

Biological Assessment of

City of Green Cove Springs Wastewater Treatment Plant

Clay County

NPDES #FL0020915

Sampled June 1996

October 1996

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 of Green Cove Springs
County: Clay
NPDES Number: Fl0020915
State Permit Expiration Date: 16 March 1997

Toxics Sampling Inspection (XSI)

Date Sampled: 11 June 1996

Results: An extremely low level of the herbicide, atrazine (0.097 µg/L) was detected in the effluent. This concentration is below acutely or chronically toxic levels. Copper (5 µg/L), silver (0.05 µg/L), iron (57 µg/L), and zinc (52 µg/L) were detected in the effluent at levels which complied with Class III water quality standards.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 11 June 1996

Results: The full strength effluent sample was not acutely toxic to the fish, *Cyprinella leedsi,* or to the invertebrate, *Ceriodaphnia dubia.*

Impact Bioassessment Inspection (IBI)

Date Sampled: Most quantitative measures of macroinvertebrate community health suggested no negative effects from the discharge. The biota throughout the study area appeared to be typical of a nutrient enriched lentic system, with some estuarine fauna represented. The algal communities at all three sites were also typical of those suffering from cultural eutrophication. Chlorophyll *a* was very high, ranging from 49.4 µg/L at the reference site to 30.9 µg/L at test site 1. These chlorophyll a values are higher than those found in over 95% of other estuaries. Cyanophytes were the most abundant algal group at all three sites, ranging from 58% of the population at test site 2 to 70% of the reference site community. Taxa often associated with nutrient enriched conditions, such as *Anabaena* sp. and *Microcystis* sp., were quite common at all receiving water stations. Although the discharge was certainly a nutrient contributor, existing phytoplankton populations in this portion of the St. Johns River already appeared to be degraded.

Water Quality Inspection (WQI)

Date Sampled: 11 June 1996

Results: Effluent concentrations of ammonia (6.0 mg/L), nitrate-nitrite (0.35 mg/L), total phosphorus (2.0 mg/L), ortho-phosphate (2.0 mg/L), and TKN (6.9 mg/L) were elevated compared to receiving water stations. The effluent unionized ammonia was calculated to be 0.04 mg/L, a violation of Rule 62-302.530(3) FAC. The facility was obviously affecting the nutrient regime of test site 1, which receives the discharge on an outgoing tide. Test site 1 levels of ammonia (0.72 mg/L), nitrate-nitrite (0.13 mg/L) and total phosphorus (0.26 mg/L) were higher than those found in 95%, 85%, and 80%, respectively, of other Florida estuaries. Unionized ammonia at test site 1 (0.06 mg/L) also violated Class III water quality standards. Water from all three receiving water sites exceeded the algal growth potential (AGP) freshwater "problem threshold" of 5 mg dry wt/L. The AGP measured at the reference site (10.2 mg dry wt/L) was lower than those of the test sites (14.9 mg dry wt/L at both sites). AGP of the effluent was 107.0 mg dry wt/L.

Introduction

The City of Green Cove Springs Wastewater Treatment Plant is located on Harbour Road, Green Cove Springs, in Clay County (see maps in Appendix). This municipal facility, with a design capacity of 1.25 MGD, treats domestic waste via contact stabilization (activated sludge) using two parallel treatment systems. The effluent is chlorinated (and subsequently dechlorinated) and discharged to the St. Johns River near the mouth of Governors Creek. During this survey, the facility was discharging 0.72 MGD.

Permit limits are as follows: flow (restricted to 0.95 MGD as an annual average), BOD and TSS (20 mg/L as an annual average), pH (6.0 to 8.5 SU), fecal coliform bacteria (200 organisms/100 mL as an annual average), dissolved oxygen (5.0 mg/L minimum), and total residual chlorine (minimum of 0.5 mg/L for disinfection, maximum of 0.01 mg/L at discharge). Additionally, the facility is required to perform toxicity bioassays of the effluent, as well as to conduct water quality sampling of the receiving waters on a quarterly basis (see Appendix).

These monitoring data indicate periodic water quality degradation in the vicinity of the discharge. For example, chlorophyll *a* concentrations are sometimes very elevated (between 54.5 µg/L and 57.6 µg/L in July, 1995). Fecal coliform violations have occurred (greater than 1,600 organisms/100 mL in February, 1993) and carbonaceous BOD has periodically been elevated (between 4.9 mg/L and 8.5 mg/L on four separate occasions). Nitrate-nitrite enrichment (with receiving water values between 0.33 mg/L and 1.3 mg/L) has been noted on four dates. Excessive levels of orthophosphate and total phosphorus (ranging from 0.268 mg/L to 1.3 mg/L for the former and up to 2.25 mg/L for the latter) have also been documented.

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	17	21	27
Shannon-Weaver Diversity	2.6	3.0	3.7
Florida Index	4	3	5
Lake Condition Index (macroinvertebrate component)	7	11	8
% Oligochaeta	13.3	20.0	18.8
% Diptera	80.4	72.2	44.1
% Amphipoda	0.8	1.3	13.0
% Isopoda	2.9	2.9	18.3
% Trichoptera	2.0	0.9	0.7
% Other	0.6	2.5	0
% Ephemeroptera	0	0.2	5.1
% Predator/Carnivores	23.7	19.2	17.4
% Above-Surface Deposit Feeders	29.3	41.1	18.8
% Below Surface Deposit Feeders	13.3	20.0	16.6
% Scavengers	1.8	2.1	15.5
% Suspension Feeders	25.2	10.2	8.4
% Shredders	3.9	3.3	3.0
% Unknown	0.1	0	2.3
% Scrapers	0	2.1	2.5
% Browser-Grazer	1.8	2.1	15.5
Phytoplankton Algae			
Number of Taxa	31	34	36
Shannon-Weaver Diversity	3.8	3.7	4.3
Chlorophyll a (µg/L)	49.4	30.9	34.8
Algal Density (#/mL)	13311.2	8165.2	10992.8
% Blue-green	70.0	68.5	58.2
% Green	7.3	7.1	20.3
% Other	0.8	1.3	3.0
% Diatoms	21.7	23.2	18.5
Algal Growth Potential (mg dry wt/l)	10.2	14.9	14.9

Methods

The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a reference site (located south of the discharge in the St. Johns River,

across from Picolata Point) and two test sites bracketing the discharge (test site 1 was located 50 meters north of the outfall, and test site 2 was 50 meters south of the outfall) (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 sites. 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 with 3 petite Ponar dredge samples per station (Ross 1990). Phytoplankton was sampled at both reference and test sites 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).

