

Biological Assessment of

Indian River Foods, Inc.

St. Lucie County

NPDES #FL0001783

Sampled January 1993

June 1993

Biology Section
Division of Technical Services

Department of Environmental Regulation
Results of Fifth Year Inspections

Discharger: Indian River Foods, Inc.
County: St. Lucie
NPDES Number: FL0001783
State Permit Expiration Date: 1 November 1993

Toxics Sampling Inspection (XSI)

Date Sampled: 13 January 1993

Results: Pesticides detected at the Tenmile Creek study sites included bromacil, simazine, malathion, metalaxyl, ethion, and norflurazon, but none were found in the test well (MW-11) down-gradient of the facility and closest to Tenmile Creek. Water quality standards are established only for one of the compounds detected (malathion, at 0.1 µg/L). The concentrations of malathion measured in Ten Mile Creek exceeded this standard (0.13 µg/L and 0.16 µg/L). However, because these levels were below the practical quantitation limit for malathion, the standard for regulatory purposes is subsequently set at the minimum detection limit (0.06 µg/L). Therefore, while these results are cause for concern, they do not indicate violations for malathion. The source of these pesticides may be runoff from the surrounding citrus groves and not necessarily from the food processing facility. Aluminum, iron, copper, and zinc were found at the various sampling locations, but all concentrations were within water quality standards.

Compliance Biomonitoring Inspection (CBI)

Results: Not sampled.

Impact Bioassessment Inspection (IBI)

Date Sampled: 12 January 1993

Results: Macroinvertebrate communities appeared stressed at both Tenmile Creek stations, but the test site generally appeared to be better than the reference site. Shannon-Weaver diversity and the Florida Index values were unusually depressed at both stations, indicating that conditions were inhospitable to pollution sensitive taxa throughout Tenmile Creek. The phytoplankton community at both stations was dominated by *Scenedesmus* sp., an organism typical of eutrophic waters. However, chlorophyll *a* was very low, indicating no algal blooms at the present time. Considering the elevated nutrients and AGP in Tenmile Creek, the algal community did not appear to be as affected as one might expect. Probably the high flow and moderate temperatures reduced problems with phytoplankton growth during the time of this survey. When conditions become more stagnant or warmer, there is a potential for algal related problems.

Water Quality Inspection (WQI)

Date Sampled: 12 January 1993

Results: Total phosphorus, ortho-phosphate, and nitrate-nitrite in both Tenmile Creek stations were higher than approximately 80% of other Florida streams. Ammonia, which was very elevated in the groundwater sample, was not abnormally high in receiving water samples. The AGP measured at the reference site and the test site both exceeded the 5 mg dry wt/L, "problem threshold". Agricultural operations in the area probably contributed to these elevated levels of nutrients and AGP in Tenmile Creek.

Introduction

Indian River Foods, Inc., located in St. Lucie County, Florida, is a citrus processing facility, producing juice and other citrus by-products (see maps in Appendix). Operation of the facility is seasonal, normally from November to June. Wastewater streams are collected and pumped to the wastewater treatment system, consisting of aeration, clarification, and retention in storage ponds. Sludge from the clarifier is recycled for cattle feed production. The facility spray irrigates wastewater from the storage ponds to a 145 acre citrus grove. Discharge to the Class III waters of Tenmile Creek, a tributary of the North Fork of the St. Lucie River, is prohibited except under wet weather conditions. The facility has not discharged effluent to surface waters for several years.

Should a discharge to Tenmile Creek become necessary during wet weather, several specific conditions apply. At least one day prior to the discharge and on each day of the discharge, pH, specific conductance, temperature, and dissolved oxygen must be monitored at two stations in Tenmile Creek. Total suspended solids and BOD must also be monitored on a weekly basis during discharge events. Discharge is allowed only if dissolved oxygen is above 5.7 mg/L at both Tenmile Creek sampling locations. The amount of BOD loading permitted to Tenmile Creek is dependent upon flow in the stream, ranging from 243 lbs/day at 28 cfs to 0 of lbs/day at 13 cfs (see Appendix). Toxicity testing is also required during discharge. Several other specific conditions involving the monitoring of wastewater, ground water, and ambient conditions in receiving waters are shown in the Appendix.

Major characteristics of community structure of control and test sites.

	Control Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	30	32
Florida Index	5	3
% Contribution of Dominant Taxon	17.6	11.6
% Oligochaeta	8.8	25.0
% Diptera	42.4	33.1
% Malacostraca	23.2	19.2
% Gastropoda	6.4	12.8
% Hemiptera	11.2	1.2
% Pelecypoda	3.2	1.7
% Other	4.8	4.6
% Predators/ Carnivores	24.3	11.1
% Deposit feeders (above surface)/ Collector-Gatherers	35.0	23.3
% Deposit feeders (below surface)	9.3	26.1
% Suspension feeders/ Collector-Filterers	7.6	5.8
% Scavengers	0	0.4
% Plant piercers	0.9	0.8
% Scrapers	6.8	14.5
% Shredders	11.1	8.1
% Borers	5.1	9.7
% Parasites	0	0.2
Macroinvertebrate Hester-Dendy		
Number of Taxa	9	24
Florida Index	1	2
Shannon-Weaver Diversity	0.4	1.1
% Oligochaeta	0.2	1.8
% Diptera	2.9	8.8
% Malacostraca	96.9	89.3
% Odonata	0	0.1
% Predators/ Carnivores	0.8	0.9
% Deposit feeders (above surface)/ Collector-Gatherers	95.8	92.8
% Deposit feeders (below surface)	0.2	1.8
% Suspension feeders/ Collector-Filterers	0.3	1.8
% Shredders	0.8	0.9
% Borers	2.1	1.8
Phytoplankton Algae		
Number of Taxa	16	16
% Contribution of Dominant Taxon	15.6	20.0
Chlorophyll a (mg/sq. m)	<0.55	<0.55
Diatom/Diatom + B-G Abundance Ratio	0.5	0.27
% Blue-green	18.8	31.4
% Green	53.1	48.6
% Diatoms	18.8	11.4
% Euglenophyta	6.2	8.6
% Pyrrophyta	3.4	0
Algal Growth Potential (mg dry wt/L)	19.9	25.0

The facility has a history of violations of Florida Statutes, Department Rules, and permit conditions. These include exceeding production and disposal rates, failure to report monitoring data, and construction/modification of the plant without a permit. Enforcement actions are ongoing.

Methods

The focus of this investigation was to determine the discharger's effects on the receiving waters. Although the facility has not discharged for several years, and was not discharging during this study, it is possible that leachate from spray fields or holding ponds may have affected nearby Tenmile Creek. A comparison of biological community health was made between a reference site (located upstream of the plant in Tenmile Creek) and a test site (downstream of the discharge point) (see maps in Appendix). A habitat assessment was performed in situ to establish comparability between sites. Supplemental physical/chemical data were also collected on groundwater monitoring wells and study sites. Compliance well #MW-11, the monitoring well down-gradient of facility and closest to Tenmile Creek, was used to represent potential effects of the leachate on receiving waters. Well MW-11 and both study sites were analyzed for metals and for organic constituents (base neutral and acid extractables, and pesticide extractables). Additionally, nutrient analyses were performed on MW-11, as well as 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). Phytoplankton was sampled via subsurface grabs. Chlorophyll *a* was also determined for phytoplankton communities (Ross 1990). Algal growth potential tests, using *Selenastrum capricornutum* as the test organism, followed Miller *et al.* (1978).

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, chlorophyll *a*, and algal growth potential are measured as the test site minus reference site divided by the reference site.

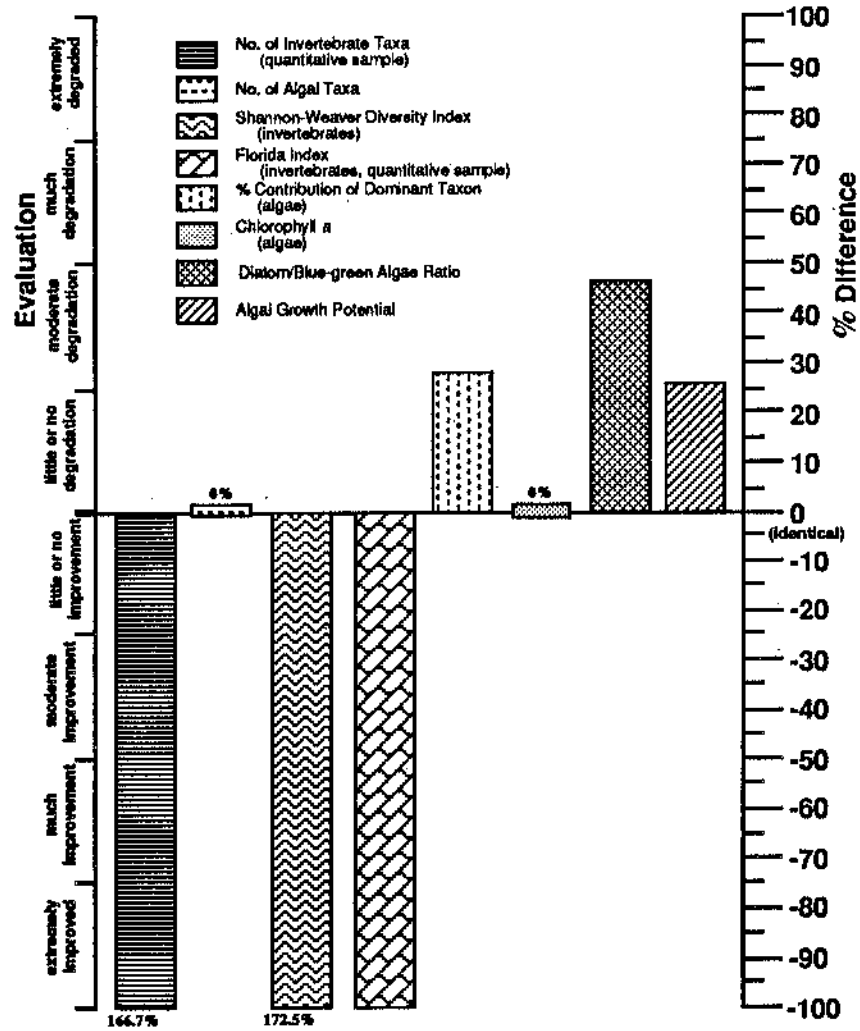
The following personnel were involved in this investigation: Doug Strom and Jeff Christian (DER Southeast District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Kathleen Lurding, Kim Pearce, Urania Quintana, Landon Ross, and Greg Wynn (Tallahassee Biology Laboratory). The report was reviewed by the Point Source Bioassessment Review Committee, consisting of Jan Mandrup-Poulsen, Wayne Magley, and Mike Tanski, as well as District representatives.

