8.7@23.0	22.7@22.4	1347@22.8
48 hr	7@7,9@9	8.8@22.0	22.0@22.3	1353@23.1

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	DO (mg/L) 0	24	48	Cond. (µmhos/cm) 0	24	48
control	A	5	5	5	8.3		8.0	~~20.7~~		23.0	8.2		8.8	131		154
control	B	5	5	5			8.1	21.3					8.9			148
control	C	5	5	3			8.1	CHANGED INCUBATOR RM 1/5					9.0			
control	D	5	5	5			8.1						9.1			
25%	A	5	5	6	8.3		8.1	20.7		23.0	8.2		9.0	154		166
25%	B	5	5	6			8.3						9.1			
25%	C	5	5	5			8.3						9.2			
25%	D	5	5	5			8.3						9.1			
50%	A	5	6	5	8.2		8.5	20.7		22.8	8.3		9.2	170		203
50%	B	5	5	5			8.5						9.3			
50%	C	5	6	5			8.5						9.3			
50%	D	5	5	6			8.5						9.4			
75%	A	5	5	6	8.2		8.6	20.2		22.8	8.3		9.5	190		231
75%	B	5	6	4			8.6						9.5			
75%	C	5	6	6			8.6						9.5			
75%	D	5	6	5			8.6						9.4			
100%	A	5	6	4	8.2		8.7	20.0		22.9	8.4		9.4	213		265
100%	B	5	5	5			8.7						9.4			
100%	C	5	5	4			8.7						9.4			
100%	D	5	4	5			8.7						9.4			
Measured/Loaded by:		AJ	KP	KP	VS		VS	ER		VS	ER		VS	VS		VS
Recorded by:		KP	KP	KP	ER		ER	VS		ER	VS		ER	ER		ER

number of organisms originally loaded was verified under a dissecting scope. Number present at 24+48hrs, therefore, represent young from organisms which were not the proper age at test initiation. K Pearce 11/7

Investigators' Signatures

Kim Pearce
Elena Rodriguez HRS
Laurie Jadick HRS

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			not measured		
Lab Tot. Resid. Cl2:		0.0	0.0	Hach	MF
Alkalinity:		57	120	HACH	AJ
Hardness:		75	125	Hach	AJ
Total Ammonia:					

Ammonia Meter Slope: _____ Ammonia Blank: _____ Salinity Sample: _____ ppt

Typical Values for Selected Parameters in Florida Waters

Adapted from Joe Hand, FDER, personal communication, 1991
(data was collected between 1980 and 1989)

