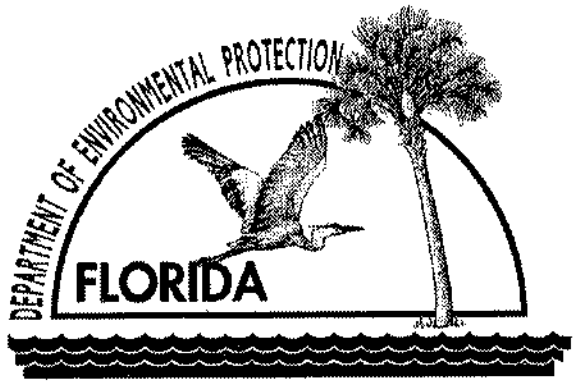


Biological Assessment of

City Industries

Orange County

NPDES #FL0043265

Sampled December 1996

June 1997

Biology Section
Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: City Industries
County: Orange
NPDES Number: FL0043265
NPDES Permit Expiration Date: 23 September 1997

Toxics Sampling Inspection **(XSI)**	
Date Sampled:	16 December 1996
Results:	No organic pollutants were detected in the effluent. Effluent metals concentrations complied with Class III water quality standards.

Compliance Biomonitoring Inspection **(CBI)**	
Date Sampled:	16 December 1996
Results:	The effluent sample was not toxic to the water flea, *Ceriodaphnia dubia*, or to the fish, *Cyprinella leedsi*.

Impact Bioassessment Inspection **(IBI)**	
Date Sampled:	16 December 1996
Results:	Measures of macroinvertebrate health indicated that the discharge was not negatively affecting the benthic community. The Hester-Dendy results showed that several macroinvertebrate parameters actually improved at the test site, when compared with the reference site. The Stream Condition Index scores (33 at the reference site and 29 at the test site) placed both sites in the excellent range for peninsular Florida streams. Elevated periphyton density, chlorophyll *a*, and dominance of a taxon tolerant of nutrient enrichment suggested that the algal communities of both sites were affected by cultural eutrophication. The results, however, indicated that factors other than the facility were responsible for these observed effects.

Water Quality Inspection **(WQI)**	
Date Sampled:	16 December 1996
Results:	Elevated nitrate-nitrite concentrations (0.28 mg/L at the reference site and 0.26 mg/L at the test site) appeared to be the result of factors other than the discharge (*e.g.*, urban stormwater runoff). Concentrations of other nutrients were relatively average for a Florida stream. Algal growth potential (AGP) exceeded the 5 mg dry wt./L "problem threshold" at both the reference site (21.1 mg dry wt./L) and at the test site (22.6 mg dry wt./L). The effluent AGP was 9.5 mg dry wt./L.

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

City Industries, a solvent storage operation, is located in Orange County (see maps in Appendix). Groundwater at the site has previously been contaminated and is currently being treated. The contaminated groundwater is extracted in 13 recovery wells and then treated by an air stripper unit. An average of 0.131 MGD of this treated groundwater is discharged into an unnamed tributary of the Little Econlockhatchee River. The design flow of the treatment system is 0.144 MGD.

Permit limits are as follows: BOD (5.0 mg/L as a monthly average, 8.0 mg/L maximum), total ammonia (1.0 mg/L as a monthly average, 1.6 mg/L maximum), total nitrogen (3.0 mg/L as a monthly average, 4.8 mg/L maximum), total phosphorus (1.0 mg/L as a monthly average, 1.6 mg/L maximum), pH (6.0 to 8.5 SU), dissolved oxygen (6.0 mg/L minimum).

The facility is also required to perform two chronic toxicity tests per year. The first test, performed in 1996, resulted in no observable effects on both organisms tested. Monthly operating report data indicate the monthly average BOD limit was exceeded in August and September of 1996.

Methods

The focus of this investigation was to determine the discharger's effects on the receiving waters. A

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	36	26
Florida Index	14	10
SCI	33	29
EPT Index	9	5
% Contribution of Dominant Taxon	25.5	21.0
% Oligochaeta	5.3	3.7
% Diptera	30.8	41.6
% Ephemeroptera	2.0	2.3
% Trichoptera	1.7	0
% Lepidoptera	5.0	0.8
% Amphipoda	6.7	21.0
% Gastropoda	26.3	17.3
% Pelecypoda	10.9	8.9
% Predators	15.7	7.9
% Above Surface Deposit Feeders	18.1	32.2
% Below Surface Deposit Feeders	4.8	3.3
% Suspension Feeders	15.3	12.6
% Scrapers	27.3	18.5
% Shredders	18.2	24.8
% Parasites	0.6	0.5
Macroinvertebrate Hester-Dendy		
Number of Taxa	17	29
Florida Index	5	12
Shannon-Weaver Diversity	2.50	2.85
EPT Index	2	3
% Oligochaeta	1.1	3.2
% Diptera	7.1	17.2
% Ephemeroptera	4.5	3.2
% Amphipoda	42.2	44.6
% Decapoda	6.0	0.8
% Gastropoda	19.4	19.6
% Predators	23.1	14.5
% Above Surface Deposit Feeders	26.9	32.5
% Below Surface Deposit Feeders	0.4	0.3
% Suspension Feeders	0	0.4
% Scrapers	21.6	21.4
% Shredders	24.2	29.2
% Parasites	0.8	1.1
Periphyton Algae		
Number of Taxa	10	8
Shannon-Weaver Diversity	1.70	0.98
Algal Density (#/sq. cm)	84672	50398
Chlorophyll a (mg/sq. m)	20.5	15.2
Diatom/Diatom + B-G Abundance Ratio	1.0	1.0
% Blue-green	0	0
% Green	5.3	2.0
% Diatoms	94.7	98.0
Algal Growth Potential (mg dry wt/l)	21.1	22.6