Results and Discussion

Tenmile Creek is a channelized stream which is tidally influenced due to its proximity to estuarine conditions. Habitat quality at the refer-

ence and test sites was similar, with scores of 50 and 53, respectively (Appendix). Land use in the area is predominantly agricultural and residential, with additional industrial influences at the test site. An old landfill is located several miles upstream of the reference site. Water in Tenmile Creek flows over a control stucture which is approximately 5 miles upstream of the study area. Both stations scored fairly well for water velocity (which was 0.2 m/sec) and substrate (25% of the stream had suitable substrate, such as snags, leaf packs, and roots). Dissolved oxygen at both sites was adequate, 6.4 mg/L at the reference site and 6.5 mg/L at the test site. Both stations were neutral in pH (7.0). Surface conductivity was the same at the two sampling locations (840 µmhos/cm) (Appendix).

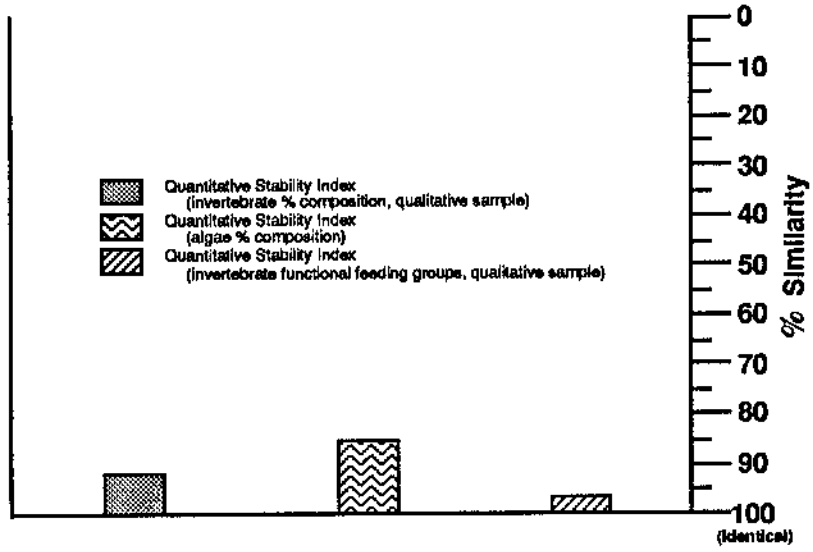
Organic constituents detected at the study sites included bromacil (2.9 µg/L at both), simazine (0.17 µg/L at both), malathion (0.13 µg/L at the reference site, 0.16 µg/L at the test site), metalaxyl (0.52 µg/L at the reference site, 0.50 µg/L at the test site), ethion (0.078 µg/L at both), and norflurazon (1.8 µg/L at both). Water quality standards are established only for one of the compounds detected (malathion, at 0.1 µg/L). The concentrations of malathion measured in Ten Mile Creek exceeded this standard (0.13 µg/L and 0.16 µg/L). However, because these levels were below the practical quantitation limit for malathion, the standard for regulatory purposes is subsequently set at the minimum detection limit (0.06 µg/L). Therefore, while these results are cause for concern, they do not indicate violations for malathion. It should be noted that no organics or pesticides were found in the ground water (MW-11) sample. This suggests that the source of these compounds may be runoff from the surrounding citrus groves and not necessarily from the food processing facility.



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

Aluminum (107 µg/L at the reference site, 90 µg/L at the test site), iron (8830 µg/L in MW-11, 642 µg/L at the reference site, 644 µg/L at the test site), copper (3.4 µg/L in MW-11, 12 µg/L at the reference site, 12 µg/L at the test site), and zinc (19 µg/L in MW-11, 11 µg/L at the reference site, 14 µg/L at the test site) were also found at the various sampling locations at levels above detection limits. These concentrations of metals were within water quality standards.

Both the reference site and the test site had concentrations of total phosphorus (above 0.30 mg/L), orthophosphorus (above 0.26 mg/L), and nitrate-nitrite (above 0.36 mg/L) which were higher than approximately 80% of other Florida streams (see table of typical water quality parameters in Appendix). Ammonia, which was very elevated in the groundwater MW-11 sample (34 mg/L), was not abnormally high (below 0.087 mg/L) in receiving water samples. Nitrate-nitrite was undetected in the MW-11 monitoring well sample. Agricultural operations in the area probably contributed to these somewhat elevated levels of nutrients in Tenmile Creek.



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

Results of algal growth potential tests indicated that waters in Tenmile Creek may be subject to eutrophication effects. The AGP measured at the reference site (19.9 mg dry wt/L) and the test site (25.0 mg dry wt/L) both exceeded the 5 mg dry wt/L, "problem threshold". This is the level above which the negative consequences associated with nutrient enrichment (D.O. depletion, algal blooms, fish kills) are probable (Raschke and Schultz 1987). With no direct discharge from the Indian River Foods facility in years, nonpoint sources are again implicated.

Certain measures of benthic macroinvertebrate community health indicated stressed conditions at both Tenmile Creek stations. The test site, however, generally appeared to be better than the reference site. The figure on p. 3 indicates the degree of difference between the reference and test sites. Larger differences (that is, higher percentages) correspond with greater degrees of degradation.

Shannon-Weaver diversity was 0.4 at the reference site and 1.1 at the test site. Both of these values are unusually depressed, being lower than approximately 95% of typical Florida streams. Florida Index was also lower than expected at both sites, which should be 15 points at a minimum for flowing streams in south Florida. In the Hester-Dendy samples, the reference site received 1 Florida Index point, while the test site received 2 points. In dip net samples, Florida index was reduced from 5 points at the reference site to 3 points at the test site. This indicates that conditions were inhospitable to pollution sensitive taxa throughout Tenmile Creek. In dip net samples, taxa richness was acceptable, with 30 taxa at the reference site and 32 taxa at the test site. Taxa richness improved dramatically downstream of the facility in the Hester-Dendy samples, from 9 at the reference to 24 at the test site.

The figure on this page summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation. In this particular case, the macroinvertebrate percent composition at the two sites was very similar. Hester-Dendy samples showed that the macroinvertebrate assemblage, both above and below the discharge, was composed almost entirely of malacostracans (mostly *Gammarus tigrinus*), causing the QSI for percent composition to be 92.4%. Not surprisingly, the QSI for functional feeding groups also indicated that the two sites were very similar.

The phytoplankton community was relatively similar at the two stations. Both sites had the same number of taxa (16) and the same biomass (less than 0.55 µg/L of chlorophyll *a*). The percent contribution of the dominant taxon was not unusually high at either site (15.6% at the reference, 20% at the test site). However, the dominant taxon at both stations was *Scenedesmus* sp., an organism typical of eutrophic waters. Chlorophytes were most numerous at the two sites (approximately 50% of the population), followed by cyanophytes and diatoms. The algal QSI for percent composition was 85%, further indicating the similarity of the two populations. Considering the elevated nutrient levels and AGP in Tenmile Creek, the phytoplankton community did not appear to be as affected as one might expect. Probably the flow (velocity was 0.2 m/sec) kept the system well flushed during the time of this survey. Furthermore, cool temperatures may have moderated algal growth. When conditions become more stagnant, and/or when the weather warms up, there is a potential for algal related problems, both in Tenmile Creek and farther downstream in the St. Lucie River.

Conclusions

Six pesticides (see Chemistry Summary Table) were found at the two receiving water sites, but none were found in the test well (MW-11) down-gradient of the facility and closest to Tenmile Creek. Water quality standards are established only for one of the compounds detected (malathion, at 0.1 µg/L). The concentrations of malathion measured in Ten Mile Creek exceeded this standard (0.13 µg/L and 0.16 µg/L). However, because these levels were below the practical quantitation limit for malathion, the standard for regulatory purposes is subsequently set at the minimum detection limit (0.06 µg/L). Therefore, while these results are cause for concern, they do not indicate violations for malathion. The source of these pesticides may be runoff from the surrounding citrus groves and not necessarily from the food processing facility.