Percentile Distribution

Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%
STREAMS (1617 stations)											
Phytoplankton Chlorophyll *a*	0.22	0.52	0.94	1.60	3.02	4.63	6.72	9.87	14.68	27.35	48.70
Periphyton Chlorophyll *a*	0.31	0.43	0.77	1.04	2.16	2.94	6.45	10.51	17.00	39.51	60.85
H-D Diversity	0.84	2.12	2.48	2.74	2.88	3.09	3.25	3.40	3.52	3.76	3.90
Qualitative Taxa Richness	9.00	12.00	17.00	20.00	22.00	24.50	26.00	28.00	31.00	37.00	53.00
H-D Taxa Richness	6.00	6.50	9.00	11.50	13.00	15.00	17.00	21.50	26.00	29.00	32.00
TKN	0.30	0.39	0.56	0.73	0.87	1.00	1.11	1.26	1.49	1.93	2.80
Ammonia	0.02	0.02	0.04	0.05	0.06	0.08	0.11	0.14	0.20	0.34	0.60
NO2-NO3	0.01	0.01	0.03	0.05	0.07	0.10	0.14	0.20	0.32	0.64	1.05
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	0.18	0.25	0.39	0.74	1.51
Ortho Phosphorus	0.01	0.01	0.03	0.04	0.05	0.08	0.11	0.17	0.27	0.59	1.37
Turbidity	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	10.45	16.30
LAKES (477 stations)											
Phytoplankton Chlorophyll *a*	0.80	1.71	2.88	4.28	10.06	13.40	20.00	30.10	47.20	65.44	113.90
Dredge Diversity	0.71	0.97	1.43	1.74	1.98	2.12	2.21	2.59	2.85	3.15	3.17
Dredge Taxa Richness	3.00	5.00	6.50	7.00	9.00	10.00	11.00	13.00	15.00	17.00	21.00
TKN	0.36	0.49	0.67	0.83	1.08	1.26	1.40	1.51	1.68	2.11	3.46
NH3+NH4	0.01	0.02	0.02	0.03	0.04	0.06	0.08	0.12	0.15	0.21	0.28
NO2-NO3	0.00	0.00	0.01	0.01	0.01	0.02	0.04	0.05	0.10	0.14	0.23
Total Phosphorus	0.01	0.02	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.23	0.42
Ortho-Phosphorus	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.08	0.21	0.32
Turbidity	1.00	1.25	1.55	2.05	2.75	4.50	6.45	9.60	14.10	26.00	40.00
ESTUARIES (690 stations)											
Phytoplankton Chlorophyll *a*	2.14	3.28	4.49	5.13	6.00	6.93	7.94	9.60	12.40	17.60	22.20
Dredge Diversity	1.34	1.53	1.91	2.28	2.56	2.90	3.15	3.59	4.01	4.53	4.98
Dredge Taxa Richness	4.00	6.00	9.00	11.00	15.00	18.50	25.00	35.00	41.00	62.00	90.00
TKN	0.26	0.34	0.42	0.50	0.59	0.69	0.76	0.82	0.95	1.30	1.49
NH3+NH4	0.01	0.02	0.03	0.04	0.05	0.06	0.08	0.09	0.13	0.22	0.28
NO2-NO3	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.05	0.08	0.17	0.23
Total Phosphorus	0.01	0.02	0.06	0.07	0.10	0.11	0.14	0.17	0.23	0.43	0.59
Ortho-Phosphorus	0.01	0.02	0.03	0.04	0.04	0.05	0.07	0.09	0.12	0.21	0.44
Turbidity	3.50	4.00	4.50	5.05	5.40	5.60	6.30	6.80	8.00	11.40	11.75

Units:
Phytoplankton Chlorophyll *a* (ug/L), Periphyton Chlorophyll *a* (mg/m^2), Nutrients (mg/L), Turbidity (NTU), Taxa richness and diversity values are for macroinvertebrates

Macroinvertebrate taxa list for Florida Distillers, Polk County, collected via Hester-Dendy multiplate samplers in Lake Lena Run on 2 December 1991.

	Reference Site	Test Site
Diptera		
Ablabesmyia rhamphe grp.	–	4
Asheum beckae	111	258
Chironomus decorus grp.	2085	18
Glyptotendipes lobiferus	–	139
G. paripes	–	2
Goeldichironomus amazonicus	–	20
G. carus	63	9
G. holoprasinus	65	31
Kiefferulus dux	–	20
Larsia decolorata	–	5
Polypedilum illinoense	8157	286
Tanytarsus sp.	–	5
Undetermined dipteran pupa	299	14
Ephemeroptera		
Caenis sp.	–	19
Gastropoda		
Hebetancyclus excentricus	–	1
Melanoides tuberculata	73	71
Planorbella duryi	–	1
Hirudinea		
Batracobdella paludosa	–	5
Helobdella stagnalis	65	–
Undetermined hirudinean	–	1
Malacostraca		
Hyalella azteca	–	35
Odonata		
Ischnura ramburii	32	6
Trichoptera		
Oecetis sp.	–	3

Macroinvertebrate taxa list for Florida Distillers, Polk County, collected via discrete dip net sweeps in Lake Lena Run on 4 November 1991.

