

Biological Assessment of

J. R. Kelly Generating Station

Alachua County

NPDES #FL0026646

Sampled September 1991

March 1992

Biology Section
Division of Technical Services

Department of Environmental Regulation
Results of Fifth Year Inspections

Discharger: J. R. Kelly Generating Station
County: Alachua
NPDES Number: FL0026646
State Permit Expiration Date: 2 June 1992

Toxics Sampling Inspection (XSI)

Date Sampled: 23 September 1991

Results: Aluminum (20 µg/L), iron (12 µg/L), and zinc (6 µg/L) were all below problem levels. Organics analysis detected 28 µg/L of bis (2-ethylhexyl) phthalate, a violation of ambient standards.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 23 September 1991

Results: Not acutely toxic to *Ceriodaphnia dubia* or *Notropis leedsi.*

Impact Bioassessment Inspection (IBI)

Date Sampled: 23 September 1991

Results: Benthic macroinvertebrates were moderately degraded at the test site, but both study areas possessed less than desirable communities. Florida Index values were higher at the test site than at the control site, but were lower than an undisturbed system. Species richness of both macroinvertebrates and phytoplankton algae was low. Algal communities were more degraded at the control site, and dominated by *Ankistrodesmus* sp. Downstream, the algae were more diverse and community structure was more typical of a stream, dominated by diatoms. Fecal coliform standards were violated at the control site and at the test site. These high values were probably the result of a population of waterfowl inhabiting the area upstream of the control station, and not due to the effluent (which was low in fecal coliforms).

Water Quality Inspection (WQI)

Date Sampled: 23 September 1991

Results: Nutrients in the effluent were not excessively high, but appear to be a source of elevated phosphorus compounds, NO_2NO_3, and TKN in downstream receiving waters. AGP was above the enrichment threshold (5 mg algal dry wt/L) at both control and test sites, but was 56% higher downstream of the discharge.

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

Introduction

The J. R. Kelly Generating Station, located in Gainesville, Alachua County, Florida, is permitted to discharge cooling tower and blower blowdown, as well as low-volume and metal cleaning batch wastewater. Treatment at this 0.097 MGD design capacity facility consists of pH adjustment, clarification, oil skimming, sand filtration, and waste sludge disposal to a landfill. Effluent is discharged to Sweetwater Branch, which flows through Paines Prairie to Alachua Sink.

The effluent must meet ambient standards for Class III freshwaters. The facility has an 800 meter mixing zone for copper, after which the 30 µg/L ambient copper standard must be met. During the past two years, several plant upsets have occurred:

1) 24 October 1989: During cleaning of a demineralizer resin bed, 1800 gallons of brine solution discharged to Sweetwater Branch. The brine solution was being routed to the city's WWTP when the pipeline ruptured, causing the spill.

2) 8 July 1990: A station service transformer failed, resulting in power loss and subsequent overflow of an undetermined amount of low volume wastewater into Sweetwater Branch.

3) 25 February 1991: water in the #1 sludge pond spilled over a low spot in the dike. The water level was high due to increased rainfall and the shut down of the brine concentrator.

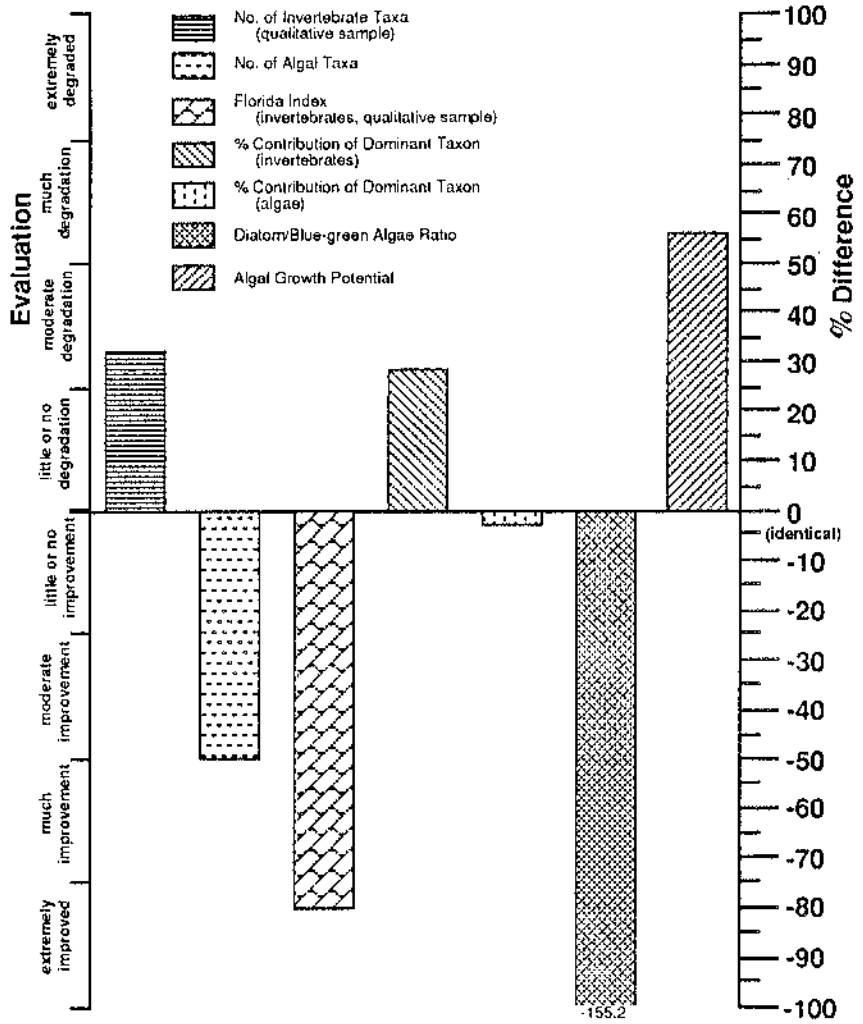
4) 20 March 1991: The pipe from the low volume waste sump to treatment plant was broken by construction work, discharging 4000 gallons of wastewater to Sweetwater Branch.