Aluminum, iron, copper, and zinc were found at the various sampling locations, but all concentrations were within water quality standards.

Total phosphorus (above 0.30 mg/L), ortho-phosphate (above 0.26 mg/L), and nitrate-nitrite (above 0.36 mg/L) in both Tenmile Creek stations were higher than approximately 80% of other Florida streams. Ammonia, which was very elevated in the groundwater MW-11 sample (34 mg/L), was not abnormally high (below 0.087 mg/L) in receiving water samples. Agricultural operations in the area probably contributed to these somewhat elevated levels of nutrients in Tenmile Creek.

The AGP measured at the reference site (19.9 mg dry wt/L) and the test site (25.0 mg dry wt/L) both exceeded the 5 mg dry wt/L, "problem threshold". With no direct discharge from the Indian River Foods facility in years, non-point sources are again implicated.

Certain measures of benthic macroinvertebrate community health indicated stressed conditions at both Tenmile Creek stations. The test site, however, generally appeared to be better than the reference site. Shannon-Weaver diversity was unusually depressed at both stations, being lower than approximately 95% of typical Florida streams. The Florida Index was also much lower than expected at both sites, indicating that conditions were inhospitable to pollution sensitive taxa throughout Tenmile Creek.

The phytoplankton community at both stations was dominated by *Scenedesmus* sp., an organism typical of eutrophic waters. However, chlorophyll *a* was very low, indicating no algal blooms at the present time. Considering the elevated nutrient levels and AGP in Tenmile Creek, the phytoplankton community did not appear to be as affected as one might expect. Probably the high flow and moderate temperatures reduced problems with phytoplankton growth during the time of this survey. When conditions become more stagnant or warmer, there is a potential for algal related problems, both in Tenmile Creek and farther downstream in the St. Lucie River.

Literature Cited

Miller, W. E., T. E. Maloney, and J. C. Greene. 1978. The *Selenastrum capricornutum* Printz algal assay bottle test. U. S. Environ. Prot. Agency, EPA-600/9-78-018. 126 p.

Raschke, R. L. and D. A. Schultz. 1987. The use of the algal growth potential test for data assessment. J. Wat. Poll. Cont. Fed. 59(4): 222-227.

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

Chemistry summary table for

Indian River Foods, Inc.	Compliance Well MW-11	Reference Site	Test Site
Organic Constituents (ug/L)			
Bromacil		2.9	2.9
Ethion		0.078 T	0.078 T
Malathion		0.13 T	0.16 T
Metalaxyl		0.52 T	0.50 T
Simazine		0.17	0.17
Norflurazon		1.8	1.8
Metals (ug/L)			
Aluminum		107	90
Antimony		15 U	15 U
Arsenic	20 U	20 U	20 U
Cadmium	3 U	0.08 U	0.08 U
Copper	3.4	12	12
Chromium	10 U	10 U	10 U
Iron	8830	642	644
Lead	15 U	15 U	15 U
Manganese	80		
Mercury		0.1 U	0.1 U
Nickel		5 U	5 U
Selenium	30 U	30 U	30 U
Silver	3 U	0.05 U	0.05 U
Zinc	19	11	14
Nutrients (mg/L)			
Ortho-phosphate		0.27	0.26 A
Total phosphorus		0.32	0.30
Ammonia	34	0.083	0.087
Nitrate+Nitrite	0.020 U	0.37 A	0.36
TKN		1.1	1.2
Other Parameters			
Habitat Assessment		50	53
D.O. (mg/L)		6.4	6.5
pH (SU's)		7.0	7.0
Conductivity (µmhos/cm)		840	840
Temperature (°C)		22.7	23.0
Hardness (mg CaCO3)		250	251
Chloride (mg/L)	53		
TOC (mg C/L)	28		

A - Value reported is the mean of two or more determinations

T - Value reported is less than the practical quantitation limit

U - Material analyzed for but not detected; value reported is the minimum detection limit

Typical Values for Selected Parameters in Florida Waters

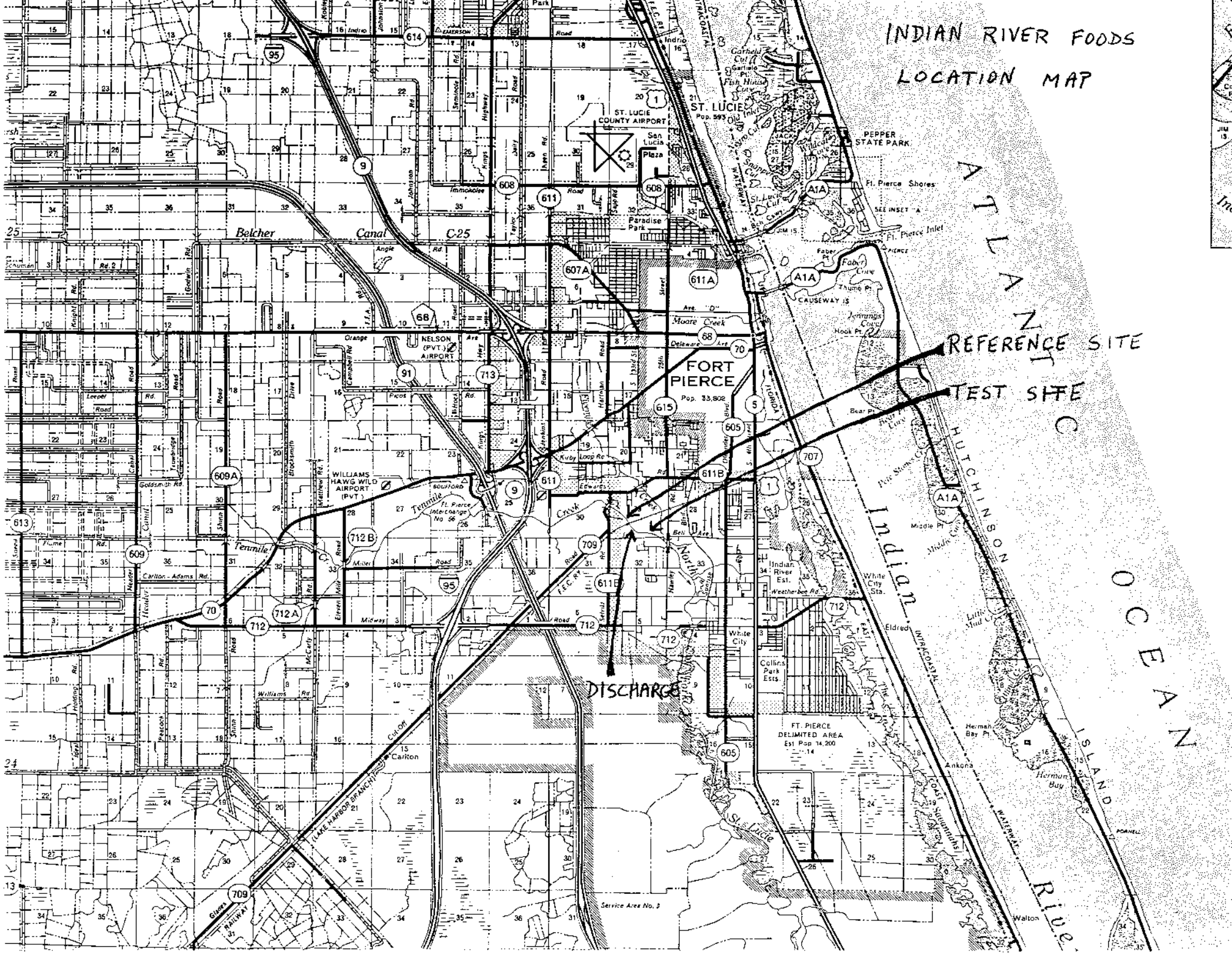
Adapted from Joe Hand, FDER, personal communication, 1991
(data was collected between 1980 and 1989)