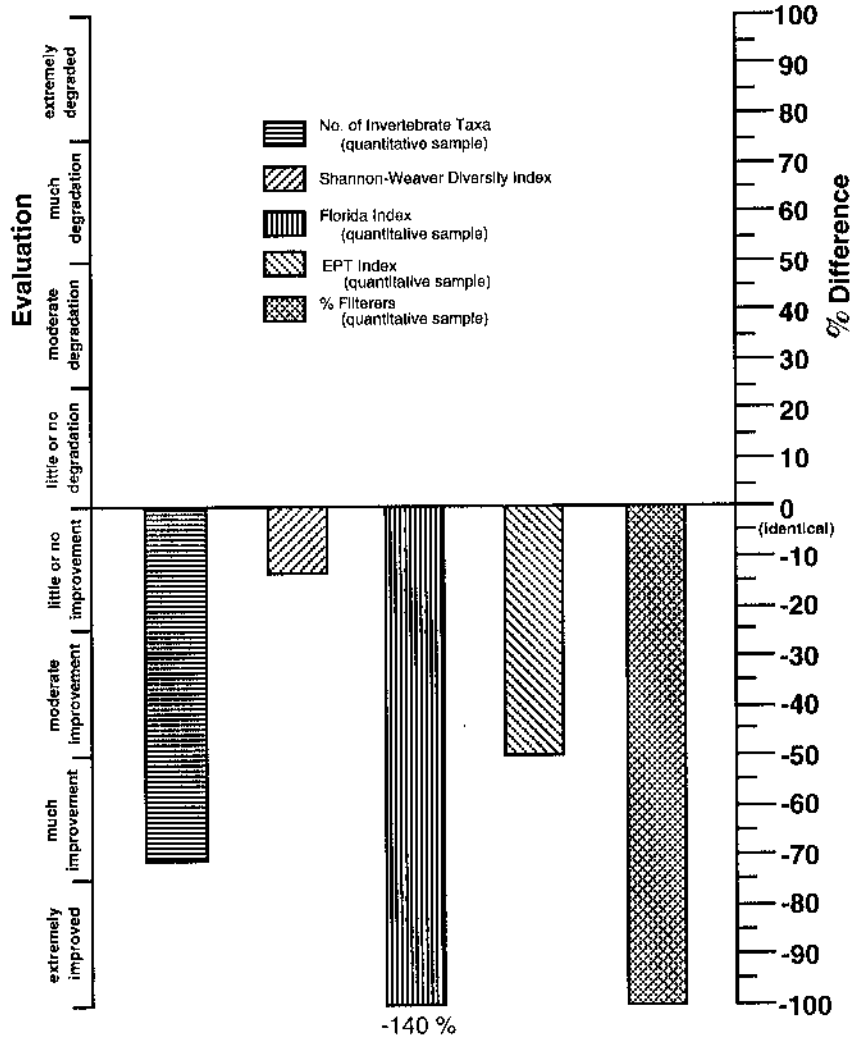
comparison of biological community health was made between a reference site (located upstream of the discharge in an unnamed tributary of the Little Econlockhatchee River) and a test site (located downstream of the discharge) (see maps in Appendix). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. Acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Cyprinella leedsi* as test organisms, were 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 site samples. Methods used for all chemical analyses are on file at the Tallahassee DEP Chemistry Laboratory.

Benthic macroinvertebrate communities were evaluated at reference and test sites. Invertebrates were collected from multiple natural 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 the periphyton communities (Ross 1990). Bacterial populations were analyzed for total and fecal coliforms following the methods of APHA (1989). 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 to determine the effects of a discharge. These are briefly discussed here.

Habitat Assessment: Seven attributes known to have potential effects on the freshwater stream biota were evaluated and scored, with 20 points possible for each factor. Based on the sum of these individual scores, overall habitat quality is assigned to one of four categories: Optimal (105-140 points); Suboptimal (70-104 points); Marginal (35-69 points); and Poor (0-34 points). For marine systems, overall habitat quality is also assigned to one of four categories: Optimal (75-100 points); Suboptimal (50-75 points); Marginal (25-49 points); and Poor (0-24 points) (see habitat assessment field sheets in Appendix).



Effect of discharge on the benthic macroinvertebrate community.

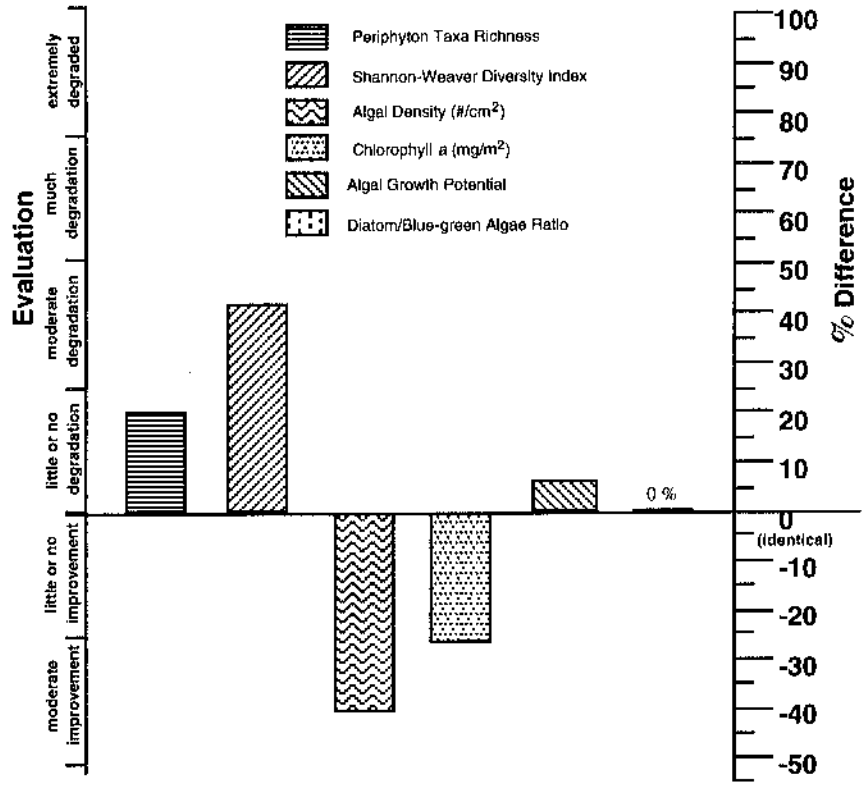
Taxa richness: Stress tends to reduce the number of different types of organisms present in a system, although moderate nutrient enrichment may sometimes be correlated with increased algal taxa richness.

Shannon-Weaver diversity: This index is specified in the Florida Administrative Code as a measure of biological integrity. Low diversity scores are undesirable. They represent conditions where only a few organisms are abundant, to the exclusion of other taxa. Excessive numerical dominance of a single type of organism (a high % contribution of the dominant taxon) is a related measure which is also associated with disturbance.

Numbers of pollution sensitive taxa: Some organisms become rare or absent as the intensity or duration of disturbance increases. For example, 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. Species sensitivity data from other sources, such as Hulbert (1990), Hudson *et al.* (1990), Lenat (1993), Farrell (1992), Chang *et al.* (1992), and Whitmore (1989), are used as appropriate.

Ephemeroptera/Plecoptera/Trichoptera Index: This index is the sum of the number of EPT taxa present. Higher EPT values are associated with healthier systems.

Community structure: Substantial shifts in the proportions of major groups of organisms, compared to reference conditions, may indicate degradation. In marine systems, an increase in the % tubificid oligochaetes, a decrease in the % pelecypods, and a decrease in the number of polychaete taxa are all considered indicators of disturbance (Engel *et al.* 1994).



Effect of discharge on the algal community.

Algal biomass: High algal biomass (algal density or chlorophyll *a*) implies nutrient stress. 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 in flowing streams.

Trophic composition/feeding guilds: Disturbance can shift the feeding strategies of invertebrates. In Florida, for example, pollution may be responsible for reducing the numbers of filter-feeders (FDEP 1994) and shredders (EA Engineering 1994).