5) 14 June 1991: Following an acid spill in the plant, the spill was flushed to a holding basin. The basin emptied due to an incompletely closed drain valve, discharging 4000 gallons of pH 3.55 wastewater to Sweetwater Branch.

The E.P.A. has requested information concerning plant upsets #2,

Major characteristics of community structure of control and test sites.

	Control Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	25	17
Florida Index	5	9
% Contribution of Dominant Taxon	46.9	60.2
% Diptera	53.7	73.9
% Odonata	27.2	4.5
% Oligochaeta	8.2	5.7
% Malacostraca	5.4	8.0
% Gastropoda	1.4	6.8
% Other	4.1	1.1
% Predators	53.0	37.8
% Collector-Gatherers	28.2	31.2
% Shredders	17.2	22.2
% Scrapers	1.4	7.5
% Piercers	0.2	0.4
% Collector-Filterers	0	1.0
Macroinvertebrate Hester-Dendy		
Number of Taxa	9	7
Florida Index	2	5
Shannon-Weaver Diversity	2.97	2.04
% Diptera	42.1	33.3
% Gastropoda	47.4	55.6
% Odonata	10.5	11.1
% Scrapers	50.0	59.1
% Collector-Gatherers	33.3	14.0
% Predators	11.1	16.6
% Shredders	5.6	8.9
% Collector-Filterers	0	1.3
Phytoplankton Algae		
Number of Taxa	10	15
% Contribution of Dominant Taxon	32.3	31.4
Diatom/Diatom + B-G Abundance Ratio	0.29	0.74
% Blue-green	32.3	22.9
% Green	54.8	8.6
% Diatoms	12.9	65.7
% Euglenophyta	0	2.9
Algal Growth Potential (mg dry wt/l)	7.397	11.509



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

#4, and #5 listed above. The facility entered into a Consent Agreement effective 25 December 1991.

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 control site (located in Sweetwater Branch approximately 0.25 miles above the plant) and a test site (approximately 0.25 miles downstream of the discharge) (see map in Appendix). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. Acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Notropis leedsi* as test organisms, were performed on an effluent sample (Peltier and Weber 1985, FDER 1985). The effluent was analyzed for organic constituents (base neutrals, acid extractables, and pesticide extractables) and metals. Additionally, nutrient analyses were performed on effluent, control, and test sites. Methods used for all chemical analyses are on file at the Tallahassee DER Chemistry Laboratory.

Benthic macroinvertebrate communities were evaluated at control and test sites. Collection methods consisted of a timed (one hour per site) multi-substrate (*e.g.*, snags, vegetation, sediment) semi-quantitative effort. Additional invertebrate collections were accomplished using Hester-Dendy multiplate samplers which were incubated for 28 days (Ross 1990). Phytoplankton was collected via sub-surface grabs. 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. Many of these, such as the number of taxa, Shannon-Weaver Diversity Index, and chlorophyll *a* are well known. Others are briefly explained here. The Florida Index assigns points to stream-dwelling macroinvertebrates based on their sensitivity to pollution (see Ross 1990). A site with a high Florida Index score is considered healthy (*i.e.*, many clean-water organisms are present). Excessive numerical dominance of a single type of organism (a high % contribution of dominant taxon) is usu-

ally associated with disturbance. A decreased diatom to blue-green algae ratio (calculated by dividing the number of individuals in the Bacillariophyta by the number of individuals in the Bacillariophyta + Cyanophyta) is often indicative of nutrient enriched conditions. The determination of the Quantitative Stability Index (for taxonomic % composition) is a two step process. First, the relative proportions of major taxonomic groups are calculated for each site. Then, the lesser of the two percentages for each discrete taxonomic group is totaled. A QSI (% composition) of 100% means that the two sites being compared are identical. This same type of procedure is used for calculating the QSI (functional feeding groups).

For graphical purposes, the percent differences between the control and test sites involving the number of taxa, Florida Index and the diatom to blue-green algae ratio are measured as the control site minus test site divided by the control site. The percent differences between sites involving the percent contribution of dominant taxon, and algal growth potential are measured as the test site minus control site divided by the control site.

