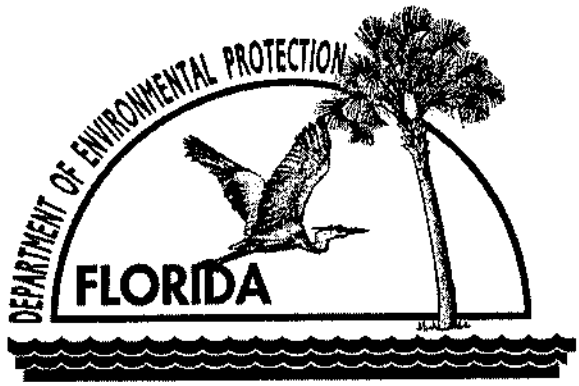


Biological Assessment of

Florida Power and Light - Manatee Plant

Manatee County

NPDES #FL0032174

Sampled April 1994

August 1994

Biology Section
Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: Florida Power and Light – Manatee Plant
County: Manatee
NPDES Number: FL0032174
State Permit Expiration Date: 28 February 1995

Toxics Sampling Inspection (XSI)

Date Sampled: 11 April 1994

Results: No metals were detected at levels which exceed Class III standards or violated permit limits. No organic pollutants were found.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 11 April 1994

Results: The sample of effluent was not acutely toxic to the bannerfin shiner, *Cyprinella leedsi*, or to the invertebrate, *Ceriodaphnia dubia*.

Impact Bioassessment Inspection (IBI)

Date Sampled: 11 April 1994

Results: The results of the benthic community analyses, based upon the dip net sampling, indicated that the test site was slightly impaired. Taxa richness, the Florida Index, and the EPT Index all decreased somewhat from the reference to test site. While the reference site scored in the lower range of the "no impairment" category of the Stream Invertebrate Index for Florida (SIIF), with 27 points, the test site scored in the upper range of the "moderate impairment" category with a score of 25 points. While ephemeropterans and trichopterans were present at the reference site, these groups were completely eliminated downstream of the discharge. This observation, along with the slight, but consistent, decreases in most measurements of community health, suggest minor negative effects associated with the discharge. The presence of high concentrations of hydrogen sulfide in the effluent is one factor which may have influenced the quality of the biological community at the test site. Since the periphyton racks were lost, it was possible to collect only the phytoplankton, which are not well suited to demonstrate near-field nutrient enrichment effects in flowing waters. No negative effects on the phytoplankton community could be attributed to the facility.

Water Quality Inspection (WQI)

Date Sampled: 11 April 1994

Results: Dissolved oxygen in the Weir 6 discharge (4.6 mg/L) was in violation of permit limits and Class III standards (Rule 17-302.560(31) FAC), but was adequate in receiving waters. Although ammonia levels were elevated in the Weir 6 outfall, receiving water ammonia was below average for a typical Florida stream. Concentrations of ortho-phosphate and nitrate-nitrate were similar at the reference and test sites. While these values were higher than approximately 80% of other typical Florida streams, there was no pattern indicating enrichment by the facility. Algal growth potential decreased slightly from the reference site (27.2 mg dry wt/L) to the test site (26.4 mg dry wt/L), but both sites still exceeded the 5 mg dry wt/L "problem threshold", possibly due to the agricultural activities noted upstream. AGP at the Weir 6 discharge was very low at 0.5 mg dry wt/L while at Weirs 8 and 10 it was elevated (27.7 mg dry wt/L).

Introduction

The Florida Power and Light – Manatee Plant is an industrial power generating facility located in Manatee County, Florida (see maps in Appendix). Wastewater is treated in precipitation basins, neutralization basins, oil/water separators, and sludge drying basins, before discharge into a cooling pond. Discharge from this cooling pond to the Class III Little Manatee River results from cooling pond seepage and semi-annual gate testing. Because seepage water was the only discharge during this sampling, it was considered "effluent" for this study. The plant has two permitted outfalls , one at Weir 6 and one at Weirs 8 and 10 (see maps in Appendix).

Permit limits are as follows: pH (6.0 to 8.5 S.U.'s), iron (1.0 mg/L), copper (16 µg/L), zinc (140 µg/L) and dissolved oxygen (5.0 mg/L minimum). Additionally, specific conductance shall not be increased by more than 50% above background or to 1275 µmhos/cm, whichever is greater. The permit allows for mixing zones for iron, copper, and pH.