The Stream condition Index for Florida (SCI) is a composite macroinvertebrate metric (Barbour *et al.* 1996). The SCI assigns points to a variety of parameters, depending on how closely each parameter approaches an expected reference condition.

For graphical purposes, the percent differences between the reference and test sites involving the number of taxa, the diversity index, the Florida Index, the EPT Index, the diatom to blue-green algae ratio, and the % filter-feeders are measured as the reference site minus test site divided by the reference site. The percent differences between sites involving algal density, 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: Phil Kane, Steve Kent, Clayton Smith, and Eugene Elliott (DEP Central District) and Lyn Burton, Jennifer Eichelberger, Ken Espy, Marshall

Faircloth, Russel Frydenborg, Maosen Hua, Joy Jackson, Elizabeth Miller, Urania Quintana, Bart Richard, Landon Ross, Lisa Tamburello, David Whiting ,Vicki Whiting, 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

Habitat quality ratings at the reference site (59 points) and at the test site (59 points) were equal, with both sites scoring in the marginal category. Both sites had adequate in-stream habitat and good water velocity (0.3 m/sec), but lost points in the categories of artificial channelization, habitat smothering, bank stability, and riparian buffer zone width. Water in the stream was adequately oxygenated, with dissolved oxygen concentrations of 8.7 mg/L at the reference site and 8.1 mg/L at the test site. Water at both sites was circumneutral, with pH measurements of 7.2 SU at the reference site and 7.1 SU at the test site. Conductivity was slightly higher at the reference site (298 µmhos/cm) than at the test site (262 µmhos/cm).

The effluent sample was not toxic to the water flea, *Ceriodaphnia dubia*, or to the fish, *Cyprinella leedsi*. No mortality occurred during the two 48 hour toxicity tests (Appendix).

No organic pollutants were detected in the effluent. With the exception of non-problem levels of aluminum (302 µg/L) and iron (531 µg/L), no metals were detected in the effluent at concentrations above their respective practical quantitation limits.

Nitrate-nitrite concentrations (0.28 mg/L at the reference site and 0.26 mg/L at the test site) exceeded the values found in approximately 75% of other Florida streams (see Table of Typical Water Quality Values in Appendix). This nitrate-nitrite enrichment appeared to be the result of factors other than the discharge (*e.g.*, urban stormwater runoff). Concentrations of total phosphorus (0.13 mg/L reference site and 0.19 mg/L at the test site) and ammonia (0.1 mg/L at the reference site and 0.09 at the test site) were relatively average for a Florida stream.

Algal growth potential (AGP) exceeded the 5 mg dry wt./L "problem threshold" at both the reference site (21.1 mg dry wt./L) and at the test site (22.6 mg dry wt./L) (Raschke and Schultz 1987). The effluent AGP was 9.5 mg dry wt./L. The elevated AGP at both the reference and test sites appeared to be attributable to the nitrate-nitrite enrichment, and is probably the result of stormwater inputs.

Measures of macroinvertebrate health indicated that the discharge was not negatively affecting the benthic community. The figure on p. 2 indicates the degree of difference between the invertebrate populations of 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 control.

The Hester-Dendy sample results indicated that several macroinvertebrate parameters actually improved at the test site, when compared with the reference site. For example, taxa richness increased from 17 taxa at the reference site to 29 at the test site and the Florida Index increased from 5 taxa at the reference site to 12 taxa at the test site. Shannon-Weaver diversity was also slightly higher at the test site (2.9) than at the reference site (2.5). The EPT Index (with 2 EPTs at the reference site and 3 EPTs at the test site) was similar at both sites.

The dip net results demonstrated that the biota of both sites were healthy. The Stream Condition Index scores (33 at the reference site and 29 at the test site) placed both sites in the excellent range for peninsular Florida streams.

The figure on p. 3 represents changes in the periphyton algal community. As was noted with the macroinvertebrates, larger differences (that is, higher percentages) correspond with greater degrees of degradation. Periphyton taxa richness, the diatom/blue green algal ratio, and chlorophyll *a* were mostly unchanged between sites. Periphyton Shannon-Weaver diversity was 1.7 at the reference site and 1.0 at the test site. The lowered diversity values at both sites were largely due to the dominance of *Cocconeis placentula*, a diatom tolerant of nutrient enrichment (Whitmore 1989). Algal density (84,672 cells/cm at the reference site and 50,398 cells/cm at the test site) was relatively elevated at both sites. Periphyton chlorophyll *a* (20.5 mg/m^2 at the reference site and 15.2 mg/m^2 at the test site) exceeded the values found in approximately 75% of other Florida streams, reflecting the nitrate-nitrite enrichment. These results indicate that the fa-

cility was having no adverse effects on the algal community, which already appeared to be suffering the effects of cultural eutrophication.

Conclusions

The effluent sample was not toxic to the water flea, *Ceriodaphnia dubia*, or to the fish, *Cyprinella leedsi*.

No organic pollutants were detected in the effluent. Effluent metals concentrations complied with Class III water quality standards.

Elevated nitrate-nitrite concentrations (0.28 mg/L at the reference site and 0.26 mg/L at the test site) appeared to be the result of factors other than the discharge (*e.g.*, urban stormwater runoff). Concentrations of other nutrients were relatively average for a Florida stream.

Algal growth potential (AGP) exceeded the 5 mg dry wt./L "problem threshold" at both the reference site (21.1 mg dry wt./L) and at the test site (22.6 mg dry wt./L). The effluent AGP was 9.5 mg dry wt./L.

Measures of macroinvertebrate health indicated that the discharge was not negatively affecting the benthic community. The Hester-Dendy results showed that several macroinvertebrate parameters actually improved at the test site, when compared with the reference site. The Stream Condition Index scores (33 at the reference site and 29 at the test site) placed both sites in the excellent range for peninsular Florida streams.

Elevated periphyton density, chlorophyll *a*, and dominance of a taxon tolerant of nutrient enrichment suggested that the algal communities of both sites were affected by cultural eutrophication. The results, however, indicated that factors other than the facility were responsible for these observed effects.