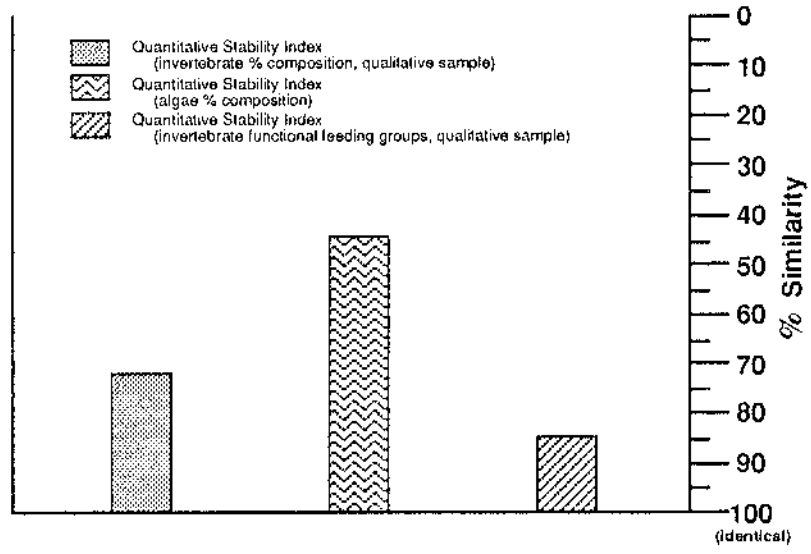
The following personnel were involved in this investigation: Michael Tanski and David Chasteen (DER Point Source Evaluation Section), Rita Felton (DER Northeast District), and Lyn Burton, Russel Frydenborg, Kathleen Lurding, and Sandy McClure (Tallahassee Biology Laboratory).

Results and Discussion

Habitat quality at the test site was 44% better than that of the control, with scores of 65 and 45, respectively. The two main factors responsible for inferior habitat quality at the control site were reduced water velocity and the amount of artificial channelization. Although the control site was located above the influence of the generating plant, this area of Sweetwater Branch receives stormwater from urban Gainesville, and is downstream of a fairly large population of ducks and geese. The area surrounding the test site was more forested, with less impervious surface in the watershed and fewer obvious sources of stormwater, although stormwater could still be delivered to this site from the upstream sources (Appendix).

The effluent was not toxic to either *Ceriodaphnia dubia* or *Notropis leedsi*. No organisms died during the 48 hour static acute bioassay (Appendix). With the exception of very small amounts of aluminum, iron, and zinc, no other metals were found above their detection limits. Analysis of organic constituents resulted in the detection of 28 µg/L of bis (2-ethylhexyl) phthalate. This is a violation of the Class III standard for freshwater (which is 3 µg/L). Phthalates can be chronically toxic to aquatic organisms at low concentrations. For example, di (2-ethylhexyl) phthalate, the most widely used and studied phthalate esther, impairs reproduction in *Daphnia magna* by 60% at a concentration as low as 3 µg/L (Mayer and Sanders 1973). The oil and grease level measured in the effluent was 8.3 ppm. However, the sample was not collected in a teflon-capped container, invalidating the result.

Nutrient concentrations at the test site, particularly phosphorus compounds and nitrate-nitrite, were somewhat higher than those found in typical Florida streams. STORET data from 1617 Florida stream stations, for the period of 1980 to 1989, have been compiled into a percent distribution table, found in the Appendix (Joe Hand, personal communication). Data from this present in-



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

vestigation were evaluated against these values. Total phosphorus, 0.093 mg/L at the control site (39th percentile), increased to 0.29 mg/L downstream, higher than 73% of streams statewide. Similarly, the NO_2NO_3 levels measured at this area of Sweetwater Branch were higher than 76% of other streams in Florida (see chemistry summary table). Concentrations of these compounds, along with TKN, were higher in the effluent than they were downstream, suggesting that the discharge is contributing to the observed enrichment.

Algal growth potential (AGP) was relatively high at both receiving water sites. According to Raschke and Schultz (1987), at AGP levels above 5 mg dry wt/L, enrichment problems such as excessive algal growth and D.O. sags are likely to occur. The AGP at the control site (7.4 mg dry wt/L) was probably influenced by nutrient inputs from upstream (urban runoff, waterfowl). The increase in AGP at the test site to 11.5 mg dry wt/L is the result of nutrient addition by the effluent. AGP of the effluent was 12.1 mg dry wt/L.

Fecal coliform standards were violated at both control and test sites, but were very low (less than 2 organisms/100 ml) in the effluent. As was the case with nutrients, fecal material introduced by the ducks and geese inhabiting the area above the control site was probably related to the >1600 organisms/100 ml of fecal coliform bacteria found there. Downstream, fecal coliform populations had dropped to 900 organisms/100 ml, still in excess of ambient standards. The effluent appeared to provide a degree of dilution in reducing fecal coliform bacteria. Total coliform bacteria were greater than 1600 organisms/100 ml at both the control and test sites, but were only 110 organisms/100 ml in the effluent. Due to the detection limit for total coliforms at the control and test sites, it was not possible to determine if the values were in excess of the 2400 organisms/100 ml standard.

Problems which would reduce the reliability of the Hester-Dendy data set were encountered during the recovery of Hester-Dendy samplers. Therefore, the qualitative data set will be used to evaluate the impact of the facility's discharge on Sweetwater Branch.

Although it was not clear-cut, qualitative measures of benthic macroinvertebrate community health indicated moderate degradation at the test site (see table and figures). The upper figure on p. 2 indicates the degree of difference between the control 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 figure on p. 3 summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation. In this particular case, though, the lack of similarity between phytoplankton algal communities at the two sites is indicative of improvement.