In the past, there have been three discharges from the pond seepage return system due to power outages. The first two discharges violated the permit limits for iron. DEP has not received the results from the third discharge. Enforcement actions resulted in the installation of a series of sump pumps and collection pipes to return the seepage water to the cooling pond. This enforcement case was closed May 25, 1993. A bioassessment performed by the facility was determined to be inconclusive due to the large number of lost samplers. Florida Power and Light has proposed elimination of all discharges to the Little Manatee River, which should be outlined in a forthcoming plan.

Methods

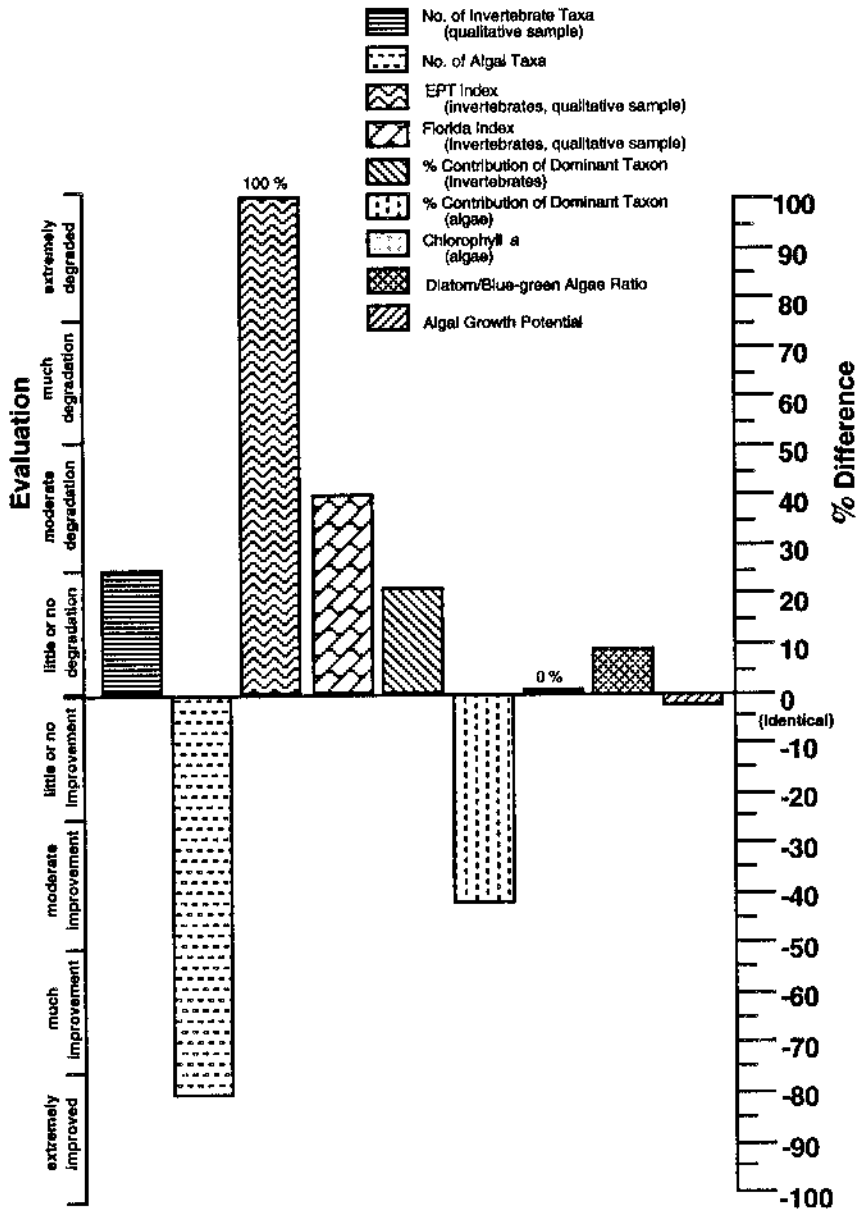
The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a reference site (located in the Little Manatee River upstream from the Weir 6 outfall) and a test site (located downstream of the outfall from Weirs 8 & 10). 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