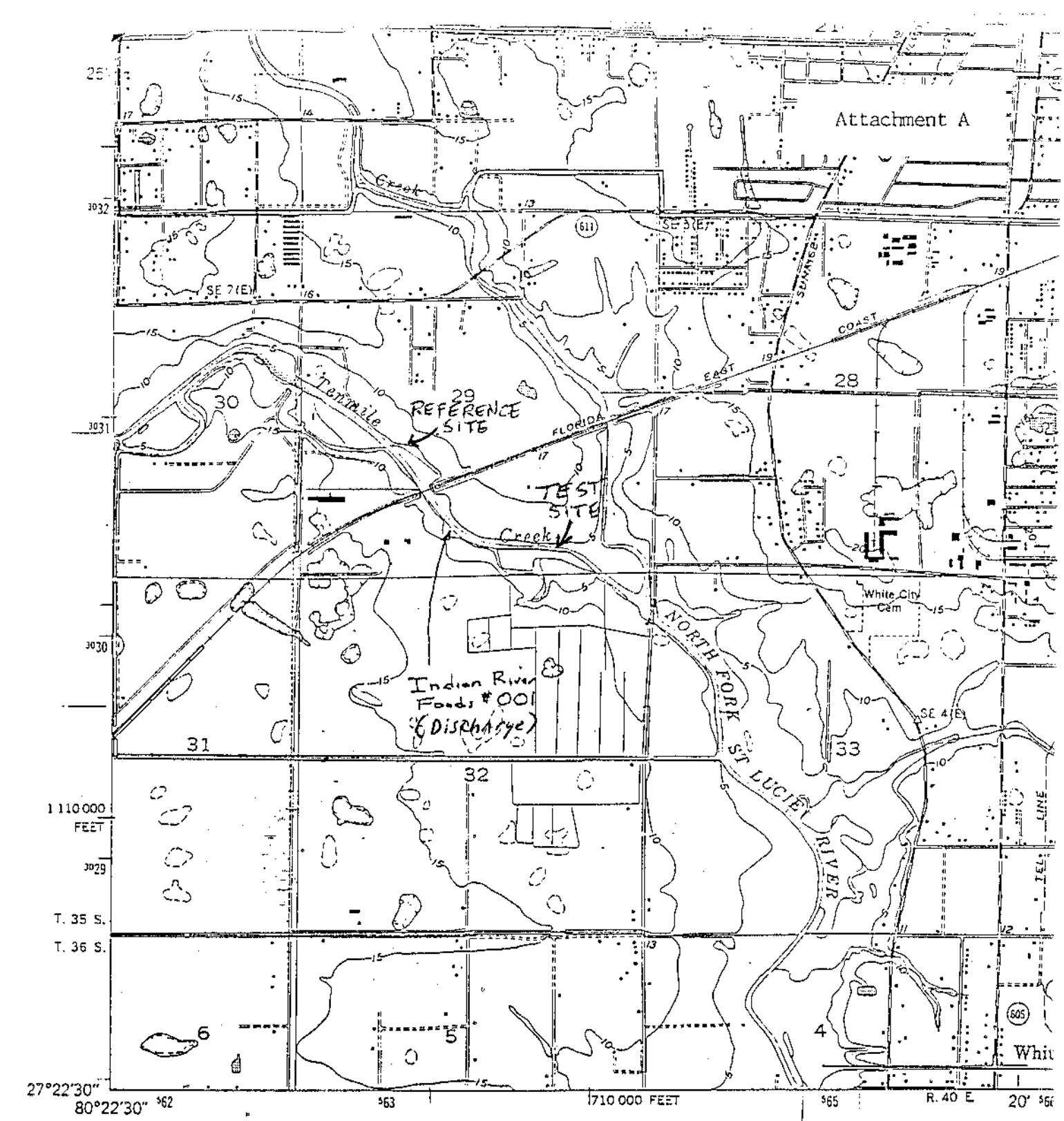
Percentile Distribution

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


INDIAN RIVER FOODS
LOCATION MAP
REFERENCE SITE
TEST SITE
DISCHARGE
FORT PIERCE
Pop. 33,802
ST. LUCIE
Pop. 593
ST. LUCIE COUNTY AIRPORT
NELSON (PVT.) AIRPORT
WILLIAMS HAWG WILD AIRPORT (PVT.)
PEPPER STATE PARK
Ft. Pierce Shores
Ft. Pierce Inlet
CAUSEWAY IS
Belcher Canal C-25
Moore Creek
Taylor Creek
Indian River Est.
White City
White City Sta.
Collins Park Ests.
FT. PIERCE DELIMITED AREA
Est Pop 14,200
Carlton
Eldred
Ankona
Hermon Bay
Walton
ATLANTIC OCEAN
Indian River
HUTCHINSON ISLAND
INTRACOASTAL WATERWAY
FLORIDA EAST COAST RY.
LAKE HARBOR BRANCH
Service Area No. 3



Mapped by the U. S. Coast & Geodetic Survey
Edited and published by the Geological Survey

Control by USC&GS (C) and USED (E)

Culture and drainage in part compiled from aerial photographs taken 1946
Topography by plane-table methods 1947. Field check 1948 and 1949

Polyconic projection. 1927 North American datum
10,000-foot grid based on Florida coordinate system, east zone

No distinction is made between dwellings, barns, commercial and industrial buildings

Red tint indicates area in which only landmark buildings are shown

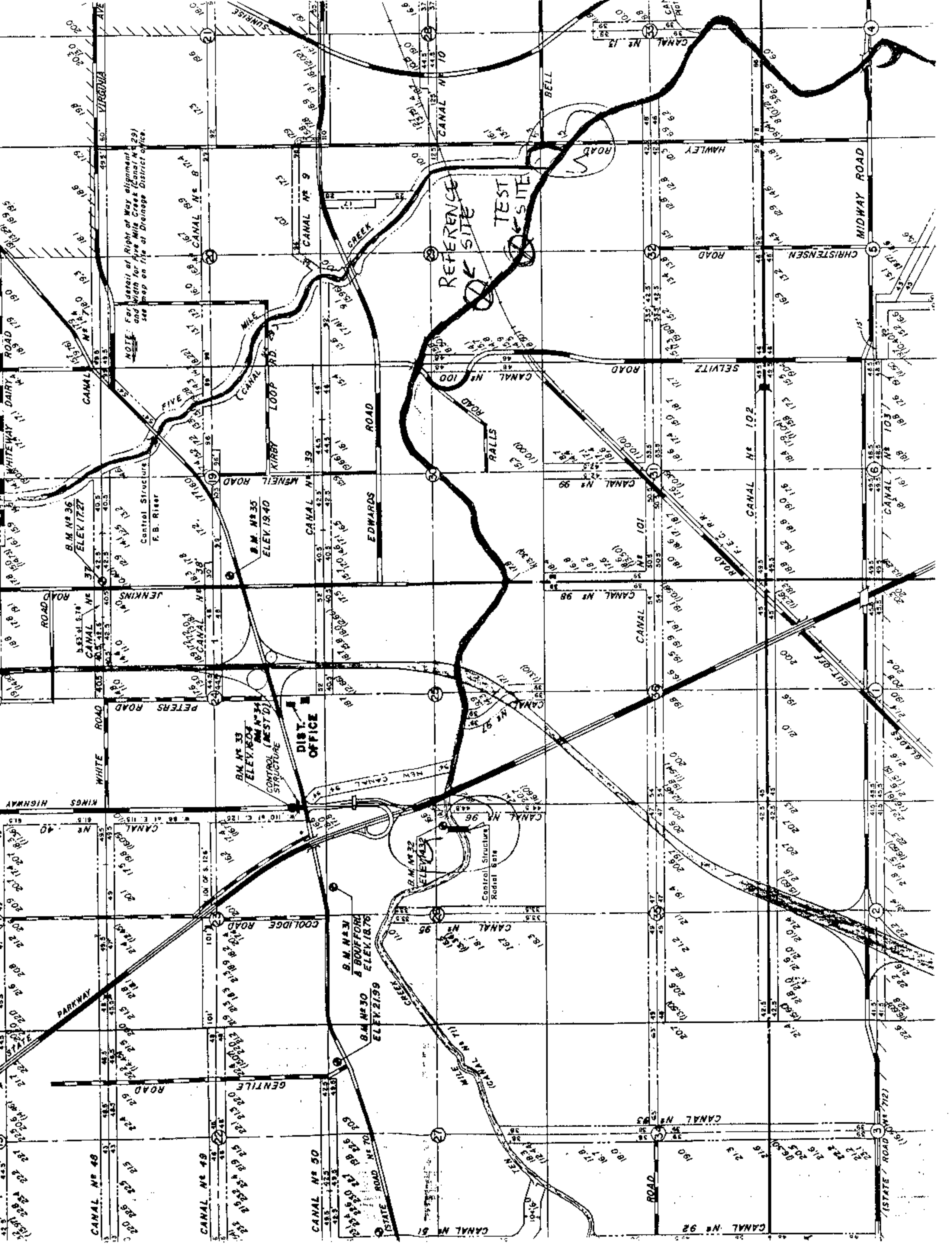
1000-metre Universal Transverse Mercator grid ticks,

MN GN
0°19' 6 MILS 1° 18 MILS

UTM GRID AND 1970 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

Revisions shown in purple compiled by the Geological Surve aerial photographs taken 1970. This information not field

Purple tint indicates extension of urban areas



REFERENCE SITE
TEST SITE
FIVE MILE CREEK
SUNRISE
VIRGINIA AVE
BELL
HAWLEY ROAD
CHRISTENSEN ROAD
MIDWAY ROAD
SELVITZ ROAD
KIRBY LOOP RD.
M'NEIL ROAD
RALLS ROAD
EDWARDS ROAD
JENKINS ROAD
PETERS ROAD
WHITE ROAD
KINGS HIGHWAY
DIST. OFFICE
COOLIDGE ROAD
GENTILE ROAD
STATE PARKWAY
STATE ROAD Nº 70
STATE ROAD
F.E.C. R.R.
CUT-OFF
GLADES
WHITEWAY
DAIRY
NOTE: For detail of Right of Way alignment and Width for Five Mile Creek (Canal Nº 29) see map on file at Drainage District office.
CANAL Nº 8
CANAL Nº 9
CANAL Nº 10
CANAL Nº 13
CANAL Nº 39
CANAL Nº 48
CANAL Nº 49
CANAL Nº 50
CANAL Nº 92
CANAL Nº 95
CANAL Nº 96
CANAL Nº 97
CANAL Nº 98
CANAL Nº 99
CANAL Nº 100
CANAL Nº 101
CANAL Nº 102
CANAL Nº 103
NEW CANAL
Control Structure F.B. Riser
Control Structure Radial Gate
B.M. Nº 36 ELEV. 17.27
B.M. Nº 35 ELEV. 19.40
B.M. Nº 33 ELEV. 16.04
B.M. Nº 34 (WEST'D)
B.M. Nº 32 ELEV. 14.32
B.M. Nº 31 & BOUFFORD ELEV. 18.76
B.M. Nº 30 ELEV. 21.99
CONTROL STRUCTURE

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: Indian River Foods, Inc.		Date Summary Prepared: 930414
Location (attach detailed map): Glades Cut-Off Road and Selvitz Road Ft. Pierce, Fl.	County: St. Lucie	District: SouthEAST
Federal Permit # FL0001783 and expiration date: 931130 Discharge # 001	State GMS # and 5156P20003 State expiration date: 931101 IO-56-204145	Facility Type: (Industrial) Municipal Federal Agricultural Other (list):

Function of facility: Processing of Citrus Fruit to produce juice and other by products.