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Chemistry Summary Table for City Industries.	Effluent	Reference Site	Test Site
Organic Constituents (ug/L)			
None Detected	None Detected		
Metals (ug/L)			
Aluminum	302		
Arsenic	20 U		
Cadmium	0.05 U		
Copper	0.02 I		
Chromium	5 U		
Iron	531		
Lead	10 U		
Mercury	0.10 U		
Nickel	4 U		
Selenium	30 U		
Silver	0.04 U		
Zinc	4 U		
Nutrients (mg/L)			
Ortho-phosphate	0.43 A	0.084 A	0.17
Total phosphorus	0.54 A	0.13	0.19
Ammonia	0.11 A	0.10	0.094 A
Nitrate+Nitrite	0.006 I	0.28	0.26
TKN	0.35 A	0.47	0.50
General Phys-Chem Parameters			
Habitat Assessment		59	59
D.O. (mg/L)	7.8	8.7	8.1
pH (SU)	7.6	7.2	7.1
Conductivity (µmhos/cm)	160	298	262
Temperature (°C)	24.7	18.1	18.8
Hardness (mg CaCO3)	46.9		
Algal Growth Potential (mg dry wt/L)	9.5	21.1	22.6
Toxicity			
Bioassay Fish-Dechlorinated	Not Toxic		
Bioassay Invertebrate-Dechlorinated	Not Toxic		

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

I - Value reported is less than the minimum quantitation limit, and greater than or equal to the minimum detection limit

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

Typical Values for Selected Parameters in Florida Waters

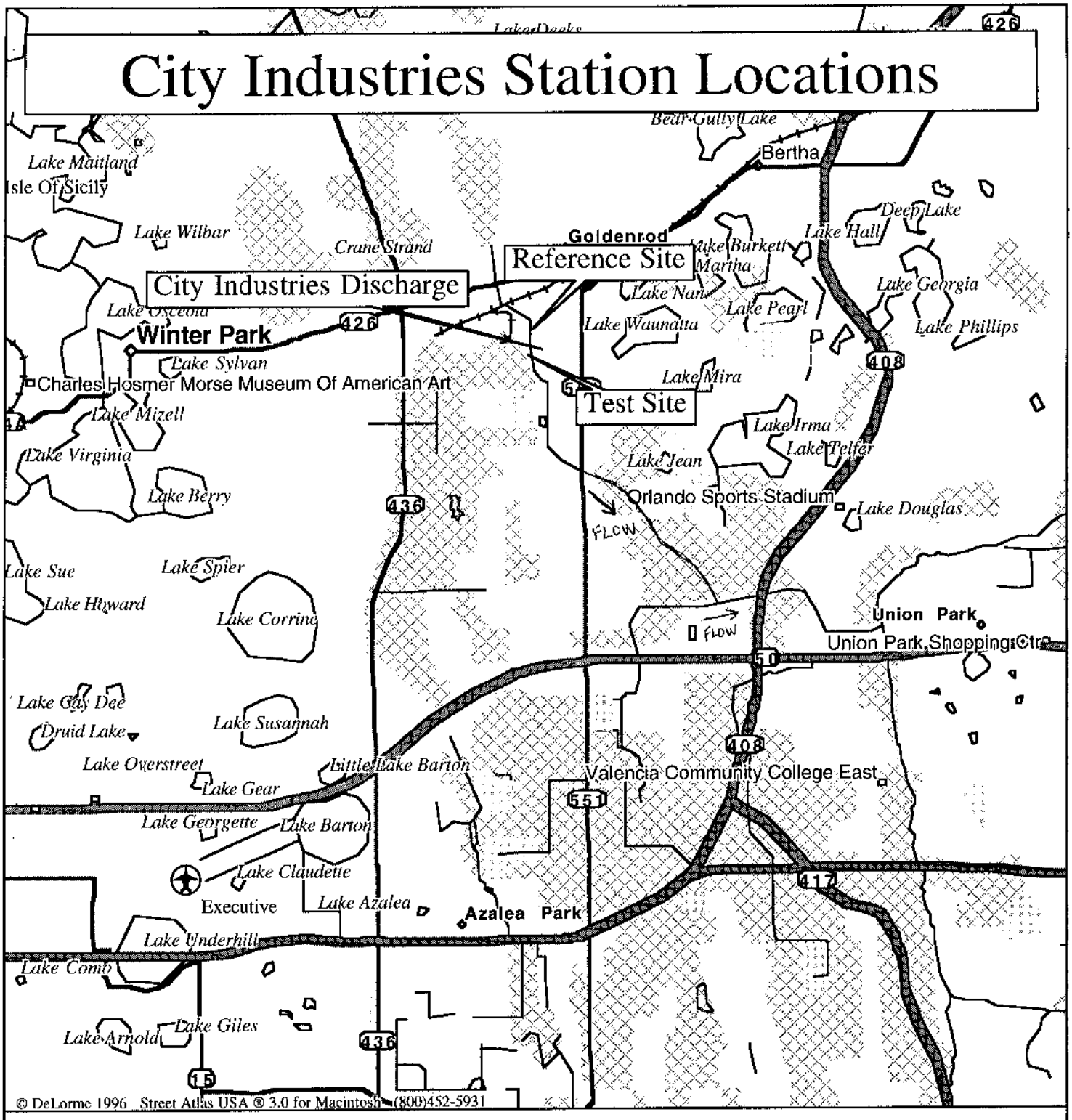
Adapted from Joe Hand, FDER, personal communication, 1991
(data was collected between 1980 and 1989)

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 Phosphate	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-Phosphate	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-Phosphate	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

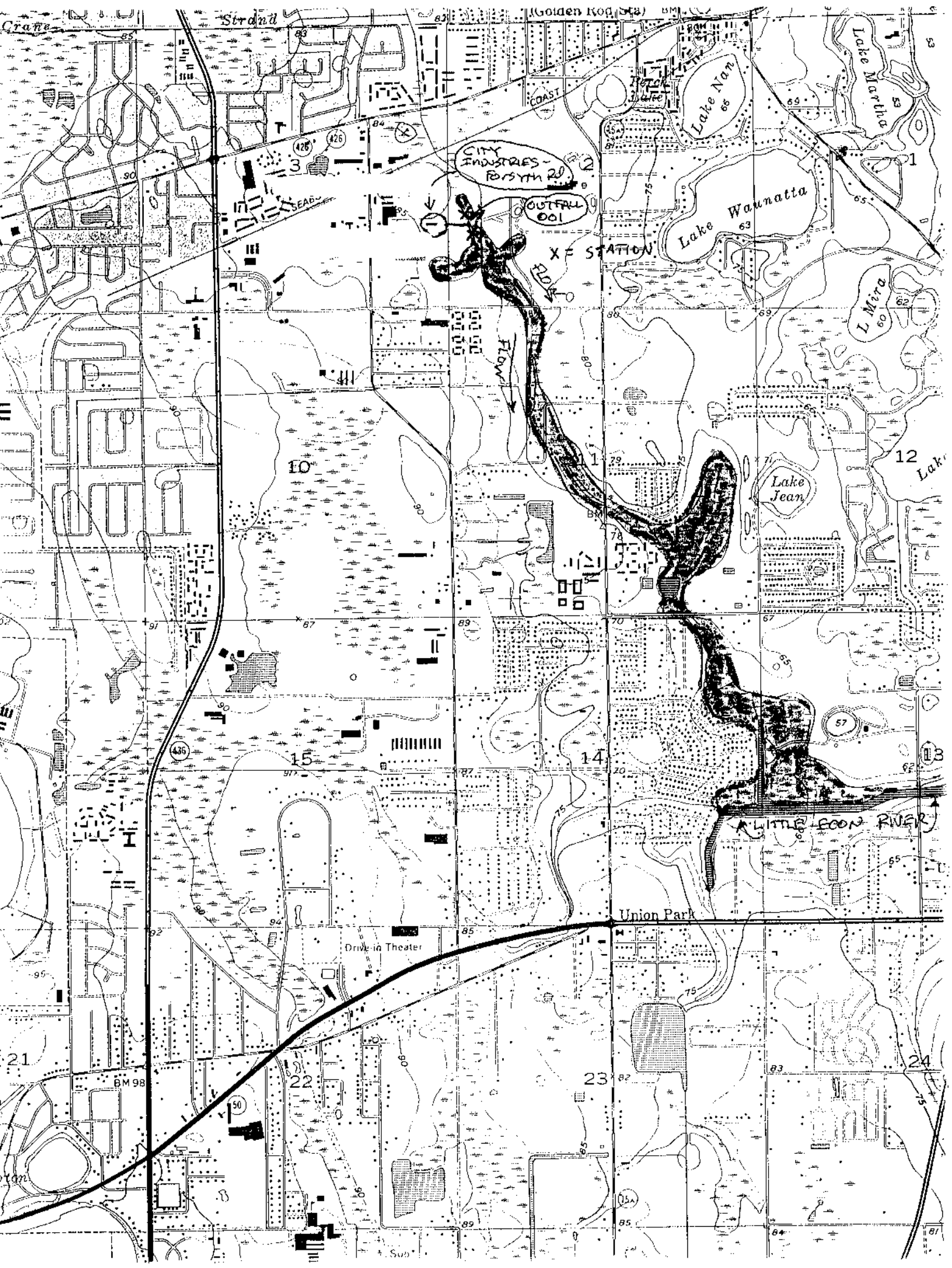
Units:
Phytoplankton Chlorophyll *a* (ug/L), Periphyton Chlorophyll *a* (mg/m^2), Nutrients (mg/L), Turbidity (NTU), Taxa richness and diversity values are for macroinvertebrates