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	28	21
Florida Index	15	9
EPT Index	3	0
Stream Invertebrate Index for Florida (SIIF)	27	25
% Contribution of Dominant Taxon	16.9	20.4
% Oligochaeta	2.6	4.0
% Diptera	44.8	34.2
% Ephemeroptera	0.7	0
% Trichoptera	22.1	0
% Odonata	2.6	6.6
% Coleoptera	3.3	10.5
% Gastropoda	7.8	42.8
% Other	16.2	1.3
% Predators/ Carnivores	6.7	8.1
% Deposit feeders (above surface)/ Collector-Gatherers	16.3	6.1
% Deposit feeders (below surface)	2.7	4.0
% Suspension feeders/ Collector-Filterers	62.3	33.2
% Scavengers	0.3	0.3
% Scrapers	9.9	48.0
% Shredders	1.6	0.2
Phytoplankton Algae		
Number of Taxa	5	9
% Contribution of Dominant Taxon	44.4	25.9
Chlorophyll a (µg/L)	0.39 U	0.39 U
Diatom/Diatom + B-G Abundance Ratio	1.0	0.91
% Blue-green	0	7.4
% Green	5.6	18.5
% Diatoms	94.4	74.1
Algal Growth Potential (mg dry wt/L)	27.2	26.4

screening toxicity bioassays, using *Ceriodaphnia dubia* and *Cyprinella leedsi* as test organisms, were performed on an effluent sample from Weirs 8 & 10. (Weber 1993). The effluents were analyzed for metals and for organic constituents (base neutral and acid extractables, VOC's, and oil and grease). Samples were collected from the iron mixing zones of the outfalls at Weir 6, Weirs 8 & 10, and the copper mixing zone of the Weir 10 outfall, and analyzed for their respective target metals. Additionally, nutrient analyses were performed on the effluents (both outfalls), the reference site, and the test site. Methods used for all chemical analyses are on file at the Tallahassee DEP Chemistry Laboratory.

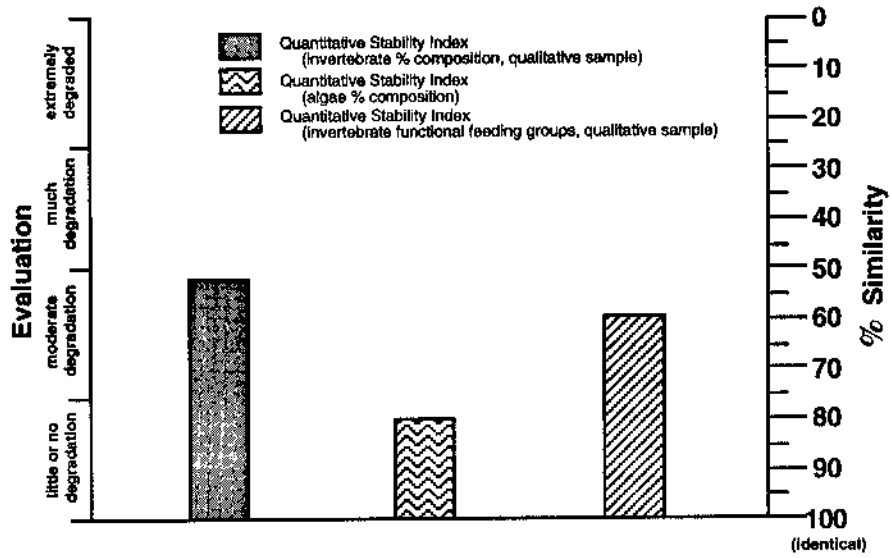
Benthic macroinvertebrate communities were evaluated at the reference and test sites. Invertebrates were collected from multiple substrates (*e.g.*, snags, leaf packs, vegetation) using discrete dip net sweeps. Invertebrates were also collected with Hester-Dendy artificial substrates, but the Hester-Dendys were completely buried due to frequent scouring and subsequent deposition of the sandy river bottom. Therefore, results of the dip net samples will be emphasized in this report. Periphyton was sampled at both sites by incubating glass microscope slides in a standard periphytometer for 28 days (Ross 1990). The periphyton rack at the downstream site was lost rendering the upstream periphyton useless for any comparison of community degradation. Therefore, periphyton data will not be used in this report. Phytoplankton algae for identification and chlorophyll *a* were collected via subsurface grabs (Ross 1990). Algal Growth Potential tests, using *Selenastrum capricornutum* as the test organism, followed Miller *et al.* (1978).