Description of treatment process:
The 0.650 GPD (maximum) citrus processing wastewater treatment and disposal system consists of pumping the wastewater into the aeration basin, clarifiers, grove storage pond and 145 acre citrus grove reuse system. Sludge from the clarifiers is returned to the feed mill for cattle feed production.
* Discharge to surface waters of the state is prohibited except under wet weather conditions. Operation is seasonal, normally November through June during the citrus harvest season.

Receiving waters: 10 mile Creek	Classification: I II (III)	
Design Flow: only when necessary * Not Stated in the Permit	Mean Flow:	Flow during survey: NOT Discharging

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

therefore, the best time to sample is: November thru June after a period of heavy rain.

If facility has a mixing zone, give details (size, parameters affected, etc.):
There is no mixing Zone.

List effluent limits (if necessary, attach relevant paperwork):

Parameter	Limit (units)
See Attachment under Specific conditions of the permit	See Attachment under Specific Condition #1 of the Permit

Describe special permit conditions and permit modifications:
A discharge to 10 mile Creek is Allowed only when the level of Dissolved Oxygen in the creek exceeds 5.7 mg/l at both sampling Locations. See specific Condition # 2 of the Permit.
The discharge is dependent on the flow of 10 mile creek. See Specific Condition #2 and Table A.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Indian River Foods Inc.
(Facility)

Description of permitted outfall(s):
According to the NPDES permit, the design capacity of the facility discharge is 0.35 MGD.
Also, According to the permittee, there is not AN in line connection from the storage pond to the discharge. So, discharge to 10 mile creek could not occure. There has not been a discharge for several years.

List permit violations (from MOR data or other source) and plant upsets that occurred within past year:
NO violations of surface water standards because no discharge has occured.

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:
No previous bioassessment inpact study on file.
For the WQBEL's refer to the attached permit.
Refer to attachments for enforcement actions

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set:
The Department does not have sampling results that would be comparable to establish trends.

Additional information:	Staff contributing to this review (signature):
	Jeffrey A. Christian (Biologist)
	Terry Davis (Inspector)
	(Engineer)
	( )
	( )
	( )

Florida Department of Environmental Regulation

Southeast District • 1900 S. Congress Ave., Suite A • West Palm Beach, Florida 33406

Lawton Chiles, Governor

Telephone: 407/433-2650
Fax: 407/433-2666

Carol M. Browner, Secretary

REISSUED WITH NEW EFFECTIVE DATE
SUPERSEDES PERMIT WITH SAME NUMBER ISSUED ON APRIL 3, 1992

PERMITTEE:
Mr. Ken Bode, Plant Manager
Indian River Foods, Inc.
P. O. Box 1749
Ft. Pierce, FL 33450

I.D. NUMBER: 5156P20003
PERMIT/CERTIFICATION NUMBER: IO 56-204145
DATE OF ISSUE: DEC 0 2 1992
EXPIRATION DATE: November 1, 1993
COUNTY: St. Lucie
LATITUDE/LONGITUDE: 27°23'38"/80°21'39"
SECTION/TOWNSHIP/RANGE: 29 & 32/T35S/R40E
PROJECT: Indian River Foods

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Chapter(s) 17-3, 17-4, and 17-660. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

OPERATE: A 0.650 GPD (maximum) citrus processing wastewater treatment and disposal system consisting of aeration basin, clarifiers, grove storage pond and 145-acre citrus grove reuse system. Sludge from the clarifiers is returned to the feed mill for cattle feed production. Discharge to surface waters of the State is prohibited except under wet-weather conditions. Operation is seasonal, normally November through June during the citrus harvest season.

IN ACCORDANCE WITH: Application to Operate, DER Form 17-660.900(1), received September 30, 1991.

LOCATED AT: Glades Cut-Off Road and Selvitz Road, Ft. Pierce, Florida.

TO SERVE: A 4000 ton raw fruit/day citrus processing plant (SIC 2037).

SUBJECT TO: General Conditions 1-15 and Specific Conditions 1-13.

DER Form 17-1.201(5)
Effective November 30, 1982

Recycled Paper

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations and restrictions set forth in this permit, are "permit conditions" and are binding and enforceable pursuant to Sections 403.141, 403.727, or 403.859 through 403.861, F.S. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

3. As provided in subsections 403.087(6) and 403.722(5), F.S., the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state, or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in this permit.

4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed and used by the permittee to achieve compliance with the conditions of this permit, are required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at reasonable times, access to the premises where the permitted activity is located or conducted to:

(a) Have access to and copy any records that must be kept under conditions of the permit;

(b) Inspect the facility, equipment, practices, or operations regulated or required under this permit; and

(c) Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

(a) A description of and cause of noncompliance; and

(b) The period of noncompliance, including dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance. The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

GENERAL CONDITIONS:

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Section 403.111 and 403.73, F.S. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance; provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

11. This permit is transferable only upon Department approval in accordance with Rule 17-4.120 and 17-30.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit or a copy thereof shall be kept at the work site of the permitted activity.

13. This permit also constitutes:

( ) Determination of Best Available Control Technology (BACT)

( ) Determination of Prevention of Significant Deterioration (PSD)

( ) Certification of compliance with state Water Quality Standards (Section 401, PL 92-500)

( ) Compliance with New Source Performance Standards

14. The permittee shall comply with the following:

(a) Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.

(b) The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

(c) Records of monitoring information shall include:

1. the date, exact place, and time of sampling or measurements;
2. the person responsible for performing the sampling or measurements;
3. the dates analyses were performed;
4. the person responsible for performing the analyses;
5. the analytical techniques or methods used;
6. the results of such analyses.

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware the relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

PERMITTEE:
Mr. Ken Bode, Plant Manager
Indian River Foods, Inc.

I.D. NUMBER: 5156P20003
PERMIT/CERTIFICATION NUMBER: IO 56-204145
DATE OF ISSUE: DEC 0 2 1992
EXPIRATION DATE: November 1, 1993

SPECIFIC CONDITIONS:

1. Unless otherwise authorized by this permit the permittee shall maintain the quality and quantity of the treated wastewater such that it does not cause a violation of the water quality standards set forth in F.A.C. Rules 17-3 and 17-302.

2. This condition applies only in the event that a wet-weather discharge of treated wastewater is necessary. A discharge of treated wastewater to Ten Mile Creek is allowed only when the aeration basin and both sections of the grove pond are filled to capacity and the rate of flow of the treated wastewater to the grove pond exceeds the rate at which the grove reuse system can accept additional water without becoming hydraulically overloaded. In order to provide the Department with adequate prior notice of the possibility that such a discharge may become necessary, the Permittee shall promptly notify the Department whenever the capacity of the first section of the grove pond is filled and begins overflowing into the second section of the grove pond.

At least one day prior to any discharge to Ten Mile Creek and on each day during which such discharge continues, Permittee shall sample the water quality of Ten Mile Creek at 3-hour intervals during daylight hours for each of the following parameters:

STORET CODE	PARAMETER	UNIT
000400	pH (field)	std un
000095	Conductivity (field)	mg/l
000011	Temperature (field)	deg F
000300	Dissolved Oxygen	mg/l

The samples shall be taken at mid-stream one foot below the water surface at the following locations:

Ten Mile Creek at Selvitz Road Bridge;
Ten Mile Creek at 25th Street Bridge.

A discharge to Ten Mile Creek is allowed only when the level of dissolved oxygen in the Creek exceeds 5.7 mg/l at both sampling locations.

The treated wastewater discharged to Ten Mile Creek shall be sampled for the following parameters on a weekly basis when such a discharge is occurring:

STORET CODE	PARAMETER	UNIT
000400	pH	std un
000095	Specific Conductance	mg/l
000011	Temperature	deg F
000300	Dissolved Oxygen	mg/l
900163	Total Suspended Solids	mg/l
000310	BOD_5	mg/l

The number of pounds of BOD_5 which may be discharged within any 24-hour period shall be dependent upon the flow of the water over the weir at Gordy Road and shall not exceed the amount allowed for that volume of flow as shown on Table A attached hereto.

Four grab samples of treated wastewater shall be taken within the first 24 hours of each such discharge (unless the last prior discharge occurred within less than two months before the current discharge) and each sample shall be subjected to a bioassay test. Each grab sample shall be subjected to a 96-hour static renewal test on 100% whole effluent. The samples shall be collected at evenly spaced intervals (every 6 hours). The quality assurance and reporting methods for the bioassay test shall be in accordance with USEPA publication EPA/600/4-90/027, "Methods For Measuring The Acute Toxicity of Effluents to Freshwater and Marine Organisms" The following test species shall be used depending on the salinity of the effluent:

Freshwater Effluent (<1 ppt salinity):
Ceriodaphnia dubia (water flea) and
Notropis leedsi (bannerfin shiner) (Pimephales promelas, the fathead minnow, may be substituted for the bannerfin shiner if necessary).