City Industries Station Locations



Mag 13.00
Thu Mar 20 11:17 1997
Scale 1:62,500 (at center)
1 Miles
2 KM

State Route
Toll Highway
Primary State Route
Utility
Railroad
Point of Interest
Town, Small City
Locale
City
Public Airport
Lake, Ocean
Woodland
Sand
Wetland


Strand
Golden Rod Sta
Lake Martha
Lake Nan
Rock Lake
COAST
CITY INDUSTRIES - FORSYTH RD
OUTFALL 001
X = STATION
Lake Waunatta
L Mira
Lake Jean
LITTLE EGG RIVER
Union Park
Drive-in Theater
BM 98
10
11
12
13
14
15
21
22
23
24

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name: CITY INDUSTRIES / FORSYTH		Date Summary Prepared: 12-9-96
Location (attach detailed map):	County: ORANGE	District: CENTRAL
Federal Permit # FL0043265 and expiration date: 9/23/97	State GMS # and State expiration date: NONE 9/23/97	Facility Type: 2 (Industrial) Municipal Federal Agricultural Other (list):

Function of facility: REMEDIATE GROUNDWATERS PREVIOUSLY CONTAMINATED BY A SOLVENT STORAGE OPERATION

Description of treatment process:
GROUNDWATER REMEDIATION CONSISTS OF EXTRACTION OF GROUNDWATER VIA 13 RECOVERY WELLS. THE CONTAMINATED GROUNDWATER IS TREATED BY PASSING THRU AN AIR STRIPPER.

Receiving waters: LITTLE ECONLOCHATCHEE	Cladsification: I II (III)	
Design Flow: 0.144 MGD	Mean Flow: 0.131 mgd	Flow during survey:

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

therefore, the best time to sample is:

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

NO MIXING ZONE

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

Parameter	Limit (units)	Describe special permit conditions and permit modifications:
FLOW (mgD)	NONE	
BOD5 (mg/L)	5.0 mo. Ave, 8.0	Daily MAX.
Ammonia (mg/L)	1.0 Mo. Avg, 1.6	Daily MAX.
TOTAL N (mg/L)	3.0 Mo. Avg, 4.8	Daily MAX.
TOTAL P (mg/L)	1.0 Mo Avg, 1.6	Daily MAX.
pH	6.0 min 8.5 max	
D.O. (mg/L)	6.0 Daily min	
7 Day chronic TOXICITY → No observable effect @ 100% eff.		

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

CITY INDUSTRIES / FORSYTH
(Facility)

FACILITY SUMMARY

Description of permitted outfall(s):
OUTFALL 001 is a 5" PVC pipe located approx. 300 feet due East of TREATMENT PLANT

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: Facility is Required to perform 2 Chronic Toxicity tests (Screening) per YEAR. The 1st Test of 1996 passed Both Species., the 2nd Test has not been Received Yet.

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:

— no previous BioAssessments
— no previous WQBEL
— no previous Enforcement.

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set:

Mor Data Results reveal that BOD_5 Monthly Avrgl is exceeded During August / September This Year. No OTHER Exceedances were observed.

Additional information:
Facility Drains entire system once/week and cleans with H_2O_2. The facility used to use chlorine but this practice was ceased on 7-96.

Staff contributing to this review (signature):

Philip N. Kan	(Biologist)
Clayton L. Smith	ES II (Inspector)
Eugene Elliott	(Engineer)
	( )
	( )
	( )

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-96)

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: ~~CENTRAL FL~~ FDEP CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 12/16/96	TIME	RECEIVING BODY OF WATER: LITTLE ECON

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
UPSTREAM	ORANGE	CITY INDUSTRIES FORSYTH ROAD ORLANDO, FL.	CI

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
25%					50%	25%	

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

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

Width of riparian vegetation (m) on least buffered side: 0

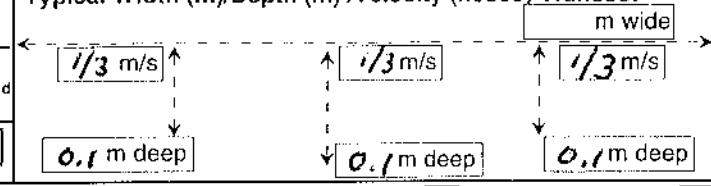
List & map dominant vegetation on back

Artificially Channelized ☐ no ☑ recent, severe ☐ some recovery ☐ mostly recovered, more sinuous

Artificially Impounded ☐ yes

High Water Mark: 0.2M (m above present water level) + 0.1M (present depth in m) = 0.3M (m above bed)

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect



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 Deposition: Sludge ☐ Sand smothering: none slight moderate (severe) Silt smothering: none slight (moderate) severe Other:

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand	80%	5	NET
Leaf Packs or Mats				Mud/Muck/Silt			
Aquatic Vegetation	20%	15	NET	Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top								TO BOTTOM
Mid-depth								
Bottom								

SEE ADDITIONAL SHEETS

System Type: Stream ☑ (1st - 2nd order, 3rd - 4th order, 5th - 6th order, 7th order or greater) 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/Notes:

SUN/CLOUD

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

SAMPLING TEAM	SIGNATURE	DATE
KANE, KENT	Phil Kane	12/16/96

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET (4-22-96)

SUBMITTING AGENCY CODE: 38 / SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 12/16/96	RECEIVING BODY OF WATER: LITTLE ECON

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
UPSTREAM	ORANGE	CITY INDUSTRIES FORSYTH ROAD ORLANDO, FL.	CI

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Substrate Types & Availability [13]	Greater than 30% snags, logs, tree roots, aquatic vegetation, leaf packs (partially decayed), undercut banks, rock, or other stable habitat. 20 19 18 17 16	16% to 30% snags, logs, tree roots, aquatic vegetation, leaf packs, etc. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	5% to 15% snags, logs, tree roots, aquatic vegetation, leaf packs, etc. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	Less than 5% snags, logs, tree roots, aquatic vegetation, leaf packs, etc. Lack of habitat is obvious, substrates unstable or smothered. 5 4 3 2 1
Water Velocity [19]	Max. observed at typical transect: >0.25 m/sec. but < 1 m/sec 20 19 18 17 16	Max. observed at typical transect: 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed at typical transect: 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed at typical transect <0.05 m/sec, or spate occurring; > 1 m/sec 5 4 3 2 1
Artificial Channelization [2]	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Habitat Smothering [5]	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent 5 4 3 2 1
Bank Stability [5]	Stable. No evidence of erosion or bank failure. Little potential for future problems. 20 19 18 17 16	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 15 14 13 12 11	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 10 9 8 7 6	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 5 4 3 2 1
Riparian Buffer Zone Width [5]	Width of native vegetation (least buffered side) greater than 18 m 20 19 18 17 16	Width of native vegetation (least buffered side) 12 m to 18 m 15 14 13 12 11	Width of native vegetation 6 to 12 m, human activities still close to system 10 9 8 7 6	Less than 6 m of native buffer zone due to intensive human activities 5 4 3 2 1
Riparian Zone Vegetation Quality [10]	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions. 20 19 18 17 16	50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 15 14 13 12 11	25% to 50% of riparian zone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 10 9 8 7 6	Less than 25% of streambank surfaces are vegetated and/or poor plant community (*e.g.* grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 5 4 3 2 1

[0] Add **5 points** if cross-sectional area of flow is estimated to be > one square meter during periods of normal flow.

[59] **TOTAL SCORE**

Comments

ANALYSIS DATE:	ANALYST:	SIGNATURE:
12/16/96	KANE	Phil Kane

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-96)

SUBMITTING AGENCY CODE: 30 ~~FDEP~~ PK SUBMITTING AGENCY NAME: ~~CENTRAL FDEP~~ CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 12/16/96	TIME	RECEIVING BODY OF WATER: LITTLE ECON

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
DOWNSTREAM	ORANGE	CITY INDUSTRIES FORSYTH ROAD ORLANDO, FL.	CI

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
25%					50%	25%	

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

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

Width of riparian vegetation (m) on least buffered side: 0

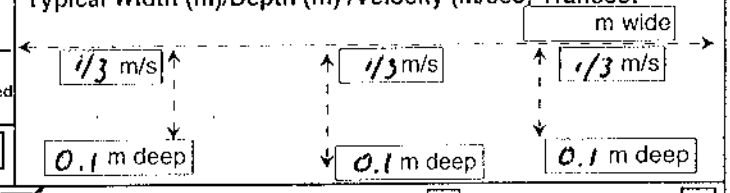
List & map dominant vegetation on back

Artificially Channelized ☐ no ☑ recent, severe ☐ some recovery ☐ mostly recovered more sinuous

Artificially Impounded ☐ yes

High Water Mark: 0.2M (m above present water level) + 0.1M (present depth in m) = 0.3M (m above bed)

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect



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 Deposition: Sludge: ☐ Sand smothering: none slight moderate severe Silt smothering: none slight moderate severe Other:

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand	80%	5	NET
Leaf Packs or Mats				Mud/Muck/Silt	80%	5	NET PK
Aquatic Vegetation	20%	15	NET	Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top								TO BOTTOM
Mid-depth								
Bottom								

SEE SAMPLING KEELS

System Type : Stream: ☑ (1st - 2nd order 3rd - 4th order 5th - 6th order 7th order or greater) 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/Notes:

SUN/CLOUD

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

SAMPLING TEAM	SIGNATURE	DATE:
KANE, KENT	Phil Kane	12/16/96

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET (4-22-96)

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 12/16/96	RECEIVING BODY OF WATER: LITTLE ECON

REMARKS: DOWNSTREAM	COUNTY: ORANGE	LOCATION: CITY INDUSTRIES FORSYTH ROAD ORLANDO, FL.	FIELD ID/NAME: CI

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[0] Add 5 **points** if cross-sectional area of flow is estimated to be > one square meter during periods of normal flow.

Comments

[59] **TOTAL SCORE**

ANALYSIS DATE: 12/16/96	ANALYST: KANE	SIGNATURE: Phil Kane

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: City Industries
County: Orange
Contact / District: Dr. Phil Kane / Central
NPDES Permit #: FL0043265
LIMS Sample #: 163477 LIMS Job #: 96-DEC-17-22-01
sample log 12/30 ow

Sample Collection: Date 12/16/96 Time 0900
Test Beginning: Date 12/17/96 Time 1530
Test Ending: Date 12-19-96 Time 1530
Organism Batch #: 54 Diluent Batch #: 61
Organism Age: <24 hours
Test Organism: Ceriodaphnia dubia

Test Type: Screening | Definitive
Static | Static Renewal | Flow-through

Test Number: 1 of 2

Remarks:

Instrument Calibrations:	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0	24.5 @ 24.5	8.2 @ 25.2 °C	1033 @ 1010
	9.0 @ 9.0			985 @ 1001 @ 25.1 °C
24 hr	7.0 @ 7.0	21.6 @ 21.8	8.4 @ 23.6 °C	1041 @ 1010 (1000 @ 1001 @ 24.1 °C)
	9.0 @ 9.0			
48 hr	7.0 @ 7.0	23.5 @ 23.5	8.5 @ 23.1 °C	1034 @ 1010
	9.0 @ 9.0			1000 @ 1001 @ 25.1 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
Ctr	A	5	5	4	8.2		8.1	24.1		24.7	8.0		7.7	175		190
Ctr	B	5	5	5			8.1			24.7			7.8			190
Ctr	C	5	5	5			8.1			24.7			7.8			190
Ctr	D	5	5	5			8.1			24.8			7.8			190
100%	A	5	5	5	7.6		7.9	24.1		24.8	7.8		7.8	160		165
100%	B	5	5	5			7.8			24.9			7.8			165
100%	C	5	5	5			7.8			24.9			7.8			165
100%	D	5	5	5			7.8			24.8			7.8			170
Measured/Loaded by:		OW	ND	MF	ND		MF	ND		MF	ND		MF	ND		MF
Recorded by:		ND	ND	MF	JS		ND	JS		ND	JS		ND	JS		ND