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

Explanation of Measurements of Community Health

Several different measurements of macroinvertebrate and algal community health have been employed in this report. Many of these, such as the number of taxa and Shannon-Weaver Diversity Index 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). The



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

Ephemeroptera/Plecoptera/Trichoptera (EPT) Index is calculated by summing the number of distinct taxa of EPT's represented in a sample. A higher EPT Index is associated with good water quality. Excessive numerical dominance of a single type of organism (a high % contribution of dominant taxon) is usually associated with disturbance. 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 selected, and their cumulative total is the QSI. A QSI (for % composition) of 100% means that the two sites being compared are identical. This same type of procedure is used for calculating the QSI (for functional feeding groups). The Stream Invertebrate Index for Florida (SIIF) is a composite metric which is based upon the macroinvertebrate communities found at Florida Eco-regional reference sites sampled with dip net sweeps (EA Engineering 1994). The SIIF assigns 5, 3, or 1 point(s) to a variety of invertebrate parameters, depending on how closely that parameter approaches the expected Eco-regional reference condition. Five points is the best score for metrics which are particularly strong at discriminating between healthy and impaired sites (see SIIF calculation table in Appendix). The following parameters are used in calculating the SIIF for the Panhandle: taxa richness, EPT Index, % contribution of the dominant taxa, % Diptera, Florida Index, % suspension feeders/filterers, and % shredders (EA Engineering 1994). In the Panhandle, 23-29 SIIF points indicates no impairment, 15-22 points indicates moderate impairment, and 7-14 points is clear evidence of severe degradation. In the Florida Peninsula, these same parameters, along with the number of crustacean and mollusk taxa and the % of crustacean and mollusk taxa, are used to calculate the SIIF. In the Peninsula, 27-33 SIIF points indicates no impairment, 17-26 points indicates moderate impairment, and 9-16 points is clear evidence of severe degradation. Although the SIIF is based on samples collected during the summer, similar relationships should apply in other seasons.

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

The following personnel were involved in this investigation: Pat Fricano, Lisa Carter, and Stefan Schulze (DEP Southwest District), and Chris Barge, Lyn Burton, Marshall Faircloth, Russel Frydenborg, Christy LeDuc, Kathleen Lurding, Elizabeth Miller, Kim Pearce, Urania Quintana, Landon Ross, Greg Wynn, and David Young (Tallahassee Biology Laboratory). The report was reviewed by the Point Source Bioassessment Review Committee, consisting of Jan Mandrup-Poulsen, Wayne Magley, and Mike Tanski, as well as District representatives.

Results and Discussion

Habitat quality was somewhat better at the reference site (79 points) than at the test site (66 points). Productive habitat at the

test site consisted primarily of undercut banks and roots (approximately 10%), with the remainder being a sand bottom substrate. The reference site had slightly more woody debris and snags. Although surrounding land near the reference and test sites was completely forested, considerable farming activities were noted upstream from the reference site. Water velocity at the reference and test sites was favorable for benthic macroinvertebrates (0.33 and 0.25 m/sec, respectively). The reference and test sites were of similar width (10 m) and depth (1 m). Although periphyton was commonly observed at the reference site, none was noted downstream at the test site. While sampling, the District biologists noted that the smell of hydrogen sulfide was overpowering at the Weir 6 outfall.

Surface dissolved oxygen (7.9 mg/L at the reference site and 7.5 mg/L at the test site) was within water quality standards. However, dissolved oxygen at the Weir 6 discharge was 4.59 mg/L. Since there is no mixing zone specified for dissolved oxygen, this discharge was in violation of permit limits, as well as Class III water quality standards (Rule 17-302.560(31) FAC). Specific conductance was identical at the reference and test sites (566 µmhos/cm). The water was neutral (7 SU's) at both sites. Although the pH's measured at both outfalls were somewhat low (below 6 SU's), the mixing zone values were within permit limits. Temperature measurements (22.7 °C to 22.1 °C) were also similar at both sites.