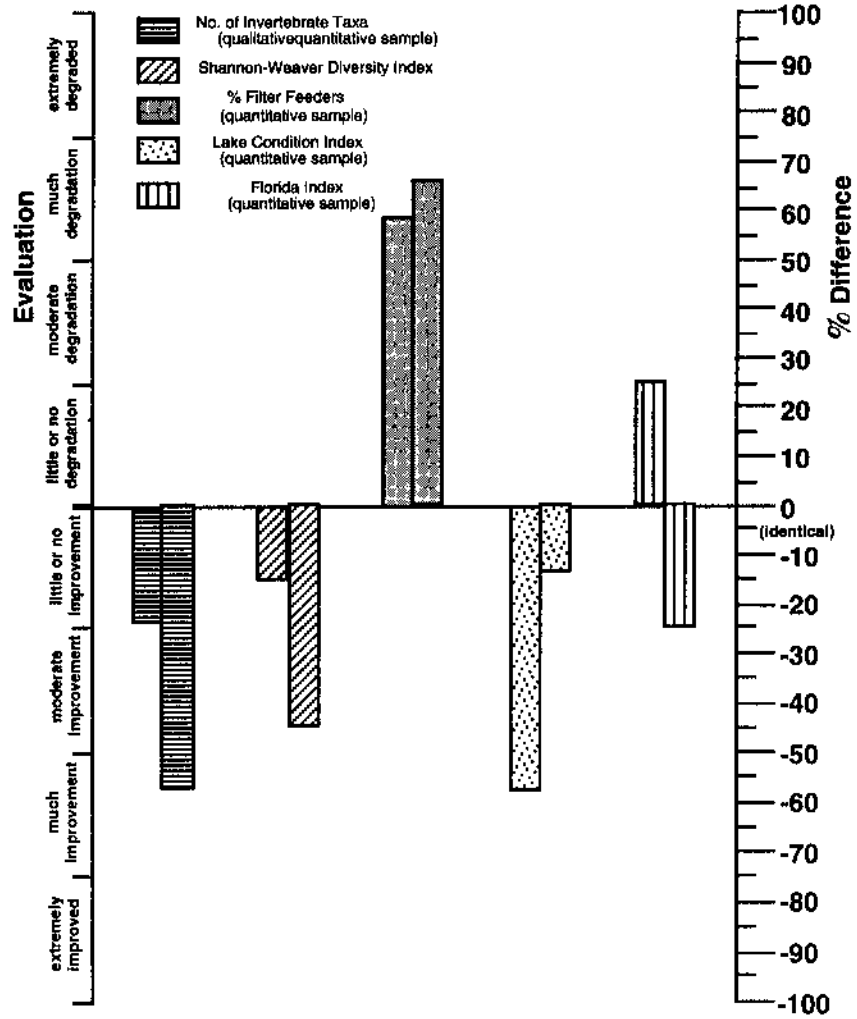
Explanation of Measurements of Community Health

Several different measurements of macroinvertebrate and algal community health have been employed to determine the effects of a discharge. These are briefly discussed here.

Habitat Assessment: Seven attributes known to have potential effects on the 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).

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



Effect of discharge on the benthic macroinvertebrate community.

The left bar for each parameter shows differences between the reference site and test site 1. The right bar shows differences between the reference site and test site 2.

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.

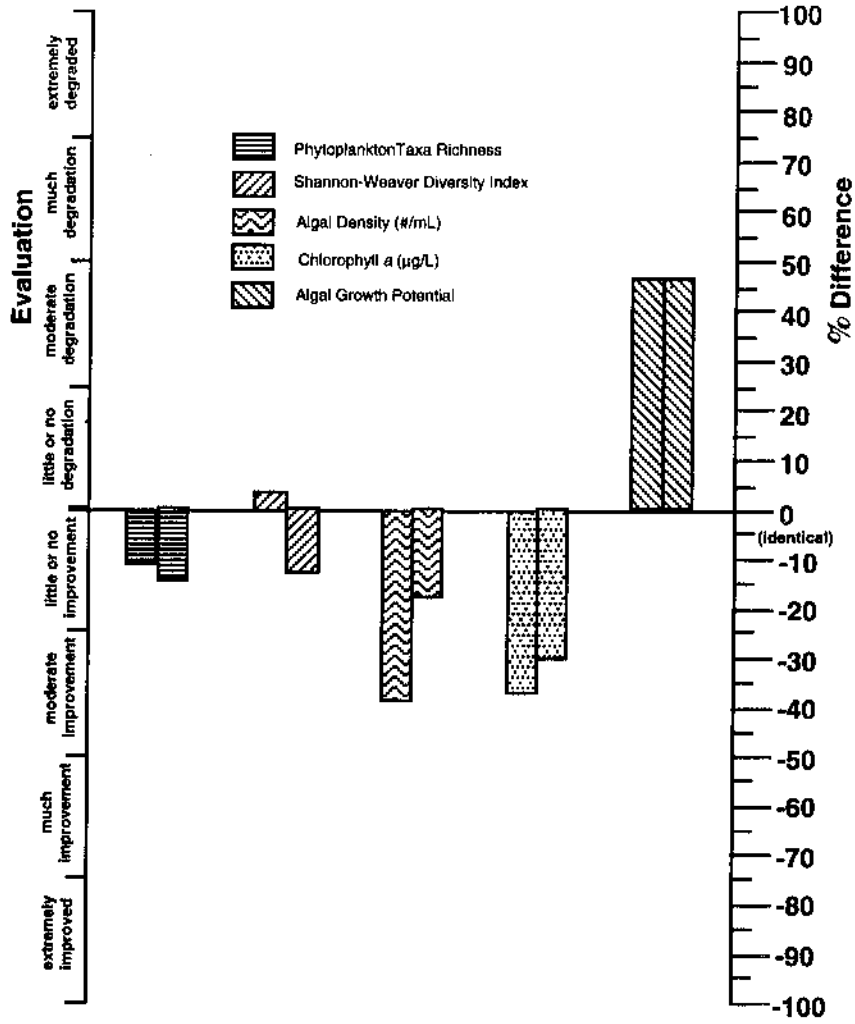
Numbers of pollution sensitive taxa: Some organisms become rare or absent as the intensity or duration of disturbance increases. For example, the Florida Index assigns points to stream-dwelling macroinvertebrates based on their sensitivity to pollution (see Ross 1990). A site with a high Florida Index score is considered healthy. Species sensitivity data from other sources, such as Hudson *et al.* (1990), Lenat (1993), and Chang *et al.* (1992) 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 proportions of major groups of organisms, compared to reference conditions, may indicate degradation.

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).



Effect of discharge on the benthic macroinvertebrate community.

The left bar for each parameter shows differences between the reference site and test site 1. The right bar shows differences between the reference site and test site 2.

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 (see SCI calculation table in Appendix).

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: Tim McKelvey (DEP NE District) and Lyn Burton, Jennifer Eichelberger,

Marshall Faircloth, Russel Frydenborg, Joy Jackson, Kathleen Lurding, Tina Mikulski, Elizabeth Miller, Urania Quintana, Bart Richard, Lisa Tamburello, David Whiting, Vicki Whiting, and Greg Wynn (Tallahassee Biology Laboratory). The report was reviewed by the Point Source Studies Review Committee, consisting of Wayne Magley, Jan Mandrup-Poulsen, and Michael Tanski, as well as District representatives.

Results and Discussion

The test sites were situated in a cove of the St. Johns River, while the reference site was located several miles south of the discharge in the St. Johns River (see maps in Appendix). The St. Johns River is an unusual system, in that it originated as a coast-parallel estuarine lagoon, is low gradient, very wide, and flows from south to north (Appendix). The water at the study sites was predominantly fresh during this survey, and the river, at this location, appears to be very lake-like (a wide system with no apparent water velocity). At other times, a salt wedge is present at the bottom, and the system behaves more like an estuary. Consequently, the benthic sampling consisted of petite Ponar dredges, which would be suitable in either situation. Additional metrics, such as the Lake Condition Index (Hulbert 1990), were employed to assess the health of this (presently) lentic freshwater system.