Investigators' Signatures

Julie Sharpe
Dennis Mosher
Tim Cash
Marilyn Fowler
Al Wolfe
Reviewer

form updated 4/01/96

Water Quality Parameters	Salt Water Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			Not Measured		
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03	<0.03	DR-100	JS
Alkalinity (mg/L as $CaCO_3$):	125	75	35	Hach	ND
Hardness (mg/L as $CaCO_3$):	133	90	55	Hach	ND
Total ammonia (mg/L as N):	<0.017	<0.017	<0.017	ORION	DN

Ammonia Meter #98136 Ammonia Meter Slope: -59.6 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: City Industries
County: Orange
Contact / District: Dr. Phil Kane / Central
NPDES Permit #: FL00 43265
LIMS Sample #: 163477 **LIMS Job #:** 96-DEC-17-22-04
sample log 11/26 203
Test Type: Screening / Definitive
Static / Static Renewal / Flow-through
Test Number: 2 of 2
Remarks:

Sample Collection: Date 12/16/96 Time 0900
Test Beginning: Date 12/17/96 Time 1530
Test Ending: Date 12-19-96 Time 1530
Organism Batch #: 93 **Diluent Batch #:** Well
Organism Age: 14 days
Test Organism: Cyprinella leedsi

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0	24.5 @ 24.5	8.2 @ 25.2 °C	103.3 @ 101.0
	9.0 @ 9.0			995 @ 1001 @ 25.1 °C
24 hr	7.0 @ 7.0	21.6 @ 21.8	8.4 @ 23.6 °C	104.1 @ 101.0
	9.0 @ 9.0			1000 @ 1001 @ 24.1 °C
48 hr	7.0 @ 7.0	23.5 @ 23.5	8.5 @ 23.1 °C	103.4 @ 101.0
	9.0 @ 9.0			1010 @ 1001 @ 25.1 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
Ctrl A	01	5	3 2D	~~4~~ 3 2D	7.9	8.2	8.3	25.0	24.0	23.5	7.9	7.1	8.0	255	250	250
Ctrl B	02	5	5	~~3~~ 3 2D	7.9	8.2	8.3	25.0	23.8	23.5	7.8	7.2	8.0	255	245	250
Ctrl C	03	5	5	~~4~~ 4 2D	7.9	8.2	8.3	26.0	23.7	23.5	7.8	7.3	8.1	255	245	230
Ctrl D	04	5	5	~~5~~ 5 2D	7.9	8.2	8.3	25.0	23.8	23.9	7.8	7.4	8.1	255	230	230
100% A	05	5	5	~~2~~ 2 2D	7.7	7.7	7.7	24.5	23.7	23.4	7.8	7.3	8.0	160	160	160
100% B	06	5	5	~~3~~ 3 2D	7.7	7.6	7.7	24.2	23.5	23.5	7.8	7.2	8.0	160	155	160
100% C	07	5	5	~~4~~ 4 2D	7.6	7.6	7.7	24.1	23.5	23.3	7.8	7.2	8.1	155	160	160
100% D	08	5	5	~~5~~ 5 2D	7.6	7.6	7.7	24.0	23.6	23.3	7.8	7.2	8.1	155	160	160
				3												
				5												
				5												
				3 2D												
				4 2D												
				5												
				3 2D												
				4 2D												
Measured/Loaded by:		SS	SS	DN	ND	SS	MF	ND	SS	MF	ND	SS	MF	ND	SS	MF
Recorded by:		ND	ND	DN	JS	ND	ND	JS	ND	ND	JS	ND	ND	JS	ND	ND

Investigators' Signatures

Julie Harper

Dennis Nicholson

Mark Fairchild

reviewer

form updated 4/01/96

@ entry error 12/19/96 DN

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			Not measured		
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03	<0.03	DR-100	JS
Alkalinity (mg/L as $CaCO_3$):	125	25	35	Hach	ND
Hardness (mg/L as $CaCO_3$):	135	90	55	Hach	ND
Total ammonia (mg/L as N):	<0.017	<0.017	<0.017	ORION	DN

Ammonia Meter #98136 Meter Slope: -59.6 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

Reference Site

Winter Index Period: Stream Condition Index for Florida (SCI) (April 1996)													
Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	Value	Panhandle				Peninsula				Northeast			
		5	3	1	Score	5	3	1	Score	5	3	1	Score
Total Number of Taxa	36	≥27	26-14	<14		≥ 27	26-14	<14	5	≥18	17-9	<9	
EPT Index	9	≥6	5-3	<3		≥ 4	3-2	<2	5	-	≥3	<3	
# Chironomid Taxa	10	≥9	8-5	<5		≥9	8-5	<5	5	≥4	3-2	<2	
% Contribution of Dominant Taxon	26	≤25	26-62	>62		≤30	31-65	>65	5	≤37	38-69	>69	
% Diptera	31	-	≤60	>60		-	≤52	>52	3	-	≤67	>67	
Florida Index	14	≥ 13	12-7	<7		≥10	9-5	<5	5	≥ 6	5-3	<3	
% Suspension feeders/Filterers	15	≥ 13	12-7	<7		≥15	14-8	<8	5	≥ 25	25-13	<13	
Total Score		Panhandle				Peninsula			33	Northeast			
Interpretation of Score		Excellent			27-33	Excellent			27-33	Excellent			26-31
		Good			21-26	Good			21-26	Good			20-25
		Poor			14-20	Poor			14-20	Poor			14-19
		Severely Degraded			7-13	Severely Degraded			7-13	Severely Degraded			7-13

Test Site

Winter Index Period: Stream Condition Index for Florida (SCI) (April 1996)													
Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	Value	Panhandle				Peninsula				Northeast			
		5	3	1	Score	5	3	1	Score	5	3	1	Score
Total Number of Taxa	26	≥27	26-14	<14		≥ 27	26-14	<14	3	≥18	17-9	<9	
EPT Index	5	≥6	5-3	<3		≥ 4	3-2	<2	5	-	≥3	<3	
# Chironomid Taxa	13	≥9	8-5	<5		≥9	8-5	<5	5	≥4	3-2	<2	
% Contribution of Dominant Taxon	21	≤25	26-62	>62		≤30	31-65	>65	5	≤37	38-69	>69	
% Diptera	42	-	≤60	>60		-	≤52	>52	3	-	≤67	>67	
Florida Index	10	≥ 13	12-7	<7		≥10	9-5	<5	5	≥ 6	5-3	<3	
% Suspension feeders/Filterers	13	≥ 13	12-7	<7		≥15	14-8	<8	3	≥ 25	25-13	<13	
Total Score		Panhandle				Peninsula			29	Northeast			
Interpretation of Score		Excellent			27-33	Excellent			27-33	Excellent			26-31
		Good			21-26	Good			21-26	Good			20-25
		Poor			14-20	Poor			14-20	Poor			14-19
		Severely Degraded			7-13	Severely Degraded			7-13	Severely Degraded			7-13

Benthic macrovertabrate taxa list for City Industries, collected via Hester-Dendy artificial substrate samplers on 16 December 1996. Abundance values are number/m^2.