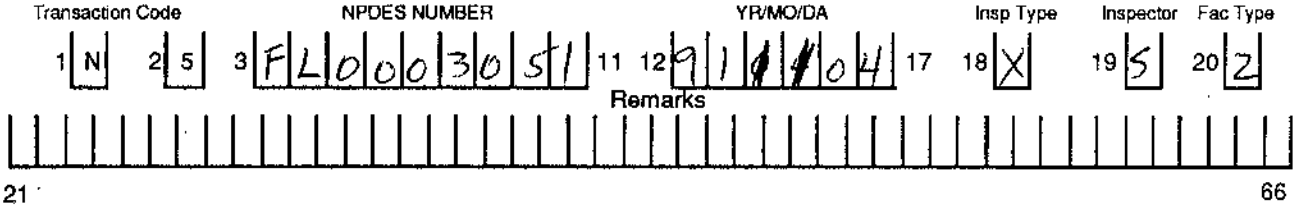
	Reference Site	Test Site
Coleoptera		
Dineutus sp.	1	–
Hydrobiomorpha casta	–	1
Peltodytes sexmaculata	3	6
Suphisellus sp.	–	1
Diptera		
Ablabesmyia rhamphe grp.	96	–
Asheum beckae	–	176
Chironomus decorus grp.	624	48
Cladotanytarsus sp.	–	16
Cryptochironomus sp.	48	48
Glyptotendipes paripes	–	16
Goeldichironomus amazonicus	48	96
G. holoprasinus	48	192
Monopelopia boliekae	–	32
Odontomyia sp.	–	112
Polypedilum convictum	–	48
P. illinoense	4320	2048
Undetermined canaceid	–	16
Undetermined pupa	–	112
Undetermined tipulid	–	16
Ephemeroptera		
Caenis sp.	–	1
Gastropoda		
Gyraulus parvus	–	1
Melanoides tuberculata	26	436
Physella sp.	–	1
Planorbella duryi	–	1
Pseudosuccinea columella	–	1
Hemiptera		
Abedus sp.	–	6
Belostoma sp.	5	26
Hydrometra sp.	1	–
Mesovelia sp.	1	6
Ranatra australis	–	8
R. buenoi	–	2
Hirudinea		
Mooreobdella tetragon	–	4
Lepidoptera		
Parapoynx sp.	–	9
Malacostraca		
Hyalella azteca	–	104
Procambarus sp.	2	–

P. fallax	–	2
Odonata		
Anax junius	3	3
Enallagma signatum	1	–
Ischnura ramburii	138	122
Libellula incesta	–	1
Orthemis ferruginea	2	–
Pachydiplax longipennis	1	3
Trichoptera		
Oecetis sp.	–	1

Periphyton taxa list for Florida Distillers, Polk County, collected in Lake Lena Run on 2 December 1991.

	Reference Site	Test Site
Diatoms		
Achnanthes exigua	60	383
A. hungarica	40	26
A. hustedtii	60	77
A. linearis	–	26
Anomoeoneis sp.	–	77
Cyclotella sp.	–	26
C. meneghiniana	20	–
Eunotia sp.	20	–
Gomphonema parvulum	20	77
Navicula minima	120	77
N. rhynchocephala	20	–
Nitzschia amphibia	–	51
N. palea	20	26
Chlorophyta		
Characium sp.	–	128
Chlamydomonas sp.	20	–
Gloeocystis sp.	–	26
Scenedesmus sp.	–	26
Stigeocolonium sp.	519	1709
Cyanophyta		
Aphanocapsa sp.	–	26
Chroococcus sp.	220	102
Gloeocapsa sp.	20	–
Lyngbya sp.	6028	2755
Microcystis sp.	–	26
Spirulina sp.	20	–

Fill Out This Section For All Surface Water Discharger Inspections (CEI, CSI, CBI, PAI, XSI - RI Optional)



Fill Out This Section For All Surface Water Discharger Inspections (CEI, CSI, CBI, PAI, XSI - RI Optional)