Species richness was 32% higher at the control site, decreasing from 25 to 17 taxa (see taxa list in Appendix). The Florida Index was higher at the test site, but these values were low for a typical undisturbed Florida stream. Both sites were dominated by dipterans, the most numerous being the chironomid midge, *Polypedilum illinoense*. This organism has been shown to replace others of the same genus as stress increases, as it is tolerant to organic, sewage, and toxic wastes (Hudson *et al.*, 1990). The control site was also inhabited by a large percentage of odonates, as a high number of 2nd instar libellulids was collected. Generally, members of this family are fairly stress-tolerant, depending on the species. Had it not been for this concentrated group of very young insects, the control site would have harbored a higher percentage of *P. illinoense* than the test site. The quantitative stability indices (QSI's) for percent composition and functional feeding groups indicated a high degree of similarity.

Assessment of the phytoplankton community indicated improved conditions downstream. A greater number of taxa was found at the test site (15, compared to 10 at the control station), but both of these values were low. The percent contribution of dominant taxon was almost identical at each site, but the most abundant organism was *Ankistrodesmus* sp. (green) at the upstream, and the diatom *Pinnularia* sp. at the test site. Because the most common algal assemblage in Florida streams is one dominated by diatoms, the percent composition differences (note the QSI) suggest that conditions are better below the discharge.

Conclusions

The effluent sample collected from J. R. Kelly Generating Plant was not acutely toxic to *Ceriodaphnia dubia* or *Notropis leedsi*. Results of organics analyses revealed the presence of bis (2-ethylhexyl) phthalate at 28 µg/L. This is a violation of Class III freshwater standards. Phthalate esthers can be chronically toxic to aquatic invertebrates at

concentrations as low as 3 µg/L. Only small amounts of the metals aluminum, iron, and zinc were detected.

Concentrations of some nutrients (total and ortho-phosphorus, nitrate-nitrite, and TKN) were somewhat elevated in the effluent and downstream. Algal growth potential was above the problem threshold throughout the study area, but to a greater degree at the test site. The control site is subject to the influences of urban runoff and stormwater, as well as a population of waterfowl nearby. Additional enrichment at the test site can be attributed to the facility's discharge, which had higher nutrient concentrations and AGP than the ambient waters tested.

Fecal coliform standards were violated at control and test sites, but were very low in the effluent. These high bacterial populations were probably related to inputs from the ducks and geese living upstream.

Even though the habitat characteristics were more favorable at the test site (higher velocity and less channelization), benthic macroinvertebrate communities were somewhat degraded there, demonstrated by a decrease in species richness and an increase in percent contribution of dominant taxon. Florida Index, however, was slightly higher downstream. It is important to note that the upstream control area was subject to the influence of non-point source inputs, and that the number of taxa and Florida Index values at both sites were low for a Florida stream of this type. Both sites were dominated by the pollution tolerant chironomid, *Polypedilum illinoense*.

Phytoplankton algae were more diverse at the test site, and were dominated by diatoms. Green algae were more numerous at the control site. Although the number of taxa were very low for an algal population, conditions appear to be more degraded above the facility's discharge.