	Reference Site	Test Site
Oligochaeta		
Dero trifida	3	–
Pristina aequiseta	–	3
Hirudinea		
Gloiobdella elongata	–	19
Helobdella triserialis	5	11
Gastropoda		
Ancylidae	–	11
Hebetancylus excentricus	132	177
Micromenetus sp.	3	–
Physella sp.	3	5
Amphipoda		
Hyalella azteca	299	439
Decapoda		
Cambaridae	16	3
Procambarus sp.	26	5
Ephemeroptera		
Caenis sp.	5	24
Stenacron sp.	26	8
Odonata		
Argia sp.	106	77
Argia moesta	–	3
Argia sedula	32	26
Hemiptera		
Pelocoris sp.	3	–
Coleoptera		
Stenelmis sp.	–	3
Trichoptera		
Trichoptera	–	3
Diptera		
Ablabesmyia mallochi	–	5
Ablabesmyia rhamphe grp.	3	11
Chironomidae	3	3
Chironomus sp.	–	16
Cryptochironomus sp.	–	3
Goeldichironomus sp.	–	3
Larsia sp.	–	3
Paratanytarsus sp. C Epler	–	3
Polypedilum sp. A Epler	3	3
Polypedilum halterale	–	3
Polypedilum halterale grp.	5	3
Polypedilum illinoense	8	13
Polypedilum scalaenum	–	71

Polypedilum scalaenum grp.	26	21
Polypedilum tritum	3	5
Tanytarsus sp. A Epler	–	3
Thienemanniella sp. C Epler	–	3

Benthic macrovertebrate taxa list for City Industries, collected by 20 discrete dip net sweeps of multiple substrates on 16 December 1996.

	Reference Site	Test Site
Nemertea		
Prostoma rubrum	1	–
Oligochaeta		
Dero trifida	1	–
Nais communis	2	1
Nais pardalis	14	6
Hirudinea		
Helobdella fusca	2	–
Helobdella triserialis	–	1
Gastropoda		
Ancylidae	48	4
Melanoides sp.	2	–
Gastropoda	1	–
Hebetancylus excentricus	42	30
Physella sp.	1	3
Pelecypoda		
Corbicula fluminea	36	19
Pisidiidae	3	–
Acarina		
Hygrobates sp.	–	1
Limnesia sp.	4	–
Amphipoda		
Amphipoda	1	–
Hyalella azteca	23	45
Decapoda		
Procambarus sp.	–	1
Ephemeroptera		
Acerpenna pygmaeus	2	–
Caenis sp.	3	5
Callibaetis floridanus	2	–
Odonata		
Argia sp.	5	4
Argia sedula	–	1
Coenagrionidae	14	3
Enallagma sp.	2	–
Enallagma cardenium	11	–
Odonata	1	–
Zygoptera	1	–
Coleoptera		
Peltodytes sexmaculatus	1	–
Trichoptera		
Cheumatopsyche sp.	1	–
Oxyethira sp.	5	–
Lepidoptera		

Acentria sp.	4	–
Lepidoptera	3	–
Nepticulidae	1	–
Paraponyx sp.	–	1
Parapoynx sp.	9	–
Petrophila sp.	1	–
Diptera		
Chironomidae	11	–
Chironomus sp.	–	1
Clinotanypus sp.	–	*1*
Cricotopus tricinctus	–	2
Cryptochironomus sp.	–	3
Cryptotendipes sp.	2	–
Dicrotendipes modestus	1	–
Goeldichironomus sp.	–	2
Orthocladiinae	–	2
Palpomyia/bezzia grp.	1	7
Paracladopelma sp.	–	1
Paracladopelma nereis	1	–
Paratanytarsus sp. A Epler	–	2
Paratanytarsus sp. C Epler	9	5
Pentaneura inconspicua	3	–
Polypedilum sp.	1	1
Polypedilum halterale grp.	–	1
Polypedilum illinoense	50	42
Polypedilum scalaenum grp.	20	10
Rheotanytarsus exiguus	4	2
Tanytarsus sp.	1	–
Tanytarsus sp. A Epler	1	–
Thienemanniella sp.	5	4
Thienemanniella sp. C Epler	–	3

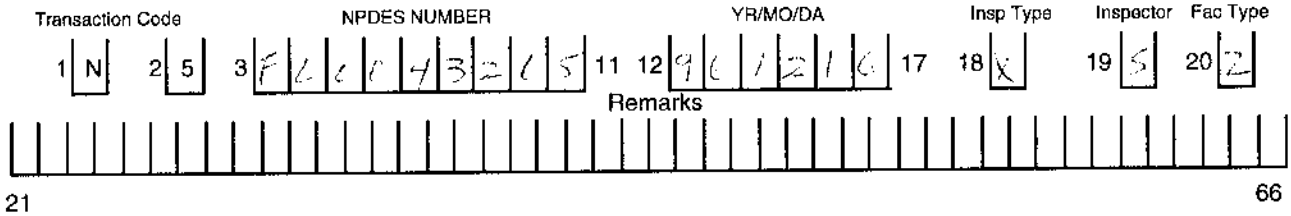
Periphyton taxa list for City Industries, collected via standard diatometers on 16 December 1996. Abundance values are numbers/m^2.

	Reference Site	Test Site
Cyanophyceae		
Stigeoclonium sp.	3214	666
Chlorophyceae		
Euastrum sp.	140	–
Oedogonium sp.	1118	333
Bacillariophyceae		
Achnanthes exigua	2236	777
Achnanthes lanceolata	20539	2775
Cocconeis placentula	49881	42072
Cyclotella sp.	279	–
Eunotia sp.	2515	2331
Navicula sp.	–	444
Navicula minima	2236	–
Navicula pupula	–	222
Nitzschia palea	279	222
Pennales	2236	555

Phytoplankton taxa list for City Industries, collected via grab sample on 16 December 1996. Abundance values are numbers/ml.

	Reference Site	Test Site
Cyanophyceae		
Anabaena sp.	21	21
Chlorophyceae		
Chlamydomonas sp.	10	–
Chlorella sp.	10	–
Chlorophyceae	10	–
Cosmarium sp.	21	–
Spermatozoopsis sp.	10	–
Chrysophyceae		
Dinobryon sp.	10	–
Bacillariophyceae		
Achnanthes sp.	113	147
Cocconeis sp.	51	63
Cyclotella sp.	–	11
Gomphonema sp.	10	–
Navicula sp.	72	95
Nitzschia sp.	21	21
Pennales	62	95
Cryptophyceae		
Cryptomonas sp.	10	21

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)