PERMITTEE:
Mr. Ken Bode, Plant Manager
Indian River Foods, Inc.

I.D. NUMBER: 5156P20003
PERMIT/CERTIFICATION NUMBER: IO 56-204145
DATE OF ISSUE: DEC 0 2 1992
EXPIRATION DATE: November 1, 1993

SPECIFIC CONDITIONS:

Brackish Effluent (1-5 ppt salinity):
Mysidopsis bahia (mysid or possum shrimp), using effluent salinity adjusted up to 5 ppt, and
Menidia beryllina (tidewater silverside), using effluent of natural salinity.

Salt Water Effluent (>5 ppt salinity):
Mysidopsis bahia (mysid or possum shrimp) and
Menidia beryllina (tidewater silverside).

3. The permittee shall monitor the wastewater and ground water monitoring wells as follows:

A. WASTEWATER

1) Raw effluent (inlet to aeration basin)
2) Aeration Basin (outlet to grove clarifiers)
3) Clarifiers (outlet to grove storage pond)
4) Irrigation Water (irrigation pumps)

The above four wastewater streams shall be sampled bi-weekly and analyzed for the following parameters:

STORET CODE	PARAMETER	UNIT
900201	Total Suspended Solids	mg/l
000310	BOD_5	mg/l
000680	Total Organic Carbon	mg/l
000400	pH	std un
000600	Total Nitrogen	mg/l
000630	$NO_2 + NO_3$	mg/l
000665	Total Phosphorous	mg/l
000929	Sodium	mg/l
070304	Total Dissolved Solids	mg/l
000940	Chloride	mg/l
000095	Conductivity	mg/l
900187	Flow, Max	MGD
050053	Flow, Avg.	MGD

NOTE: Only raw wastewater and sprayfield pump flow rates need to be taken, on a daily basis. Monthly maximum and average flows shall be reported.

B. GROUND WATER MONITORING WELLS

1) Background well: MW-12
2) Intermediate wells: MW-2, MW-7 and MW-3
3) Compliance wells: MW-1, MW-7A, MW-8, MW-9, MW-10, MW-11 and MW-13

The monitoring wells shall be sampled on a monthly basis and analyzed for the following parameters:

STORET CODE	PARAMETER	UNIT
000400	pH (field)	std un
000095	Conductivity	mg/l
000630	$NO_2 + NO_3$	mg/l
000929	Sodium	mg/l
070304	Total Dissolved Solids	mg/l
000680	Total Organic Carbon	mg/l
000940	Chloride	mg/l
082545	Water Level (NGVD)	ft. (1/100)

PERMITTEE:
Mr. Ken Bode, Plant Manager
Indian River Foods, Inc.

I.D. NUMBER: 5156P20003
PERMIT/CERTIFICATION NUMBER: IO 56-204145
DATE OF ISSUE: DEC 0 2 1992
EXPIRATION DATE: November 1, 1993

SPECIFIC CONDITIONS:

In addition MW-11 shall be analyzed for the following parameters, also on a monthly basis:

STORET CODE	PARAMETER	UNIT
000612	Ammonia (unionized)	mg/l
000011	Temperature (field)	deg F

C. SURFACE WATER

1) Ten Mile Creek Upstream (Selvitz Rd.)
2) Ten Mile Creek (Adjacent to Aeration Basin)
3) Ten Mile Creek Downstream (25th Street)

The water at the center of the stream shall be tested monthly for the parameters given below. During sampling, the flow direction and wind direction shall be noted and reported along with the analyses. The samples shall be taken at one foot below the Water Surface. The sample taken next to the aeration basin may be taken within 5-10 feet of the bank in lieu of the center of the creek.

STORET CODE	PARAMETER	UNIT
000400	pH (field)	std un
000095	Conductivity (field)	mg/l
000612	Ammonia (unionized)	mg/l
000011	Temperature (field)	deg F
000300	Dissolved Oxygen	mg/l

D. STORMWATER

The stormwater in the stormwater detention pond shall be sampled within four hours of each discharge of stormwater from the stormwater detention pond into Canal #101 or monthly, whichever occurs less frequently, for the following parameters:

STORET CODE	PARAMETER	UNIT
000310	BOD	mg/l
900201	Total Suspended Solids	mg/l
000095	Conductivity (field)	mg/l

4. The sprayfield application rate shall not exceed an average of 100 lb. BOD_5/acre/day. Sprayfield loading rates shall be reported quarterly, calculated using monthly BOD effluent average as applied to the sprayfield and volumetric loading rates.

5. The production rate shall not exceed 4,000 tons/day raw fruit processed. Daily production records shall be reported to the Department on a quarterly basis.

6. The Zone of Discharge and the exemption for "existing installations" shall be in accordance with FAC Rule 17-28.700. The permittee shall not cause or contribute to violation of the water quality standards for Class G-II ground waters given in FAC Rule 17-3.404 outside the permitted Zone of Discharge. However, there shall be no Zone of Discharge for the Minimum Criteria for ground water as given in FAC Rule 17-3.402.

7. All sampling and operational reports are due no later than thirty (30) days after the reporting period. Ground water, wastewater and surface water reports shall be submitted using the attached DER Form "Water Quality Test Results". For reporting purposes, test sites shall be identified as follows:

Test Site	GMS ID
Raw Effluent	5156X12081
Aeration Basin	5156X12326
Clarifiers	5156X12327
Irrigation Water	5156X12083
Stormwater Detention Pond	5156X12364

PERMITTEE:
Mr. Ken Bode, Plant Manager
Indian River Foods, Inc.

I.D. NUMBER: 5156P20003
PERMIT/CERTIFICATION NUMBER: IO 56-204145
DATE OF ISSUE: DEC 0 2 1992
EXPIRATION DATE: November 1, 1993

SPECIFIC CONDITIONS:

Test Site	GMS ID
MW-1	5156A12078
MW-2	5156A10363
MW-3	5156A10360
MW-7	5156A12079
MW-7A	5156A12179
MW-8	5156A12080
MW-9	5156A12180
MW-10	5156A12181
MW-11	5156A12331
MW-12	5156A12332
MW-13	5156A12333
Ten-Mile Creek Selvitz Rd.	5156X12328
Ten-Mile Creek at Plant	5156X12330
Ten-Mile Creek 25th Street	5156X12329

8. Two copies of monitoring reports shall be submitted to the Department, one copy to the West Palm Beach Office and one copy to the Port St. Lucie Branch Office at the addresses given below:

FDER
1900 South Congress Ave.
Suite A
West Palm Beach, FL 33406

FDER
1801 S.E. Hillmore Drive
Suite C204
Port St. Lucie, FL 34982

9. The application of wastewaters shall be discontinued before rainfall approaches runoff conditions so that there will be no mixing of wastewater and stormwater runoff.

10. No wastewater shall be allowed to deliberately bypass the treatment facility, except in cases of emergency, without the prior approval of the Department. The Department shall be promptly notified, in writing, of the emergency and all information as to the cause of the problem and the corrective measures to be taken to prevent its recurrence.

11. This permit does not authorize the treatment, storage or disposal of hazardous wastes.

12. All records and data relating to this permit, including field sampling and monitoring logs, shall be maintained at the facility and made available for inspection by the staff of the Department. Copies of all reports, tests, notifications or other submittals required by this permit shall be submitted to the Department of Environmental Regulation, Southeast Florida District Office in West Palm Beach and branch office in Port St. Lucie.

13. No later than sixty (60) days prior to the expiration of this permit, the permittee shall either request an extension of this permit, or submit a construction permit application to modify the treatment system as may be necessary.