Literature Cited

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

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Chemistry summary table for

J. R. Kelly Generating Station

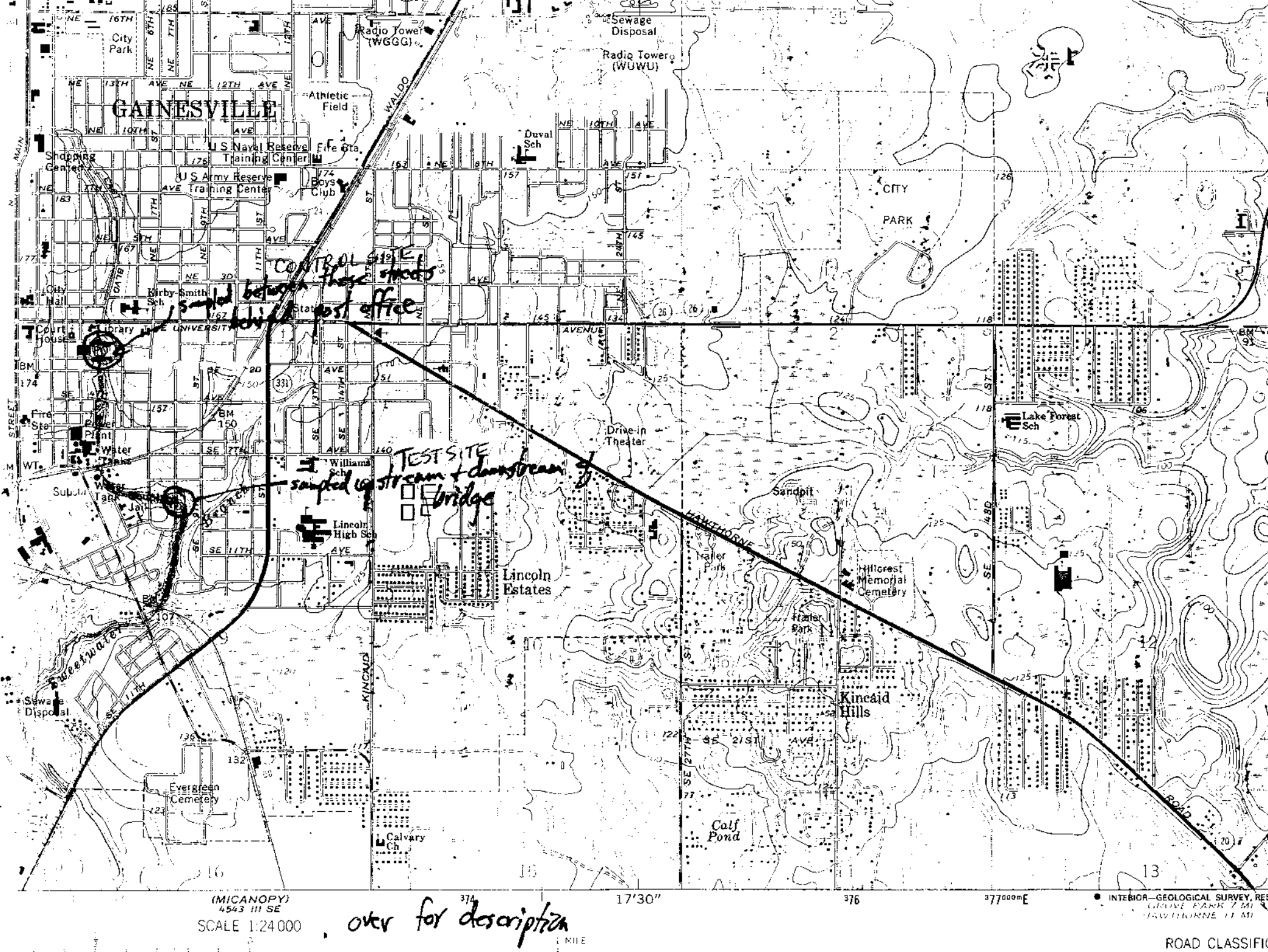
	Effluent	Control Site	Test Site
Organic Constituents (ug/L)			
Bis (2-ethylhexyl) phthalate	28		
Tentative Identification and est. conc.:			
aliphatic compounds (also in blank)	< 10		
Oil and Grease (ppm)	8.3		
Metals (ug/L)			
Aluminum	20 T		
Antimony	15 U		
Arsenic	20 U		
Cadmium	0.07 U		
Copper	5 U		
Chromium	10 U		
Iron	12		
Lead	15 U		
Mercury	0.2 U		
Nickel	5 U		
Selenium	30 U		
Silver	0.14 U		
Zinc	6 T		
Nutrients (mg/L)			
Ortho-phosphorus	0.43 A	0.11 A	0.28 A
Total phosphorus	0.41	0.093	0.29
Ammonia	0.02 U	0.024 T	0.02 U
Nitrate+Nitrite	0.43 A	0.10 A	0.28 A
TKN	1.1	0.39	0.58
Other Parameters			
Habitat Assessment		45	65
D.O. (mg/L)*	8.2	Equipment Malfunction No Field Parameters	
pH (SU's)*	7.6		
Conductivity (µmhos/cm)*	867		
Temperature (°C)*	21.0		
Sulfate (mg/L)	360 A		
Bioassay Fish-Dechlorinated	Not Toxic		
Bioassay Invertebrate-Dechlorinated	Not Toxic		
Fecal coliform (org/100 ml)	< 2	> 1600	900
Total coliform (org/100 ml)	110	> 1600	> 1600

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

T - Value reported is less than the practical quantitation limit

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

*Measured in the laboratory immediately prior to bioassay


GAINESVILLE
City Park
Radio Tower (WGGG)
Sewage Disposal
Radio Tower (WUWU)
Athletic Field
WALDO
Duval Sch
U S Naval Reserve Training Center
U S Army Reserve Training Center
Boys Club
Shopping Center
CITY PARK
CONTROL site needs to be sampled between these two bridges
City Hall
Kirby-Smith Sch
Post office
Court House
Library
UNIVERSITY AVENUE
BM 174
Fire Sta
Power Plant
Water Tanks
BM 150
Drive-in Theater
Lake Forest Sch
TEST SITE sampled upstream + downstream of bridge
Williams Sch
Lincoln High Sch
Sandpit
HAWTHORNE
Trailer Park
Lincoln Estates
Hillcrest Memorial Cemetery
Sewage Disposal
Sweetwater
KINCAID
Kincaid Hills
Evergreen Cemetery
Calvary Ch
Calf Pond
(MICANOPY)
4543 III SE
SCALE 1:24000
17'30"
over for description
INTERIOR—GEOLOGICAL SURVEY, RES
ROAD CLASSIFIC

Sample sites:

Control Site - in urban area but fringed w/ semi-wild buffer strip

HD here

Portion sampled had stretch of narrow, herbaceous vegetated sides, + about 1 meter deep. Got shallow about midway down + widened with exposed sand bar + slightly faster flow ~ 6-12" deep.

Test Site - Sampled both side of bridge because closest sites to provide similar habitat. Narrow, herbaceous vegetated sides, about .5 m deep - slightly swifter than control. Down from bridge - 1m deep pool - wide ~8-10 feet which gets shallower w/ exposed sand bars + narrows into forested, vegetated stream. HD here Sampled areas similar to control site + barely went into forested stretch. The portion above the above bridge sampled site + below the pool/sandbar site appeared to be natural woodland stream. Water is considerably more tannic downstream (test) than upstream (control)

Did not observe actual outfall pipes.