The land near the reference site was predominantly forest, consisting of hammocks, hardwood swamps, and pine flatwoods. Residential, commercial, and recreational (boat ramp) uses were considerably higher at the two test sites. Habitat quality at the test sites (ranging from 37 to 45 points) was much lower than the reference site (with 87 points). The difference in scores was mostly due to the wider variety of community types observed at the reference site. Most field parameters were similar between the reference and test sites (*e.g.*, conductivity was between 600 µmhos/cm and 700 µmhos/cm, mid-depth dissolved oxygen ranged from 7.4 mg/L to 8.0 mg/L, and mid-depth temperature ranged from 26.8 °C to 27.5 °C). The pH at test site 2 (7.2 SU) was lower than the reference site (8.2 SU) or test site 1 (8.0 SU), probably because test site 2 receives some water from Governors Creek during outgoing tide.

The full strength effluent sample was not acutely toxic to the fish, *Cyprinella leedsi*, or to the invertebrate, *Ceriodaphnia dubia*.

An extremely low level of the herbicide, atrazine (0.097 µg/L), was detected in the effluent. This concentration is below acutely or chronically toxic levels (AQUIRE 1991). Copper (5 µg/L), silver (0.05 µg/L), iron (57 µg/L), and zinc (52 µg/L) were detected in the effluent at levels which complied with Class III water quality standards.

Effluent concentrations of ammonia (6.0 mg/L), nitrate-nitrite (0.35 mg/L), total phosphorus (2.0 mg/L), ortho-phosphate (2.0 mg/L), and TKN (6.9 mg/L) were elevated compared to receiving water stations. The effluent unionized ammonia was calculated to be 0.04 mg/L, a violation of Rule 62-302.530(3) FAC.

The facility was obviously affecting the nutrient regime of test site 1. Since sampling occurred on an outgoing tide, this site was situated within the discharge plume. Consequently, test site 1 had much higher concentrations of nutrients than did test site 2 or the reference site. For example, ammonia concentrations were fairly typical at the reference site and test site 2 (0.059 mg/L or less), but so elevated at test site 1 (0.72 mg/L) that they were higher than those found in over 95% of other Florida estuaries (see Typical Values for Selected Parameters in Appendix). Unionized ammonia at test site 1 (0.06 mg/L) also violated Class III water quality standards (Rule 62-302.530(3) FAC). While nitrate-nitrite was low or undetected at the reference site and test site 2, the test site 1 concentration (0.13 mg/L) was higher than those found in approximately 85% or other estuaries. Total phosphorus was 0.077 mg/L at the reference site, 0.26 mg/L at test site 1, and 0.12 mg/L at test site 2. The test site 1 total phosphorus value was higher than those found in approximately 80% of other Florida estuaries.

Results of algal growth potential (AGP) tests indicate that water from all three sites exceeded the freshwater eutrophication "problem threshold" of 5 mg dry wt/L (Raschke and Schultz 1987). The AGP measured at the reference site (10.2 mg dry wt/L) was lower than those of the test sites (14.9 mg dry wt/L at both sites). AGP of the effluent was 107.0 mg dry wt/L.

Most quantitative measures of macroinvertebrate community health suggested no negative effects from the discharge. 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 sites are better than the reference site.

In the petite Ponar samples, some community measures were ac-

tually better at the test sites than at the reference site. For example, taxa richness improved from 17 taxa at the reference site, to 21 taxa at test site 1 and 27 taxa at test site 2. The Shannon-Weaver diversity index also improved from 2.6 at the reference site, to 3.0 at test site 1 and 3.7 at test site 2. The macroinvertebrate component of the Lake Condition Index was also somewhat higher at the test sites (ranging from 8 to 11), compared with the reference site (where it was 7). Note, however, that a minimum LCI score of 12 is expected from an unimpacted Florida lake. As earlier alluded to, the Lake Condition Index was employed because the St. Johns River, at this location, was lentic freshwater.

Not surprisingly (because there was no water velocity), the Florida Index was lower than expected for a peninsular stream, and was roughly the same at all three sites (4 at the reference site, 3 at test site 1, and 5 at test site 2). Dipterans and oligochaetes were the dominant taxonomic groups represented at all three stations. The above-surface deposit feeding strategy was the most common functional feeding method employed at all three sites. Filter-feeders were more numerous at the reference site (25.2%) than at either test site 1 (10.2%) or test site 2 (8.4%).

The figure on p. 3 represents changes in the phytoplankton algal community. As was noted with the macroinvertebrates, larger differences (that is, higher percentages) correspond with greater degrees of degradation. The algal communities at all three sites were typical of those suffering from cultural eutrophication. Chlorophyll *a* was very high, ranging from 49.4 µg/L at the reference site to 30.9 µg/L at test site 1. These chlorophyll *a* values are higher than those found in over 95% of other estuaries. Algal density ranged from 13,311 cells/mL at the reference site to 8,165 cells/mL at test site 1. Cyanophytes were the most abundant algal group at all three sites, ranging from 58% of the population at test site 2 to 70% of the reference site community. Taxa often associated with nutrient enriched conditions, such as *Anabaena* sp. and *Microcystis* sp., were quite common at all receiving water stations. Although the discharge was certainly a nutrient contributor, existing phytoplankton populations in this portion of the St. Johns River already appeared to be degraded.

Conclusions

The full strength effluent sample was not acutely toxic to the fish, *Cyprinella leedsi*, or to the invertebrate, *Ceriodaphnia dubia*.

An extremely low level of the herbicide, atrazine (0.097 µg/L) was detected in the effluent. This concentration is below acutely or chronically toxic levels (AQUIRE 1991). Copper (5 µg/L), silver (0.05 µg/L), iron (57 µg/L), and zinc (52 µg/L) were detected in the effluent at levels which complied with Class III water quality standards.

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Chemistry summary table for City of Green Cove Springs WWTP.

	Effluent	Reference Site	Test Site 1	Test Site 2
Organic Constituents (ug/L)				
Atrazine	0.097 I			
Metals (ug/L)				
Aluminum	100 U			
Arsenic	10 U			
Cadmium	0.05 U			
Copper	5 I			
Chromium	10 U			
Iron	57 A			
Lead	10 U			
Mercury	0.10 U			
Nickel	4 U			
Selenium	30 U			
Silver	0.05 I			
Zinc	52 A			
Nutrients (mg/L)				
Ortho-phosphate	2.0 Q	0.015 J	0.060 A	0.058
Total phosphorus	2.0	0.077	0.26	0.12
Unionized Ammonia	0.04	0.0	0.06	0.0
Ammonia	6.0	0.036	0.72	0.059
Nitrate+Nitrite	0.35	0.020 U	0.13	0.045 I
TKN	6.9	1.5	1.8	1.3
General Phys-Chem Parameters				
Habitat Assessment		87	40	37
D. O. (mg/L)	8.0	7.6	8.0	7.4
pH (SU)	7.0	8.2	8.0	7.2
Specific Conductance (umhos/cm)	461	700	668	600
Temperature (°C)	26.9	27.5	27.5	26.8
Turbidity (NTU's)		15.6	0.6	5.1
Hardness (mg CaCO3)	99.0			
Algal Growth Potential (mg dry wt/L)	107.0	10.2	14.9	14.9
Toxicity				
Bioassay Fish-Not Dechlorinated	No Mortality			
Bioassay Invertebrate-Not Dechlorinated	No Mortality			