No organic pollutants were detected in the effluent. Of the metals analyzed for, aluminum (1100 µg/L, Weir 6; 421 µg/L, Weirs 8 & 10) and iron (509 µg/L, Weir 6; 673 µg/L, Weirs 8 & 10) and zinc (5 µg/L, Weirs 8 & 10) were found in the effluent at concentrations above their respective practical quantitation limits. None of these concentrations was in violation of Class III standards or permit limits. Levels of iron in the mixing zone had been reduced to 246 µg/L below Weir 6 and to 131 µg/L below Weirs 8 and 10.

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

Although ammonia levels were elevated in the Weir 6 outfall (1.3 mg/L) and slightly elevated in the Weir 8 and 10 outfall (0.49 mg/L), ammonia did not appear to be significantly increased at the test site when compared to the reference site. Both values (0.04 mg/L and 0.05 mg/L at the reference and test sites, respectively) were below average for a typical Florida stream. Concentrations of ortho-phosphate (0.37 mg/L to 0.39 mg/L) and nitrate-nitrate (0.36 mg/L to 0.35 mg/L) were similar at the reference and test sites. While these values are higher than approximately 80% of other typical Florida streams, there was no pattern indicating enrichment by the facility (see Table of Typical Water Quality Values in Appendix).

Algal growth potential (AGP) decreased slightly from the reference site (27.2 mg dry wt/L) to the test site (26.4 mg dry wt/L). AGP at both sites exceeded the 5 mg dry wt/L "problem threshold" (Raschke and Schultz 1987), and can possibly be attributed to the agricultural activities noted upstream. AGP of the Weir 6 discharge was very low at 0.5 mg dry wt/L while at Weirs 8 & 10 it was elevated (27.7 mg dry wt/L). The slight decrease in AGP at the test site suggested that the facility was not substantially affecting the AGP of the Little Manatee River.

The results of the benthic community analyses, based upon the dip net sampling, indicated that the test site was somewhat impaired. The figure on p. 2 indicates the degree of difference between the reference and test sites. Larger differences (that is, higher percentages) correspond with greater degrees of degradation. Negative values mean that the test site is better than the reference site. The relative abundance of each individual taxon appears in the Appendix. The figure on page 3 summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation.

Taxa richness decreased from 28 taxa at the reference station to 21 taxa at the downstream site. Similarly, the Florida Index decreased from 15 points at the reference site to 9 points at the test site. Further, the EPT Index decreased from 3 to 0. While the reference site scored in the lower range of the "no impairment" category of the Stream Invertebrate Index for Florida (SIIF), with 27 points, the test site scored in the upper range of the "moderate impairment" category with a score of 25 points. This difference of 2 points in the SIIF does not indicate significant degradation, however a slight declining trend was noted in many of the parameters.

The reference site was dominated by chironomids (44.8%, with *Rheotanytarsus exiguus* grp. making up 16.9% of the total), while hydropsychid trichopterans (22.1%), pelecypods (8.4%), gastropods (7.8%), and the rhynchocoel, *Prostoma rubrum*, (7.9%) were also well represented. The test site was also dominated by the chironomids (34.2%, with *Rheotanytarsus distinctissimus* making up 20.4.% of the total), with gastropods (42.8%), and coleopterans (mostly rif-

fle beetles, 10.5%) also being fairly numerous. Most notably, while ephemeropterans and trichopterans were present at the reference site, these groups were completely eliminated downstream of the discharge. This observation, along with the slight, but consistent, decreases in most measurements of community health, suggest minor negative effects associated with the discharge. The presence of high concentrations of hydrogen sulfide in the effluent is one factor which may have influenced the quality of the biological community at the test site.

Periphyton racks were lost at the test site, and the periphyton sample from the reference site, with no test site data to compare it to, is not particularly meaningful for the purposes of this study. Since the phytoplankton community flows with current, it is not well suited to demonstrate near-field nutrient enrichment effects in flowing waters. Consequently, phytoplankton community parameters did not appear to be much affected by the power plant discharges. In fact, the number of taxa increased from 5 at the reference site to 9 at the test site. Chlorophyll *a* was below detection limits at both sites. The percent contribution of the dominant taxon was higher at the reference site (44.4% of the population was *Navicula* sp.), while the test site was co-dominated equally by the two diatoms, *Navicula* sp. and *Nitzschia* sp. (25.9% each). The reference site population consisted of diatoms (94.4%) and chlorophytes (20%). The test site community was slightly more diverse, consisting of diatoms (74.1%), chlorophytes (18.5%), and cyanophytes (7.4%). Overall, no negative effects on the phytoplankton community could be attributed to the facility.