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

SUBMITTING AGENCY CODE / SUBMITTING AGENCY NAME	STORET STATION NUMBER	DATE (M-D-Y)	RECEIVING BODY OF WATER
		9/23/9	Suwannee River in Gilchrist Co.

REMARKS	LOCATION	FIELD ID NAME
Upstream control station	✓	J.R. Kelly Park, Manatee Control Site

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

Adjustments		TOTAL SCORE
5	Add 5 points if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	45

COMMENTS: Buffer zone around stream ~ 50-100' mostly hardwoods / littoral vegetation over much of

ANALYSIS DATE	ANALYST	SIGNATURE

Dave
10 jabs vegetation & roots → lot of Lizard's tail, Sagittaria Lancifolia? a few other less dominant
3 jabs bottom & bank
2 jabs – snags & hard litter

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

SUBMITTING AGENCY CODE / SUBMITTING AGENCY NAME	STORET STATION NUMBER	DATE (M/D/Y)	RECEIVING BODY OF WATER
		2/23/2	Sweetwater Branch

REMARKS	LOCATION	FIELD ID NAME
Better habitat out area most areas resembles upstream where are sampled	Sweetwater Branch at [illegible] Bridge	R. [illegible] Ben Robinson Tract Site

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

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

COMMENTS: Poor [illegible] areas [illegible] riparian vegetation

ANALYSIS DATE	ANALYST	SIGNATURE

Dave 10 jabs 2 vegetation + roots → [illegible]

jabs along sand bar [illegible]
1 jab & leaf packs / debris

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		9/23/21	Sweetwater Branch

REMARKS:	LOCATION:	FIELD ID/NAME:
upstream - Control Site	Sweetwater Creek behind Gainesville Post Office	J. Ri. Kelly Gen. Nacreman Control Site

RIPARIAN ZONE/INSTREAM FEATURES

Predominant Surrounding Land-Use (specify relative percent in each category): 50-100' buffer lawn/trees

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
	0	0	50%	50%	0	0

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

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

Point-Source Pollution (list location and describe): stormwater pipes up + [illegible] NPS [illegible] pipes + roads. Urban stream

Estimated Stream Width (range, m): 2-5 varies	Estimated Stream Depth (range, m): .6 m	In pool	yes
High Water Mark (m above bed):	Velocity (range, m/s): 102 GPM / .6 m/s	Impounded ☐	Channelized ☒

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

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☒ Other: ☐ _____

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

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

Substrate Types (estimated % surface coverage):

Limestone:	0	Sand/Silt/Clay Mix:	10-15
Consolidated Clay:	0	Clay/Silt (inorganic):	5
Gravel/Shell rubble	~~10~~ 15	Coarse Organic Debris:	5
Sand	80	Mud/Muck (organic):	

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top			Secchi Depth (m):	
Mid-depth			pH (SU): not taken	
Bottom			Conductivity (umho/cm): not taken	
			Other Parameters: hydrolab submitted w. report	

Stream Type (check box): Blackwater: ☐ Deep Aquifer Fed: ☒ Surficial Aquifer Fed: ☐ Alluvial: ☐ Other: ☐ _____

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

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

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

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

Weather Conditions: clear sky - ~ 85°

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y): 9/23/91	RECEIVING BODY OF WATER: Econfina River

REMARKS:	LOCATION:	FIELD ID/NAME:
Before rainfall - was performing [illegible] sampling, measuring water clarity	[illegible] bridge on [illegible]	[illegible] Test Site

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest (buffer)	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
70	0	0	0	0	30	

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

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

Point-Source Pollution (list,location and describe): downstream of [illegible] all visual stormwater sources → 3 outfalls

Estimated Stream Width (range, m): 2–6 m	Estimated Stream Depth (range, m): .5–1	yes
High Water Mark (m above bed): 1.5 m	Velocity (range, m/s): .2	Impounded ☐ Channelized ☐

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

SEDIMENT/SUBSTRATE

shaded → sun → shaded

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

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

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

Substrate Types (estimated % surface coverage):

Limestone:		Sand/Silt/Clay Mix:	
Consolidated Clay:		Clay/Silt (inorganic):	
Gravel/Shell	10	Coarse Organic Debris:	5
Sand	80	Mud/Muck (organic):	5

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):	Secchi Depth (m):
Top			pH (SU):
Mid-depth	20		Conductivity (µmho/cm):
Bottom			Other Parameters:

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

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

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

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

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

Weather Conditions: sunny, clear

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:

[illegible] channel [illegible] tributaries [illegible] Mid-channel sample

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name:		**Prepared by:** **Date:**
Location (attach detailed map):	**County** Alachua	**District**
Federal Permit # **and expiration date:**	**State GMS # and** **State expiration date:**	**Facility Type:** Industrial Municipal Federal Agricultural **Other (list):**

Function of facility:

Description of treatment process:

Receiving waters:	**Classification:**
Design Flow:	**Actual Mean Flow:**

Discharge is: Continuous Intermittent Seasonal Rainfall dependent
Other (describe) * The plant operates as a supplemental plant
therefore, the best time to sample is: during peak loads

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

List effluent limits: See Attached

Parameter	Limit (units)

Describe special permit conditions and permit modifications:

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

(Facility)

Description of permitted outfall(s):

List permit violations (from MOR data or other source) and plant upsets that occurred within past year:

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

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

Additional information:

FACILITY SUMMARY
(CONTINUED)

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

For Routing To Other Than The Addressee	
To:	Location:
To:	Location:
To:	Location:
From:	Date:

Interoffice Memorandum

Description of Treatment Process (cont.):

Effluent limits:

Sampling Point: Blackish and Rather [illegible]

Flow (MGD)
Temperature
Dissolved Oxygen
Total Suspended Solids
Oil
Sulfides
Sulfates
Chlorides

Concentration of Metal Compounds in Wastewater:

Cadmium
Chromium
Total Suspended Solids
Lead
Copper
Zinc *
Nickel *

* Analysis conducted when metal plating process is in operation.

FACILITY SUMMARY
(CONTINUED)

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

For Routing To Other Than The Addressee

To: _____ Location: _____
To: _____ Location: _____
To: _____ Location: _____
From: _____ Date: _____

Interoffice Memorandum

Plant Units Cont.'s

2/25/91 Water in No 1 sludge pond overspilled in a few spots on the eastern shore of the dike. The water has been high due to increased rainfall and the shut down of the brine concentrator

3/6/91 Pipe from the Low Volume Waste Sump to treatment plant was broken by a backhoe while digging a 4000 gallons of wastewater discharged to Swiftwater Bayou

6/14/91 4000 gallons of low volume waste water was discharged to Swiftwater Bayou at a pH of 3.55 SU. A small acid spill occurred in the plant. The acid was flushed to a holding basin, but the drain valve was not completely closed, draining the basin

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: JR KELLY GENERATING STA.
Address/City:
County: ALACHUA
Contact/District: RITA FELTON - NE
NPDES Permit #: FL0026646 Outfall #:

Sample Collection: Date 9-23-91 Time 1100
Test Beginning: Date 9-24-91 Time 1300
Test Ending: Date Time
Test Organism: C. DUBIA
Life Stage/Age: < 24 HOURS

Test Number: 1 of 2 Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through

Remarks:

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7@7.9@9	8.9@21.5	20.9@23.9°	1368 & 1381 @24.2°
24 hr	7@7.9@9	8.9@21.5	20.2@23.2	1361@23.6
48 hr	7@7.9@4	8.8@22	20.5@23.5	1366@23.8 / 1375

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	DO (mg/L) 0	24	48	Cond. (µmhos/cm) 0	24	48
control	A	5	5	5	8.2		8.2	20.2		20.4	8.4		8.6	179		188
control	B	5	5	5			8.2						8.6			
control	C	5	5	5			8.2						8.6			
control	D	5	5	5			8.2						8.6			
100%	A	5	5	5	7.5		7.8	20.2		20.1	8.5		8.5	836		887
100%	B	5	5	5			7.8						8.5			
100%	C	5	5	5			7.8						8.5			
100%	D	5	5	5			7.8						8.5			
Measured/Loaded by:		MF	MF		TM			TM		MF	TM		MF	TM		MF
Recorded by:		MF	MF	TM	AJ		TM	AJ		TM	AJ		TM	AJ		TM

Investigators' Signatures

Kim Pearce
Thomas Macom
Alison Fowler
Marshall Faircloth
Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:	[illegible]		n/m		
Lab Tot. Resid. Cl2:	0.0	0.0	0.0	Hach	MF
Alkalinity:	126	73	31	Hach	TM
Hardness:	130	70	38	Hach	TM
Total Ammonia:			44 / 1.2 TM 9/24/91	Hach	TM

Ammonia Meter Slope: _____ Ammonia Blank: 0.0 Salinity Sample: _____ ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: JR KELLY GENER, STA.
Address/City:
County: ALACHUA
Contact/District: RITA FELTON - NE
NPDES Permit #: FL00 26646 Outfall #:

Sample Collection: Date 9-23-91 Time 1100
Test Beginning: Date 9-24-91 Time 1330
Test Ending: Date Time
Test Organism: NOTROPIS LEEDSI
Life Stage/Age: 24 DAYS

Test Number: 2 of 2 Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through

Remarks:

Instrument Calibrations:

	pH	DO	Temp	Cond @24° C
0 hr	7@7, 9@9	8.9@21.5	20.9 @ 23.9°	1263 / 1351
24 hr	7@7, 9@9	8.4@21.5	20.2@23.2	1361@23.6
48 hr	7@7, 9@9	8.4 @22	20.5 @ 23.5	1366 @ 23.8 / 1375

		Number Live			pH			Temp. (°C)			DO (mg/L)			Cond. (µmhos/cm)		
Conc.	Chamber #	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
control	47	5	5	5	7.9	8.1	8.2	21.0	21.0	20.1	8.7	7.6	8.0			
control	3	5	5	5	7.9	8.1	8.2				8.7	7.8	8.0	243	246	246
100%	65	5	5	5	7.6	7.3	7.4	21.0	20.5	20.0	8.2	7.3	7.7			
100%	42	5	5	5	7.6	7.3	7.4				8.3	7.6	7.7	867	855	854
Measured/Loaded by:		MA	KP		AD	KP	MF	AD	KP	MF	AD	KP	MF	AD	KP	MF
Recorded by:		ML	GD	TM	AD	GD	TM	AD	GD	TM	AD	GD	TM	AD	GD	TM