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

J - Estimated value

O - Sampled, but analysis lost or not performed

Q - Sample held beyond normal holding time

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

Typical Values for Selected Parameters in Florida Waters

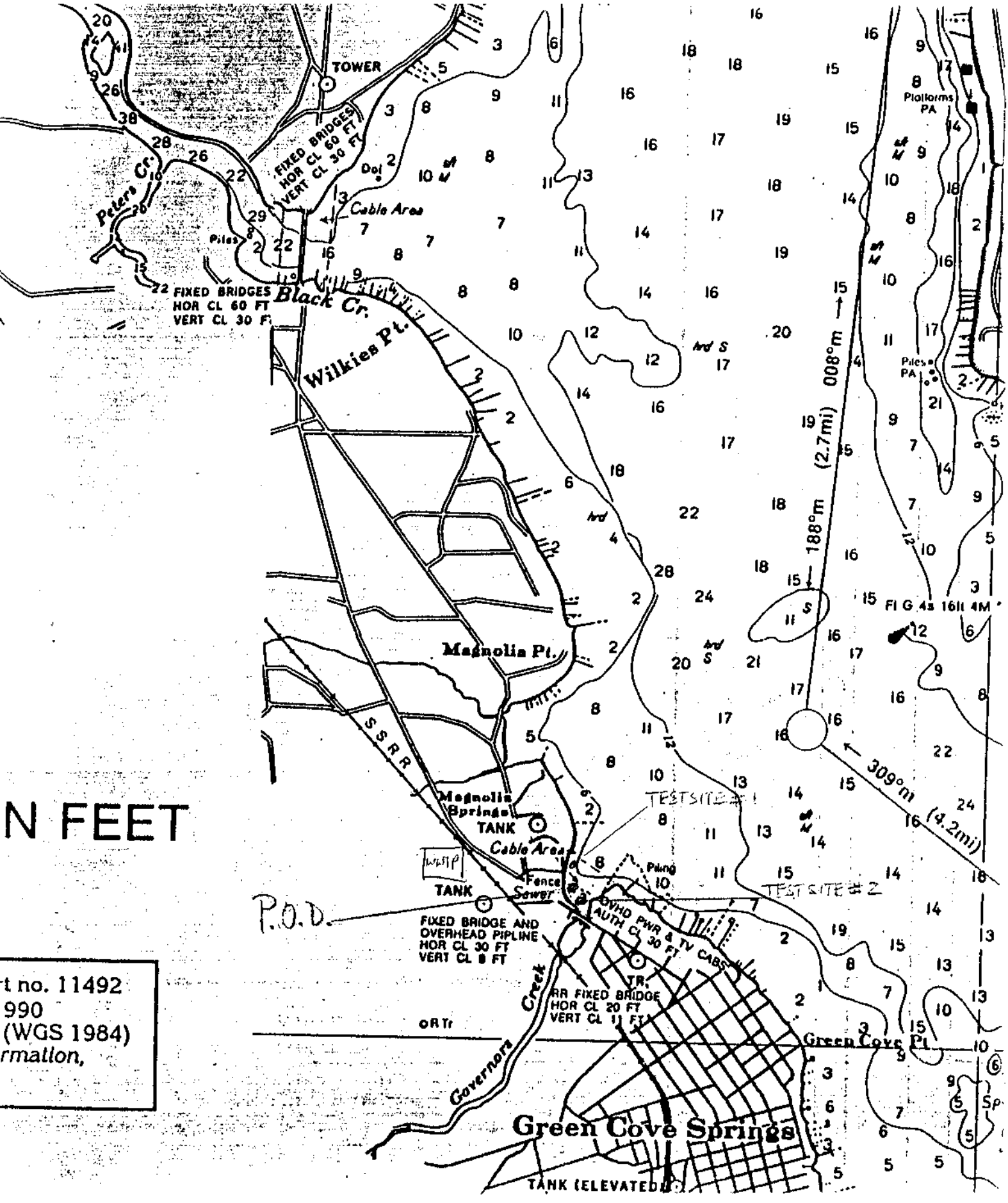
Adapted from Joe Hand, FDER, personal communication, 1991
(data was collected between 1980 and 1989)

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

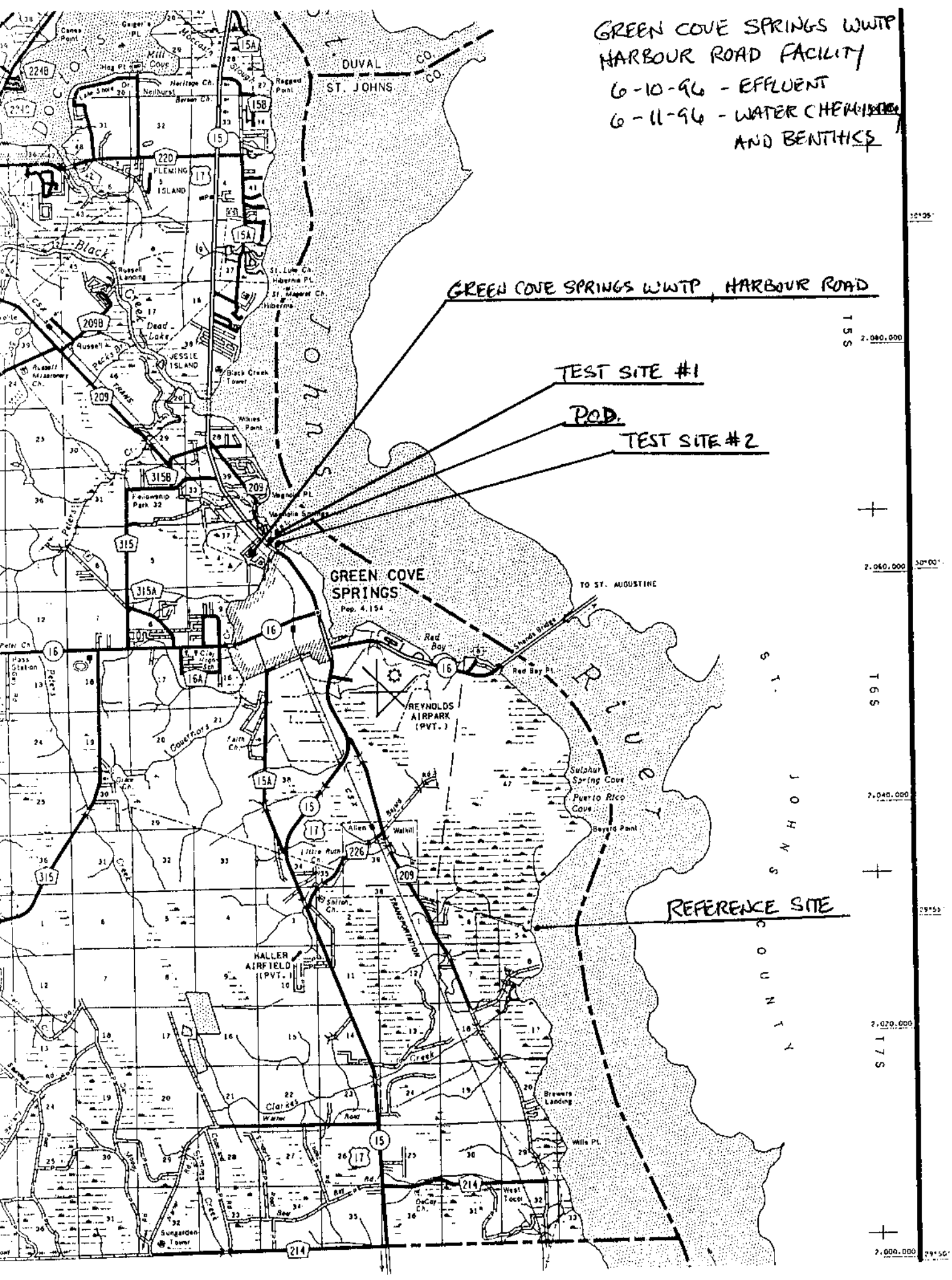
Units:

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



N FEET

t no. 11492
990
(WGS 1984)
rmation,


GREEN COVE SPRINGS WWTP
HARBOUR ROAD FACILITY
6-10-96 - EFFLUENT
6-11-96 - WATER CHEMISTRY
AND BENTHICS
GREEN COVE SPRINGS WWTP, HARBOUR ROAD
TEST SITE #1
P.O.D.
TEST SITE #2
REFERENCE SITE
GREEN COVE SPRINGS
Pop. 4,154
TO ST. AUGUSTINE
REYNOLDS AIRPARK (PVT.)
HALLER AIRFIELD (PVT.)
CLAY COUNTY
DUVAL CO.
ST. JOHNS CO.
ST. JOHNS RIVER
T5S
T6S
T7S
2,080,000
2,060,000
2,040,000
2,020,000
2,000,000
30°00'
29°55'
29°50'

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name: Green Cove Springs		Date Summary Prepared: 6-10-96
Location (attach detailed map): HARBOUR ROAD FACILITY	County: Clay	District: Northeast
Federal Permit # FL0020915 and expiration date:	State GMS # and DO 3110 M00851 State expiration date: 3-16-97	Facility Type: Industrial (Municipal) Federal Agricultural Other (list):

Function of facility:

City Wastewater (Domestic) Treatment Plant

Description of treatment process:

Two contact stabilization plants which can operate in parallel, series or independently with a joint effluent discharge to the St. Johns River at the mouth of Govener's Creek. Plant # 1 is a 0.5 MGD plant, Plant # 2 is a 0.75 MGD Plant. At the time of the inspection, leachate was being treated at plant #1 and then fed into Plant # 2 for additional treatment with the domestic influent. Only Plant # 2 was discharging.

Receiving waters: St. Johns River	Classification: I II (III)

Design Flow: 1.25 MGD restricted to 0.95 MGD	Mean Flow:	Flow during survey: 500 gpm

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

therefore, the best time to sample is: worse case - low tide However: during low tide the effluent does not flush, for these reasons we sampled during high tide

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

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

Parameter	Limit (units)
Flow	0.95 MGD
CBOD5	20 annual ave mg/L
TSS	20 ↓ ↓ ↓
Org. N	report mg/L
Ammonia	
TKN	
Nitrate + Nitrite	
Ortho Phosphorus	
Total Phosphorus	
Total Chlorine	0.5 min | 0.01 max
pH	6 – 8.5
DO	5.0 min
Fecal	200 annual ave
Toxicity - Acute	< 20 % mortality

Describe special permit conditions and permit modifications:

Stream monitoring:
5 locations including the Governors Creek.
Samples quarterly for:

- DO
- pH
- conductivity
- Cl_2
- temp
- chlorophyll a
- Total Coliform
- Fecal Coliform
- TKN
- Nitrate + Nitrite
- CBOD5
- Total Phosphorus
- Ortho Phosphorus
- Tide Stage

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Green Cove Springs
(Facility)

Description of permitted outfall(s): Single outfall line, located in a cove where Governors Creek joins the St. Johns River. The outfall is approximately 50 ft from the shoreline on the west bank of the cove. At low tide there is no more than 12" of water over the pipe.

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: None

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions: Last FYI5 of October 1993 indicated elevated nutrients, AGP, and fecal coliforms. Test sites were better than the reference site but test site #2 was populated by pollution tolerant organisms.
The reference was indicated to be effected by the effluent plume, a new reference site was chosen for this FYI5.

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set: The data is reliable.
The mode of plant operation has changed because of the manner which the leachate is being handled. Since the change, the ammonia has gotten higher. The lead operator is no longer working at the City so changes to the current mode of operation are being considered.

Additional information:

Staff contributing to this review (signature):
Timothy R. McKelvey FSIII (Biologist)
Kristen Smeltzer, P.E. (Inspector)
Kristen Smeltzer, P.E. (Engineer)
( )
( )
( )

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP NED	STORET STATION NUMBER: 20030302	DATE (M/D/Y): 6-11-96	TIME 1150	RECEIVING BODY OF WATER: ST. JOHN'S RIVER

REMARKS: tidal influenced marine & fresh orgs.	COUNTY: CLAY	LOCATION: WEST BANK OF SJR @ MOUTH OF CREEK, ACROSS FROM PICOLATA POINT, MARKER 25	FIELD ID/NAME: REFERENCE SITE

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)
100							

Local Watershed Erosion (check box): None [X] Slight [ ] Moderate [ ] Heavy [ ]

Local Watershed NPS Pollution (check box): No evidence [X] Slight [ ] Moderate potential [ ] Obvious sources [ ]

Width of riparian vegetation (m) on least buffered side: >18m

List & map dominant vegetation on back

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

m wide

m/s | m/s | m/s

see attached map

m deep | m deep | m deep

Artificially Channelized [X] no [ ] recent, severe [ ] some recovery [ ] mostly recovered

Artificially Impounded [ ] yes [ ] more sinuous

High Water Mark: .3 (m above present water level) + 1.0 (present depth in m) = 1.3 (m above bed)

Canopy Cover % : Open : [X] 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: detritus

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand	60%	1	ponar
Leaf Packs or Mats				Mud/Muck/Silt	30%	1	"
Aquatic Vegetation				Other: detritus	10%	1	"
Rock or Shell Rubble				Other:			
Undercut banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (ft):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):	TURB. NTU		Secchi (m):
Top	0							.5
Mid-depth	2'	27.5	8.2	7.6	700 µ	15.6		
Bottom	4'							

System Type : Stream: [✓] (1st - 2nd order / 3rd - 4th order / 5th - 6th order / 7th order or greater) Lake: [ ] Wetland: [ ] Estuary: [ ] Other: [✓] SJR

Water Odors (check box): Normal: [X] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Other: [ ]

Water Surface Oils (check box): None: [X] Sheen: [ ] Globs: [ ] Slick: [ ]

Clarity (check box): Clear: [ ] Slightly turbid: [ ] Turbid: [X] Opaque: [ ]

Color (check box): Tannic: [X] Green (algae): [ ] Clear: [ ] Other: [ ]

Weather Conditions/Notes:
Cloudy, humid, 80-85°F, slight breeze from the south @ 10
Tide dropping, just after high.