Issued this 1st day of December, 1992

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

Mary E. S. Williams
Director of District Management

TABLE A

Allowable BOD_5 Discharge Loading Rate

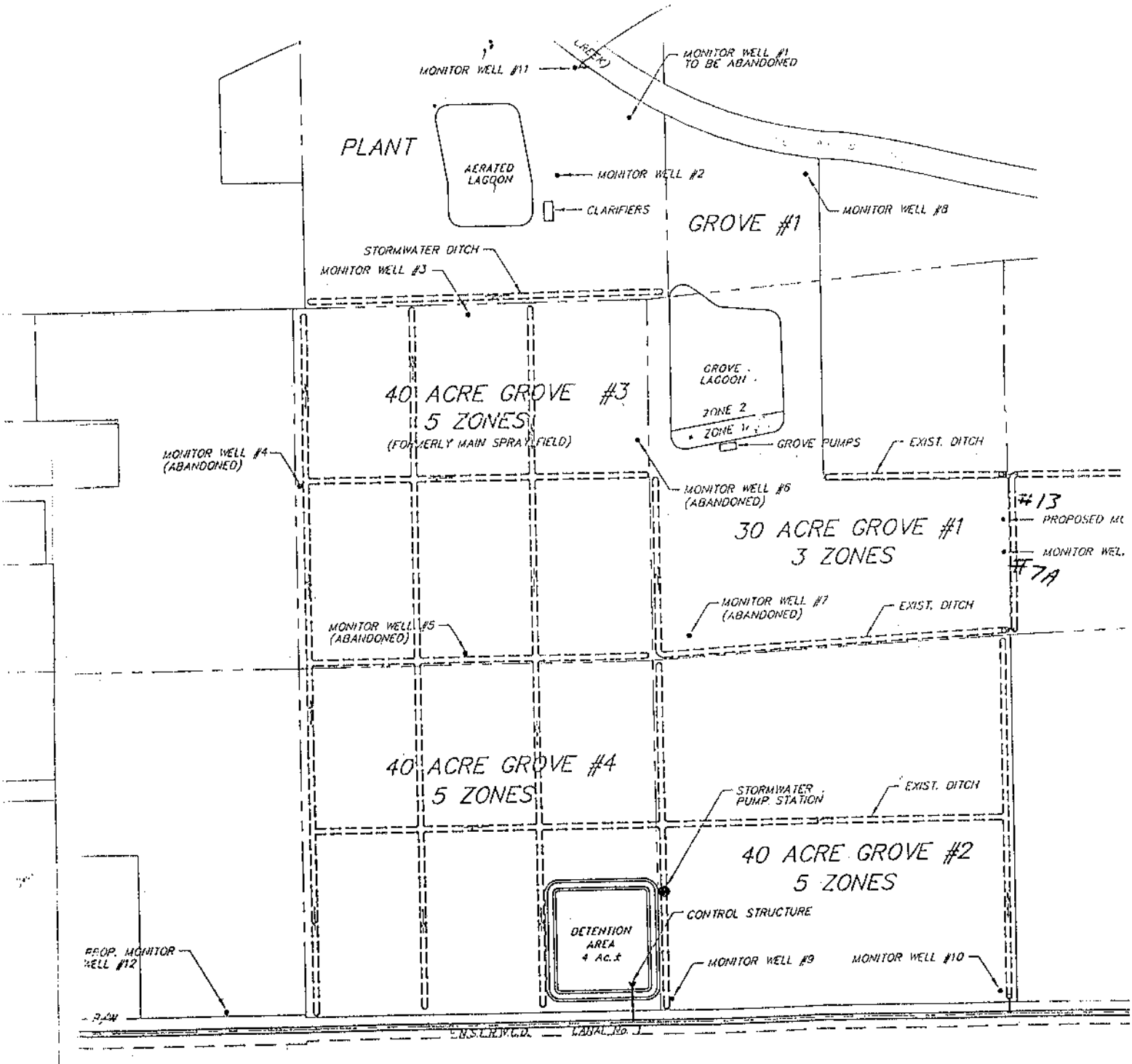
Vs.

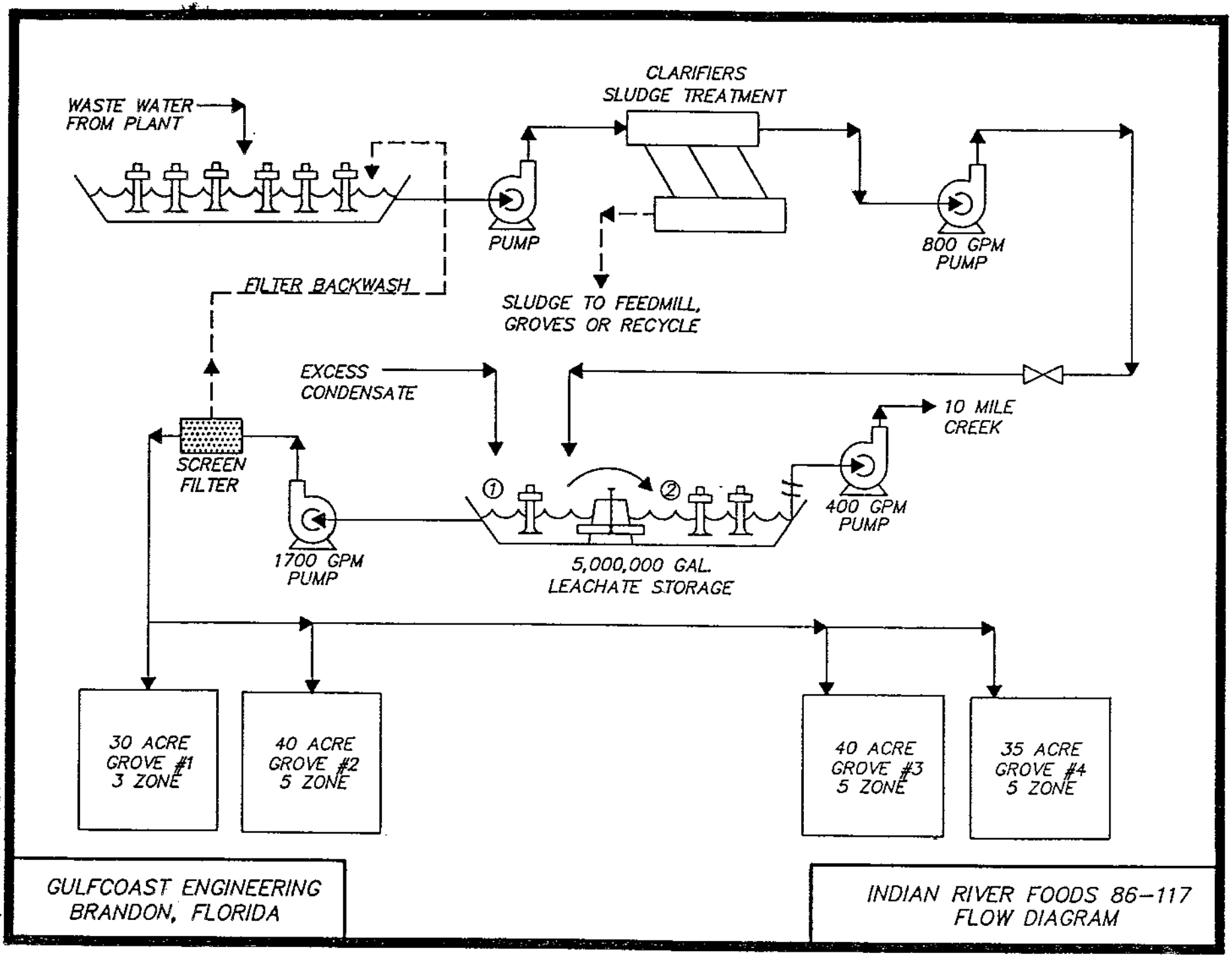
Stream Flow in Ten Mile Creek

FLOW (cfs)	BOD_5 (lb/day)
13	0
15	32
17	70
20	113
22.5	153
25	194
28	243

For any flow greater than 28cfs, the maximum loading rate is 243 lb BOD_5/day

IRF


MONITOR WELL #11
(CREEK)
MONITOR WELL #1
TO BE ABANDONED
PLANT
AERATED LAGOON
MONITOR WELL #2
CLARIFIERS
GROVE #1
MONITOR WELL #8
STORMWATER DITCH
MONITOR WELL #3
40 ACRE GROVE #3
5 ZONES
(FORMERLY MAIN SPRAY FIELD)
GROVE LAGOON
ZONE 2
ZONE 1
GROVE PUMPS
EXIST. DITCH
MONITOR WELL #4
(ABANDONED)
MONITOR WELL #6
(ABANDONED)
#13
PROPOSED MO
30 ACRE GROVE #1
3 ZONES
MONITOR WEL
#7A
MONITOR WELL #7
(ABANDONED)
EXIST. DITCH
MONITOR WELL #5
(ABANDONED)
40 ACRE GROVE #4
5 ZONES
STORMWATER PUMP STATION
EXIST. DITCH
40 ACRE GROVE #2
5 ZONES
CONTROL STRUCTURE
DETENTION AREA
4 Ac.±
PROP. MONITOR WELL #12
MONITOR WELL #9
MONITOR WELL #10
CANAL
U.S.I.R.W.C.D. CANAL No. 1


WASTE WATER FROM PLANT
CLARIFIERS SLUDGE TREATMENT
PUMP
800 GPM PUMP
FILTER BACKWASH
SLUDGE TO FEEDMILL, GROVES OR RECYCLE
EXCESS CONDENSATE
10 MILE CREEK
SCREEN FILTER
1700 GPM PUMP
400 GPM PUMP
5,000,000 GAL. LEACHATE STORAGE
30 ACRE GROVE #1 3 ZONE
40 ACRE GROVE #2 5 ZONE
40 ACRE GROVE #3 5 ZONE
35 ACRE GROVE #4 5 ZONE
GULFCOAST ENGINEERING BRANDON, FLORIDA
INDIAN RIVER FOODS 86-117 FLOW DIAGRAM
IRF\FLOW# 9-23-91 REH

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
	28010232	01-12-93	1200	North Fork St. Lucie River

REMARKS:	LOCATION:	FIELD ID/NAME:
	10 mile creek 100 yds. NW of R.R. Trestle	REFERENCE SITE Indian R.F. Control

RIPARIAN ZONE/INSTREAM FEATURES

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

Riparian Forest	Field/Pasture	Agricultural (citrus)	Residential	Commercial	Industrial	Other (Specify)
15%	5%	50%	30%			

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):

Roads, Citrus Agricultural, Houses

Estimated System Width (range, m): 20 m	Estimated System Depth (range, m): 0.5-2 m		yes
High Water Mark (m above bed): 0.5 m	Velocity (range, m/s): 0.2 m/s	Impounded ☐ Channelized ☑	