Investigators' Signatures
Kim Pearce
Thomas Macon
Alison Jordan
Marshall Fairbolt
Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:	[illegible]		n/m		
Lab Tot. Resid. Cl2:	0.0	0.0	0.0	Hach	MF
Alkalinity:	126	73	31	Hach	TM
Hardness:	130	70	387	Hach	TM
Total Ammonia:			[illegible] 1.2 TM 9/24/91	Hach	TM

Ammonia Meter Slope: _____ Ammonia Blank: 0.0 Salinity Sample: _____ ppt

Typical Values for Selected Parameters in Florida Waters

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

Percentile Distribution

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

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

Macroinvertebrate taxa list for J. R. Kelly Generating Station, Alachua County, Florida, collected via timed qualitative methods (dip net) at a control station in Sweetwater Branch and a test site (downstream of the outfall) on 9/23/91.

	Control Site	Test Site
Coleoptera		
Berosus sp.	8	–
Paracymus sp.	8	–
Tropisternus sp.	8	–
Tropisternus natator	–	6
Diptera		
Ablabesmyia idei	–	6
Chironomus decorus grp.	24	–
Cricotopus bicinctus	8	6
Goeldichironomus holoprasinus	24	–
Hemerodromia sp.	–	12
Monopelopia boliekae	8	–
Microtendipes pedellus grp.	–	6
Paramerina sp.	8	–
Pentaneura inconspicua	–	6
Polypedilum illinoense	552	318
Polypedilum scalaenum	–	12
Tanypus neopunctipennis	8	–
Tanytarsus sp.	–	6
Undetermined dipteran pupa	–	18
Gastropoda		
Melanoides turricula	–	36
Physella sp.	8	–
Undetermined ancylid	8	–
Hemiptera		
Undetermined notonectid	8	–
Lepidoptera		
Undetermined lepidopteran	16	–
Malacostraca		
Procambarus fallax	64	42
Odonata		
Argia fumipennis	8	6
Celithemis sp.	–	6
Enallagma sp.	–	6
Ischnura sp.	8	–
Ischnura ramburii	16	–
Undetermined libellulid	288	–
Progomphus obscurus	–	6
Oligochaeta		
Allonais paraguayensis	8	–
Bratislava unidentata	8	–
Dero lodeni	8	–
Limnodrilus hoffmeisteri	32	–
Lumbriculus inconstans	32	–
Nais communis	–	30
Undetermined tubificid w/o capilliform setae	8	–

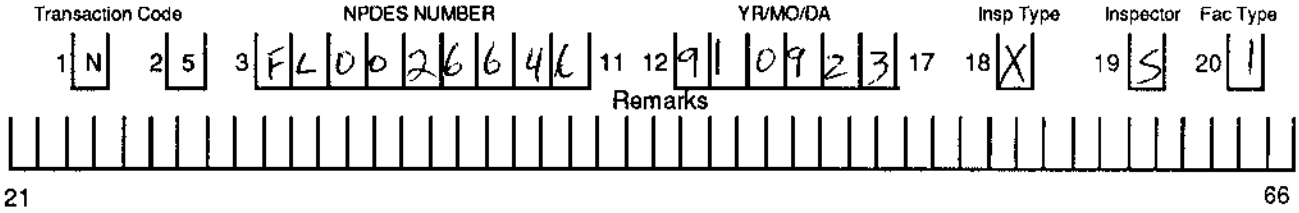
Macroinvertebrate taxa list for J. R. Kelly Generating Station, Alachua County, Florida, collected via Hester-Dendy samplers at a control station in Sweetwater Branch and a test site (downstream of the outfall) on 21 October 1991.

	Control Site	Test Site
Diptera		
Chironomus decorus grp.	2	–
Cricotopus bicinctus grp.	–	18
Goeldichironomus amazonicus	2	–
G. holoprasinus	3	–
Kiefferulus dux	–	9
Polypedilum illinoense	–	36
Tanytarsus sp.	–	9
Undetermined dipteran pupa	1	9
Gastropoda		
Cincinnatia sp.	1	–
Hebetancyclus excentricus	5	136
Laevapex peninsulae	2	–
Micromenetus dilatus	1	–
Odonata		
Argia fumipennis	2	27

Periphyton taxa list for J. R. Kelly Generating Station, Alachua County, Florida, collected in Sweetwater Branch on 23 September 1991.

	Control Site	Test Site
Diatoms		
Achnanthes sp.	147	74
Cyclotella sp.	–	74
Gomphonema sp.	–	222
Navicula sp.	–	74
Nitzschia sp. 1	147	371
Nitzschia sp. 2	–	74
Pinnularia sp.	–	815
Chlorophyta		
Ankistrodesmus sp.	736	–
Chlamydomonas sp.	147	–
Scenedesmus sp.	–	74
Tetraedron sp.	294	74
Unknown chlorophyte filament	74	–
Unknown chlorophyte flagellate	–	74
Cyanophyta		
Anabaena sp.	74	74
Aphanothece sp.	–	148
Chroococcus sp.	74	296
Gloeothece sp.	74	–
Lyngbya sp.	–	74
Oscillatoria sp.	515	–
Euglenophyta		
Trachelomonas sp.	–	74

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)