Abundance:	Absent	Rare	Common	Abundant
Periphyton	[ ]	[ ]	[✓]	[ ]
Fish	[ ]	[ ]	[✓]	[ ]
Aquatic Macrophytes	[ ]	[ ]	[✓]	[ ]
Iron/sulfur Bacteria	[X]	[ ]	[ ]	[ ]

SAMPLING TEAM:	SIGNATURE:	DATE:
TIM McKELVEY / TERESA FRAME	Tim McKelvey	

DEPARTMENT OF ENVIRONMENTAL REGULATION

MARINE BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP-NED	STORET STATION NUMBER: 20030362	DATE (M/D/Y): 1100	RECEIVING BODY OF WATER: ST. JOHNS RIVER

REMARKS: TIDALLY INFLUENCED MARINE AND FRESH ORGANISMS PRESENT.	LOCATION: WEST BANK OF SJR ACROSS FROM PICOLATA, MARKER 25	FIELD ID/NAME: REFERENCE SITE

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations: 10	None—Unaltered shoreline. 9-10 points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed: 45	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. 38-50 points	Two or three communities observed from those listed. 26-37 points	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation: 2	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations: 10	Only natural runoff.. 9-10 points	Mostly natural runoff, but with a few, small stormwater sources. 6-8 points	Considerable stormwater discharge from local roads, parking lots, etc. 3-5 points	Extensive manmade discharges, especially from canals draining large tracts of land. 0-2 points
Flow and Wave Action: 10	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. 9-10 points	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. 0-2 points
Sediment Type: 10	Combination of sand, gravel, and shell. 12-15 points	Primarily sand, with small areas of mud. 8-11 points	Mixture of sand and mud, or well-aerated mud only. 4-7 points	Anaerobic mud. 0-3 points

TOTAL SCORE: 87

COMMENTS:

ANALYSIS DATE: 6-11-96	ANALYST: TIM McKELVEY	SIGNATURE: Tim McKelvey

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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

SUBMITTING AGENCY CODE: 5031 / SUBMITTING AGENCY NAME: FDEP-NED	STORET STATION NUMBER: 20030425	DATE (M/D/Y): 6-11-96	TIME: 1330	RECEIVING BODY OF WATER: ST. JOHN'S RIVER

REMARKS: outgoing tide	COUNTY: Clay	LOCATION: 50 YARDS FROM POD ALONG NORTH BANK OF COVE, 50 FT FROM SHORELINE	FIELD ID/NAME: TEST SITE #1

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)
20				40	40		

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: 3m

List & map dominant vegetation on back

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

Artificially Impounded ☑ yes PARTIALLY ☐ more sinuous

High Water Mark: 6" (m above present water level) + 3" (present depth in m) = 3.5' (m above bed)

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

m wide

m/s | m/s | m/s

see attached map

m deep | m deep | m deep

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	60	1	penar
Leaf Packs or Mats				Mud/Muck/Silt	30	1	"
Aquatic Vegetation				Other: detritus	10	1	"
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):	TURB.		Secchi (m):
Top	0							.5
Mid-depth	1.5	27.5	7.97	7.99	668	0.6		
Bottom	3							

System Type : Stream: ☑ (1st - 2nd order / 3rd - 4th order / 5th - 6th order / 7th order or greater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☑ SJR

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: 3 days of storms prior to sampling. Cloudy, overcast w/ rain in the p.m. Breeze from south @ 10. Tide outgoing.

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

SAMPLING TEAM:	SIGNATURE:	DATE:
TIM McKELVEY / TERESA FRAME	Tim McKelvey	6/12/96

DEPARTMENT OF ENVIRONMENTAL REGULATION
MARINE BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP-NED	STORET STATION NUMBER: 20030425	DATE (M/DY): 6-11-96	RECEIVING BODY OF WATER: ST. JOHNS RIVER
REMARKS: OUTGOING TIDE	LOCATION: 50 YARDS FROM POD ALONG NORTH BANK OF COVE, SOFT FROM SHORELINE.		FIELD ID/NAME: TEST SITE # 1

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations: 5	None—Unaltered shoreline. 9-10 points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed: 13	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. 38-50 points	Two or three communities observed from those listed. 26-37 points	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation: 2	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations: 5	Only natural runoff.. 9-10 points	Mostly natural runoff, but with a few, small stormwater sources. 6-8 points	Considerable stormwater discharge from local roads, parking lots, etc. 3-5 points	Extensive manmade discharges, especially from canals draining large tracts of land. 0-2 points
Flow and Wave Action: 10	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. 8-10 points	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. 0-2 points
Sediment Type: 10	Combination of sand, gravel, and shell. 12-15 points	Primarily sand, with small areas of mud. 8-11 points	Mixture of sand and mud, or well-aerated mud only. 4-7 points	Anaerobic mud. 0-3 points

TOTAL SCORE: 45

COMMENTS: TIDALLY INFLUENCED, MARINE AND FRESHWATER ORGANISMS PRESENT.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
6-11-96	TIM McKELVEY	Tim McKelvey

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP NED	STORET STATION NUMBER: 20030426	DATE (M/D/Y): 6-11-96	TIME: 1330	RECEIVING BODY OF WATER: ST. JOHN'S RIVER

REMARKS:	COUNTY: Clay	LOCATION: 50 YARDS FROM POD ALONG WEST BANK OF COVE, 20FT. FROM SHORELINE	FIELD ID/NAME: TESTSITE #2

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)
20				40	40		

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

Artificially Impounded ☐ yes ☐ more sinuous

High Water Mark: .1 (m above present water level) + 1.0 (present depth in m) = 1.1 (m above bed)

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

m wide

m/s | m/s | m/s

see attached map

m deep | m deep | m deep

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	10	1	ponar
Leaf Packs or Mats				Mud/Muck/Silt	30	1	"
Aquatic Vegetation				Other: detritus	60	1	"
Rock or Shell Rubble				Other:			
Undercut banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (ft):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):	TURB.		Secchi (m):
Top	0							.5
Mid-depth	2'	26.8	7.23	7.39	600	5.1		
Bottom	4'							

System Type : Stream: ☒ (1st - 2nd order / 3rd - 4th order / 5th - 6th order / 7th order or greater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☐ SJR

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: 3 days of storms prior to sampling. Cloudy, overcast w/ rain in the p.m. Breeze from south @ 10. Tide outgoing.

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

SAMPLING TEAM:	SIGNATURE:	DATE:
TIM McKELVEY / TERESA FRAME	Tim McKelvey	6/12/96

DEPARTMENT OF ENVIRONMENTAL REGULATION

MARINE BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP-NED	STORET STATION NUMBER: 20030426	DATE (M/D/Y): 6-11-96	RECEIVING BODY OF WATER: ST. JOHNS RIVER

REMARKS:	LOCATION: 50 YARDS FROM POD ALONG WEST BANK OF COVE, 20 FT FROM SHORELINE.	FIELD ID/NAME:
OUTGOING TIDE		TEST SITE #2

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations: 2	None—Unaltered shoreline. 9-10 points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed: 13	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. 38-50 points	Two or three communities observed from those listed. 26-37 points	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation: 2	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations: 3	Only natural runoff.. 9-10 points	Mostly natural runoff, but with a few, small stormwater sources. 6-8 points	Considerable stormwater discharge from local roads, parking lots, etc. 3-5 points	Extensive manmade discharges, especially from canals draining large tracts of land. 0-2 points
Flow and Wave Action: 10	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. 8-10 points	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. 0-2 points
Sediment Type: 7	Combination of sand, gravel, and shell. 12-15 points	Primarily sand, with small areas of mud. 8-11 points	Mixture of sand and mud, or well-aerated mud only. 4-7 points	Anaerobic mud. 0-3 points

TOTAL SCORE: 37

COMMENTS: TIDALLY INFLUENCED, MARINE AND FRESHWATER ORGANISMS PRESENT.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
6-11-96	TIM MCKELVEY	Tim McKelvey

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample source: Green Cove Springs
County:
Contact / District: Tom McKelvey / Northeast
NPDES Permit #: FL00
LIMS sample #: [illegible] LIMS Job #: 96-JUN-11-16
Test type: Screening + Definitive
Static / Static Renewal / Flow-through
Test Number: 2 of 2
Remarks:

Sample Collection: Date 6-10-96 Time 1145
Test Beginning: Date 6-11-96 Time 1340
Test Ending: Date 6-13-96 Time 1340
Organism Batch #: 42 Diluent Batch #: well
Organism Age: 11 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 9.0 @ 9.0	23.9 @ 24.0	8.2 @ 25.3 °C	107.7 @ 105.4 1023 @ 1025 @ 25.1 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.8 @ 24.8	8.3 @ 24.8 °C	108.7 @ 105.4 1021 @ 1025 @ 25.1 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	24.3 @ 24.4	8.2 @ 25.3 °C	108.0 @ 105.4 1017 @ 1025 @ 25.2 °C

Conc.	Chamber #	Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm) (Cond. (µmhos/cm))		
		0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h
Control A	501	5	5	5	7.9	8.4	8.2	25.1	24.6	24.4	7.8	7.7	7.9	255	250	250
Control B	48	5	5	5	7.9	8.4	8.2	25.1	24.5	24.4	7.8	7.7	7.9	255	250	250
Control C	1272	5	5	5	7.9	8.4	8.2	25.1	24.5	24.4	7.8	7.8	7.9	255	250	250
Control D	602	5	5	5	7.9	8.4	8.2	25.1	24.4	24.4	7.8	7.8	8.0	255	250	250
100% A	79	5	5	5	7.4	8.0	8.0	24.8	24.4	24.4	7.7	7.8	7.8	460	460	460
100% B	302	5	5	5	7.4	8.0	8.0	24.7	24.4	24.4	7.7	7.7	7.8	460	460	460
100% C	148	5	5	5	7.4	8.0	8.0	24.7	24.4	24.4	7.7	7.7	7.7	460	460	465
100% D	601	5	5	5	7.4	8.0	8.0	24.7	24.3	24.5	7.7	7.6	7.7	460	460	465
Measured/Loaded by:		Counting Error MF 6/14/96	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF
Recorded by:		MF	MF	MF	TM	DW	LM	TM	DW	LM	TM	DW	LM	TM	DW	LM

Investigators' Signatures

Marshall Faircloth
Tina Mikulski
Liz Mould

reviewer

form updated 5/05/95

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	TM
Alkalinity (mg/L as $CaCO_3$):	120	75	105	Hach	TM
Hardness (mg/L as $CaCO_3$):	125	90	105	Hach	TM
Total ammonia (mg/L as N):	<.017	<.017	5.23	Orion	LM

Ammonia Meter #98136 Ammonia Meter Slope: -58.5 Ammonia Blank: <.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

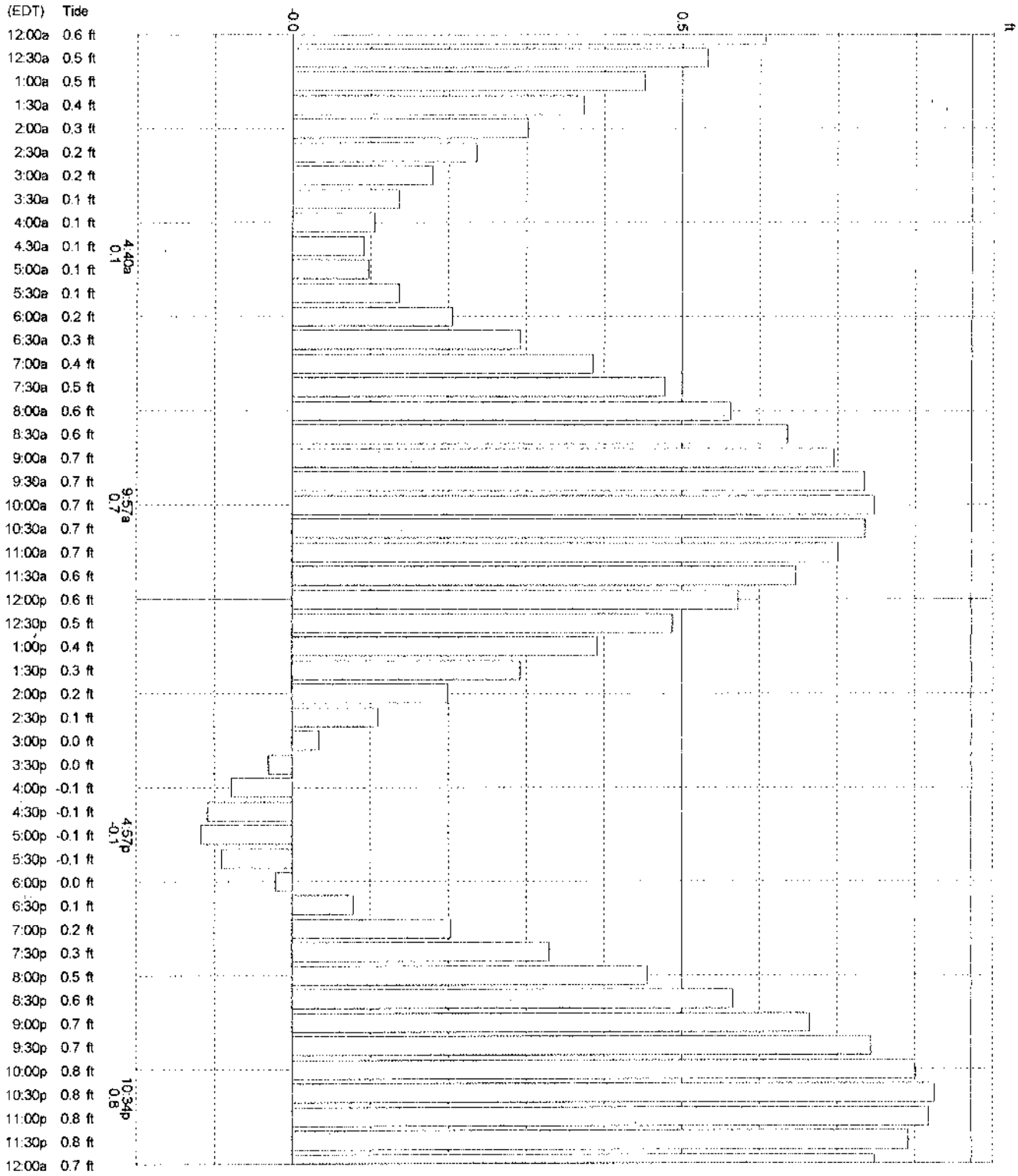
Tides-Green Cove Springs

based on Mayport, Florida (NOAA)
29° 59.04 N 81° 39.08 W

Monday, June 10, 1996

Average Tides	
Mean Range:	0.7 ft
MHHW.	0.9 ft
Mean Tide.	0.4 ft

Daily Highs & Lows		
4:40a	0.1 ft	Low
9:57a	0.7 ft	High
4:57p	-0.1 ft	Low
10:34p	0.8 ft	High



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FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Green Cove Springs WWTP
County:
Contact / District: Tim McKelvey / Northeast
NPDES Permit #: FL00
LIMS Sample #: 141444 LIMS Job #: 96-JUN-11-16
Sample log 6/13/96