Canopy Cover % : Open : ☐ Lightly Shaded (11-45%): ☑ Moderately Shaded (46-80%): ☐ 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
Woody Debris (Snags)	5	5		Riffles	0		
Leaf Packs	5	5		Sand	85	5	
Aquatic Vegetation	0			Mud/Muck/Silt	0		
Rock or Shell Rubble	0			Benthic leaf mats	0		
Undercut Banks/Roots	10	2		Other: Overhanging grass & Roots	5	4	

WATER QUALITY

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):			Secchi (m):
Top	0.2	22.7	7.0	6.4	840			
Mid-depth	—	—	—	—	—			
Bottom	1.0	22.7	*	6.4	840			1.0

System Type : Stream: ☑ (Sand Bottomed, Sand Bot w/ Spring, Swamp & Bog, Calcareous, Alluvial, Misc.) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☑ Estuarine Influenced

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

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

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

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

Weather Conditions:
partly Cloudy
80 degrees F
South East Wind 10-15 knots

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

SAMPLING TEAM:	SIGNATURE:	DATE:
J. Christian / D. Strom	J. Christian Douglas Strom	930112

* Only surface pH taken

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):	RECEIVING BODY OF WATER:
	28010232	01-12-93	North Fork St. Lucie River

REMARKS:	LOCATION:	FIELD ID/NAME:
	10 mile Creek 100 yds. NW of RR Trestle	REFERENCE SITE IRF Control

Habitat Parameter score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 12	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 18	Max. observed: >0.3 m/sec. but < 1 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, or spate occurring; > 2 m/sec **0-7 points**
Artificial Channel/ Flow Alteration 3	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 3	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 9	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		TOTAL SCORE
5	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	50

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
930112	J. Christian D. Strom	J. Christian D. Strom

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
	28010611	01-12-93	1335	North Fork St. Lucie River

REMARKS:	LOCATION:	FIELD ID/NAME:
	10 mile Creek @ Indian River Foods Discharge	TEST SITE IRF Discharge

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
riparian 20		citrus 40	10		30	

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):
Rail Road, Citrus Agriculture, Roads

Estimated System Width (range, m): 20m	Estimated System Depth (range, m): 1-3m		yes
High Water Mark (m above bed): 0.5m	Velocity (range, m/s): 0.2m	Impounded ☐ Channelized ☑	

Canopy Cover % : Open : ☐ Lightly Shaded (11-45%): ☑ Moderately Shaded (46-80%): ☐ 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
Woody Debris (Snags)	10	5		Riffles	0		
Leaf Packs	5	5		Sand	65		
Aquatic Vegetation	0			Mud/Muck/Silt	0		
Rock or Shell Rubble	0			Benthic leaf mats	0		
Undercut Banks/Roots	10	2		Other: overhanging vines & Roots	10	5	

WATER QUALITY

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):			Secchi (m):
Top	0.2	23.0	7.0	6.5	540			not done
Mid-depth	1.0	23.1	*	6.6	544			
Bottom	2.0	23.0	*	6.7	544			

System Type : Stream: ☐ (Sand Bottomed, Sand Bot w/ Spring, Swamp & Bog, Calcareous, Alluvial, Misc.) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☐

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

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

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

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

Weather Conditions:
Partly Cloudy
80 degrees F
South EAST wind 10-15 Knots

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Jeff Christian / Doug Strom	Jeffrey A. Christian / Douglas A. Strom	930112

* Only surface pH taken

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):	RECEIVING BODY OF WATER:
	28010611	01-12-93	North Fork St. Lucie River

REMARKS:	LOCATION:	FIELD ID/NAME:
	10 mile Creek @ IRF Discharge	TEST SITE IRF Discharge

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 17	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 16	Max. observed: >0.3 m/sec. but < 1 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, or spate occurring; > 2 m/sec **0-7 points**
Artificial Channel/ Flow Alteration 3	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 3	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 9	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** 53

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
930112	J. Christian D. Stram	J. Christian Dayle H. Stram

Phytoplankton taxa list for Indian River Foods, collected via subsurface grabs in Ten Mile Creek, on 1 January, 1993. Densities are in number/mL.

	Reference Site	Test Site
Diatoms		
Achnanthes sp.	24	–
Cyclotella sp.	24	25
Gomphonema sp.	–	25
Nitzschia sp.	73	25
Rhizosolenia sp.	–	25
Synedra sp.	24	–
Chlorophyta		
Ankistrodesmus sp.	–	25
Chlamydomonas sp.	73	–
Scenedesmus sp.	122	123
Tetraedron sp.	98	25
Ulothrix sp.	49	74
Unknown chlorophyte flagellate	73	172
Cyanophyta		
Anabaena sp.	24	25
Anabaenopsis sp.	49	25
Aphanocapsa sp.	24	–
Chroococcus sp.	–	98
Dactylococcopsis sp.	24	49
Gomphosphaerium sp. ?	–	25
Oscillatoria sp.	24	49
Euglenophyta		
Trachelomonas sp.	49	74
Pyrrhophyta		
Peridinium sp.	24	–

Benthic macroinvertebrate taxa list for Indian River Foods, Inc., collected via Hester-Dendy artificial substrates in Ten Mile Creek, on 12 January, 1993. Densities are in number/m^2.

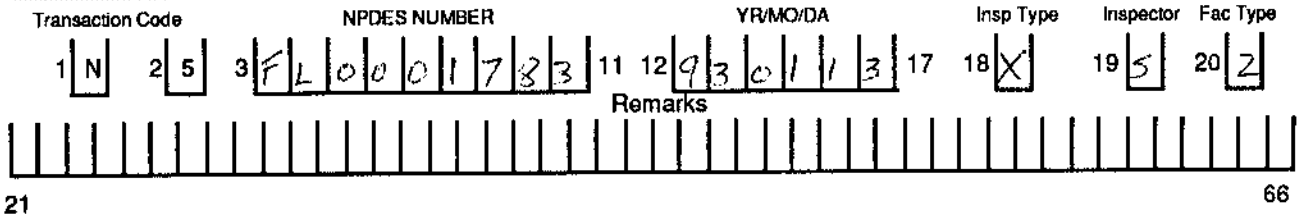
	Reference Site	Test Site
Diptera		
Asheum beckae	–	1
Dicrotendipes simpsoni	3	9
Glyptotendipes sp.	1	3
Goeldichironomus amazonicus	2	7
Nanocladius distinctus	–	13
Polypedilum illinoense	–	3
P. scalaenum grp.	29	10
P. tritum	–	3
Tanytarsus sp.	–	1
T. sp. E Epler	–	1
T. sp. F Epler	1	1
T. sp. T Epler	–	1
Undetermined dipteran pupa	–	7
Malacostraca		
Cassidinidea ovalis	26	12
Corophium sp.	–	3
Gammarus tigrinus	1196	595
Undetermined Tanaidacea	4	4
Odonata		
Enallagma pollutum	–	1
Oligochaeta		
Bratislava unidentata	–	1
Nais communis ?	–	1
N. elinguis	–	4
N. pardalis	–	4
N. pseudobtusa	–	1
Undetermined tubificid w/o capilliform setae	3	1

Benthic macroinvertebrate taxa list for Indian River Foods, collected via 20 discrete dip net sweeps in Ten Mile Creek, on 12 January, 1993.

	Reference Site	Test Site
Coleoptera		
Peltodytes sexmaculata	–	24
Undetermined curculionid	–	24
Decapoda		
Palaemonetes sp.	–	48
Diptera		
Cricotopus bicinctus	24	–
Cryptochironomus sp.	–	48
Culicoides sp.	72	96
Glyptotendipes sp.	–	72
Goeldichironomus amazonicus	120	120
Nanocladius distinctus	48	24
Parachironomus directus	–	24
Polypedilum halterale grp.	24	48
P. illinoense	528	336
P. scalaenum grp.	264	408
P. tritum	24	–
Pseudosmittia sp.	–	24
Undetermined dipteran pupa	168	168
Ephemeroptera		
Caenis sp.	–	96
Gastropoda		
Micromenetus dilatus	–	48
M. floridensis ?	–	288
Pseudosuccinea columella	72	–
Pyrogophorus platyrachis	96	168
Undetermined hydrobiid	24	24
Hemiptera		
Merragata brunnea	24	–
Neoplea sp.	–	24
N. striola	24	–
Undetermined hemipteran	288	24
Lepidoptera		
Undetermined pyralid	48	–
Malacostraca		
Amphipoda		
Gammarus sp.	456	336
Hyalella azteca	24	–
Isopoda		
Cassidinidea ovalis	48	72
Sphaeroma terebrans	72	312

Tanaidacea		
Tanais cavolini	96	72
Odonata		
Epitheca princeps	24	–
Erythemis simplicicollis	24	–
Ischnura sp.	24	–
Undetermined coenagrionid	24	–
Oligochaeta		
Aulodrilus pigueti	24	–
Dero digitata	–	24
Limnodrilus hoffmeisteri	192	480
Nais communis	–	24
N. pardalis	24	24
Tubifex tubifex	24	480
Pelecypoda		
Sphaerium or *Musculium* sp.	96	72
Platyhelminthes		
Dugesia sp.	–	72
Rhynchocoela		
Prostoma rubra	–	24

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)