Conclusions

Dissolved oxygen in the Weir 6 discharge (4.59 mg/L) was in violation of permit limits, but dissolved oxygen was adequate in receiving waters.

No organic pollutants were detected in the effluent. Of the metals analyzed for, aluminum (1100 µg/L, Weir 6; 421 µg/L, Weirs 8 & 10) and iron (509 µg/L, Weir 6; 673 µg/L, Weirs 8 & 10) and zinc (5 µg/L, Weirs 8 & 10) were found in the effluent at concentrations above their respective practical quantitation limits, but none exceeded Class III standards or violated permit limits.

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

Although ammonia levels were elevated in the Weir 6 outfall, receiving water ammonia was below average for a typical Florida stream. Concentrations of ortho-phosphate and nitrate-nitrate were similar at the reference and test sites. While these values were higher than approximately 80% of other typical Florida streams, there was no pattern indicating enrichment by the facility.

While algal growth potential decreased slightly from the reference site (27.2 mg dry wt/L) to the test site (26.4 mg dry wt/L), both sites still exceeded the 5 mg dry wt/L "problem threshold", possibly due to the agricultural activities noted upstream. AGP of the Weir 6 discharge was very low at 0.5 mg dry wt/L while at Weirs 8 and 10 it was elevated (27.7 mg dry wt/L). The slight decrease in AGP at the test site suggested that the facility was not substantially affecting the AGP of the Little Manatee River.

The results of the benthic community analyses, based upon the dip net sampling, indicated that the test site was slightly impaired. Taxa richness, the Florida Index, and the EPT Index all decreased somewhat from the reference to test site. While the reference site scored in the lower range of the "no impairment" category of the Stream Invertebrate Index for Florida (SIIF), with 27 points, the test site scored in the upper range of the "moderate impairment" category with a score of 25 points. While ephemeropterans and trichopterans were present at the reference site, these groups were completely eliminated downstream of the discharge. This observation, along with the slight, but consistent, decreases in most measurements of community health, suggest minor negative effects associated with the discharge. The presence of high concentrations of hydrogen sulfide in the effluent is one factor which may have influenced the quality of the biological community at the test site.

Periphyton racks were lost at the test site, and because the phytoplankton community flows with current, it is not well suited to demonstrate near-field nutrient enrichment effects in flowing waters. Consequently, phytoplankton community parameters did not appear to be much affected by the power plant discharges, and no negative effects on the phytoplankton community were attributed to the facility.

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Chemistry summary table for Florida Power and Light – Manatee Plant	Effluent at Weir 6	Effluent at Weirs 8 & 10	Weir 6/ Iron Mixing Zone	Iron (Weirs 8 & 10) and Copper (Weir 10) Mixing Zones
Organic Constituents (ug/L)				
None detected				
Metals (ug/L)				
Aluminum	1010	421		
Antimony	8 U	8 U		
Arsenic	20 U	20 U		
Cadmium	0.4 U	0.4 U		
Copper	10 U	10 U		10 U
Chromium	10 U	10 U		
Iron	509	673 A	246	131
Lead	15 U	15 U		
Mercury	0.10 U	0.10 U		
Nickel	5 U	5 U		
Selenium	30 U	30 U		
Silver	0.3 U	0.3 U		
Zinc	4 U	5 I		
Nutrients (mg/L)			**Reference Site**	**Test Site**
Ortho-phosphate	0.010 U	0.010 U	0.37 A	0.39
Total phosphorus	0.026	0.091	0.33	0.38
Ammonia	1.3	0.49	0.038 I	0.053 I
Nitrate+Nitrite	0.020 U	0.11	0.36	0.35
TKN	1.6	1.2	0.31	0.33
Other Parameters				
Habitat Assessment			79	66
D. O. (mg/L)	4.6	8.1	7.9	7.5
pH (SU's)	5.7	6.0	7.2	7.1
Specific Conductance (µmhos/cm)	526	497	566	566
Hardness (mg/L as CaCO3)	160	180	300	260
Temperature (°C)	25.5	25.0	22.7	22.1
Algal Growth Potential (mg dry wt/L)	0.5	27.7	27.2	26.4
Bioassay Fish		No mortality		
Bioassay Invertebrate		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