Sample Collection: Date 6-10-96 Time 1145
Test Beginning: Date 6-11-96 Time 1340
Test Ending: Date 6-13-96 Time 1342
Organism Batch #: 26 Diluent Batch #: 26
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 9.0 @	23.4 @ 24.0	8.2 @ 25.3 °C	1077 @ 1054 1023 @ 1025 @ 25.1 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.8 @ 24.8	8.3 @ 24.8 °C	1087 @ 1054 1021 @ 1025 @ 25.1 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	24.3 @ 24.4	8.2 @ 25.3 °C	1080 @ 1054 1017 @ 1025 @ 25.2 °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	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 24 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 48 h
Control A	A	5	5	5	8.3		8.1	24.1		24.7	8.0		7.7	195		220
Control B	B	5	5	5			8.1			24.6			7.6			215
Control C	C	5	5	5			8.1			24.6			7.6			210
Control D	D	5	5	5			8.1			24.6			7.7			210
100% A	A	5	5	5	7.5		8.2	24.3		24.4	7.7		7.8	440		455
100% B	B	5	5	5			8.2			24.3			7.8			470
100% C	C	5	5	5			8.2			24.3			7.8			~~460~~ *
100% D	D	5	5	5			8.2			24.3			7.8			460
Measured/Loaded by:		MF	MF	MF	MF		MF	MF			MF		MF	MF		MF
Recorded by:		MF	MF	MF	TM		MF	TM			TM		LM	TM		LM

* 46 and 470 in 48 hr

Investigators' Signatures
Marshall Faircloth
Tim McKelvey
Lisa Morton
Dan [illegible]

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	TM
Alkalinity (mg/L as $CaCO_3$):	120	76	105	Hach	TM
Hardness (mg/L as $CaCO_3$):	125	90	105	Hach	TM
Total ammonia (mg/L as N):	<.017	<.017	5.23	Orion	LM

Ammonia Meter #98136 Ammonia Meter Slope: -58.5 Ammonia Blank: <.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

reviewer

form updated 5/05/95

Benthic macroinvertebrate taxa list for City of Green Cove Springs WWTF, collected via Ponar grab samples in St. John's River, on 11 June, 1996. Densities, in number/m^2, represent the mean of three replicates.

	Reference Site	Test Site 1	Test Site 2
Oligochaeta			
Aulodrilus pigueti	5	–	8
Bratislavia unidentata	–	–	2
Dero trifida	–	1	4
Haber speciosus	–	–	23
Haemonais waldvogeli	–	–	2
Ilyodrilus templetoni	–	–	2
Limnodrilus hoffmeisteri	121	90	123
Psammoryctides convolutus	3	–	36
Gastropoda			
Littoridinops sp.	–	9	–
Pelecypoda			
Corbicula fluminea	–	1	–
Rangia cuneata	–	2	–
Acarina			
Piona sp.	2	–	1
Unionicola sp.	4	–	–
Isopoda			
Cassidinidea ovalis	–	–	1
Cyathura polita	27	13	69
Isopoda	–	–	1
Uromunna sp.	1	–	124
Amphipoda			
Gammarus sp.	8	–	138
Listriella barnardi	–	3	–
Monoculodes sp.	–	3	–
Ephemeroptera			
Caenis sp.	–	1	54
Trichoptera			
Leptoceridae	1	–	–
Oecetis sp.	17	3	7
Trichoptera	1	1	–
Diptera			
Ablabesmyia rhamphe grp.	–	3	4
Alotanypus sp.	7	–	–
Chaoborus punctipennis	–	–	17
Chironomidae	20	19	3
Cladopelma sp.	–	124	54
Cladotanytarsus sp.	418	–	–
Coelotanypus sp.	170	49	25
Cryptochironomus sp.	–	6	4

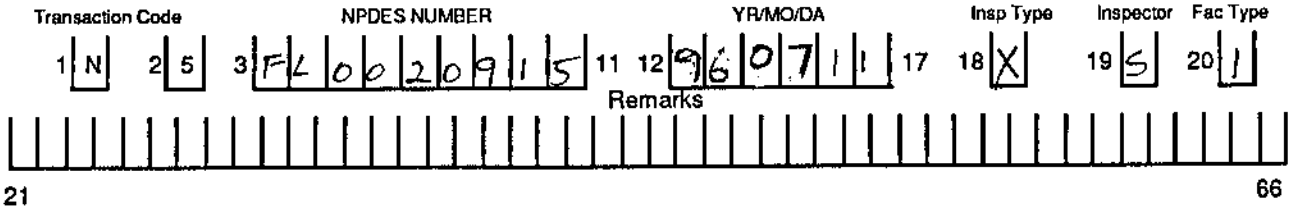
Dicrotendipes modestus	–	–	8
Dicrotendipes sp.	–	3	–
Djalmabatista pulcher	–	9	–
Glyptotendipes sp.	–	3	8
Nilothauma sp.	–	3	–
Palpomyia/bezzia grp.	9	3	2
Paralauterborniella nigrohalterale	7	–	–
Polypedilum halterale grp.	57	23	46
Procladius sp.	21	–	129
Tanytarsus sp.	28	9	100
Tanytarsus sp. L Epler	43	75	66
Tanytarsus sp. S Epler	–	–	4

Phytoplankton taxa list and densities (#/mL) for City of Green Cove Springs WWTF, collected via subsurface grabs in St. John's River, on 11 June, 1996.

	Reference Site	Test Site 1	Test Site 2
Cyanophyceae			
Anabaena sp.	2415	473	385
Aphanizomenon sp.	525	158	51
Aphanocapsa sp.	315	236	385
Aphanothece sp.	–	–	103
Chroococcus sp.	630	578	925
Cylindrospermopsis sp.	184	–	–
Dactylococcopsis sp.	53	26	257
Gomphosphaeria sp.	–	–	180
Lyngbya contorta	315	210	231
Lyngbya sp.	368	26	51
Marssoniella sp.	53	26	180
Merismopedia sp.	551	420	642
Microcystis sp.	1680	2678	2260
Oscillatoria sp.	1917	630	462
Rhabdoderma sp.	158	79	154
Spirulina sp.	–	26	–
Synechococcus sp.	158	26	128
Chrysophyceae			
Lagynion sp.	105	–	–
Tribonema sp.	26	79	128
Bacillariophyceae			
Achnanthes sp.	–	79	–
Attheya sp.	–	26	–
Cocconeis sp.	–	–	26
Coscinodiscus sp.	53	53	–
Cyclotella sp.	2022	814	848
Melosira sp.	289	446	745
Navicula sp.	–	26	77
Nitzschia sp.	184	236	154
Pennales	79	26	–
Rhizosolenia sp.	–	53	180
Synedra sp.	263	105	–
Tabellaria sp.	–	26	–
Chlorophyceae			
Ankistrodesmus sp.	–	79	77
Binuclearia sp.	53	–	180
Chlamydomonas sp.	105	–	128
Chlorococcum sp.	26	–	–
Chlorophyceae	26	–	–
Closterium sp.	–	26	–
Coelastrum sp.	–	–	51

Cosmarium sp.	53	–	–
Crucigenia sp.	–	–	360
Dictyosphaerium sp.	–	–	128
Gloeocystis sp.	158	–	77
Kirchneriella sp.	53	53	51
Micractinium sp.	–	–	26
Mougeotia sp.	79	–	–
Oocystis sp.	210	53	128
Pediastrum sp.	53	–	26
Pteromonas sp.	–	26	–
Scenedesmus sp.	–	–	796
Schroederia sp.	–	26	–
Sphaerocystis sp.	–	131	–
Tetradesmus sp.	26	–	–
Tetraedron sp.	131	131	128
Tetrastrum sp.	–	53	77
Dinophyceae			
Gymnodinium sp.	–	–	205
Peridinium sp.	–	26	–

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)