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

Typical Values for Selected Parameters in Florida Waters

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

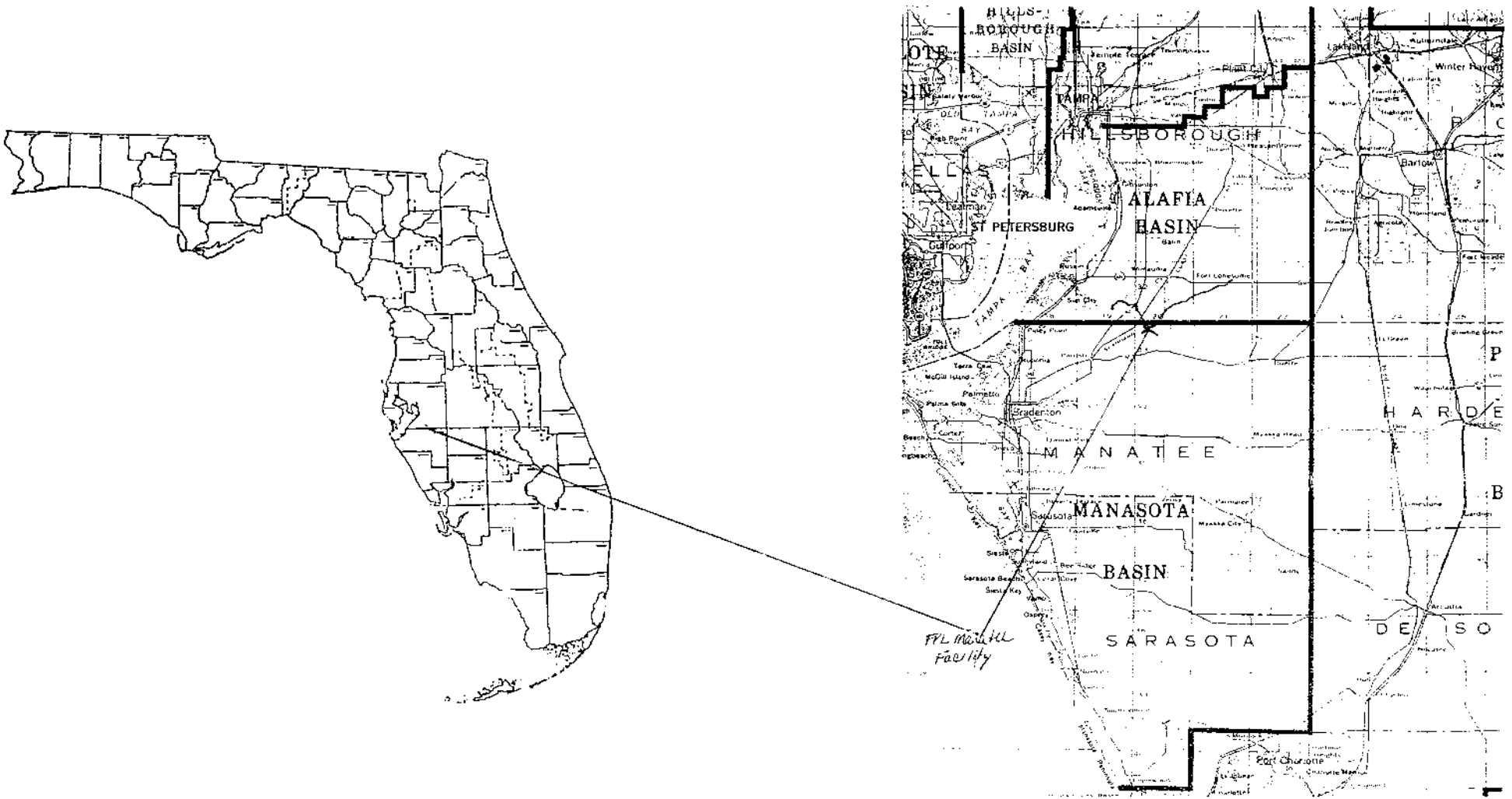
Percentile Distribution

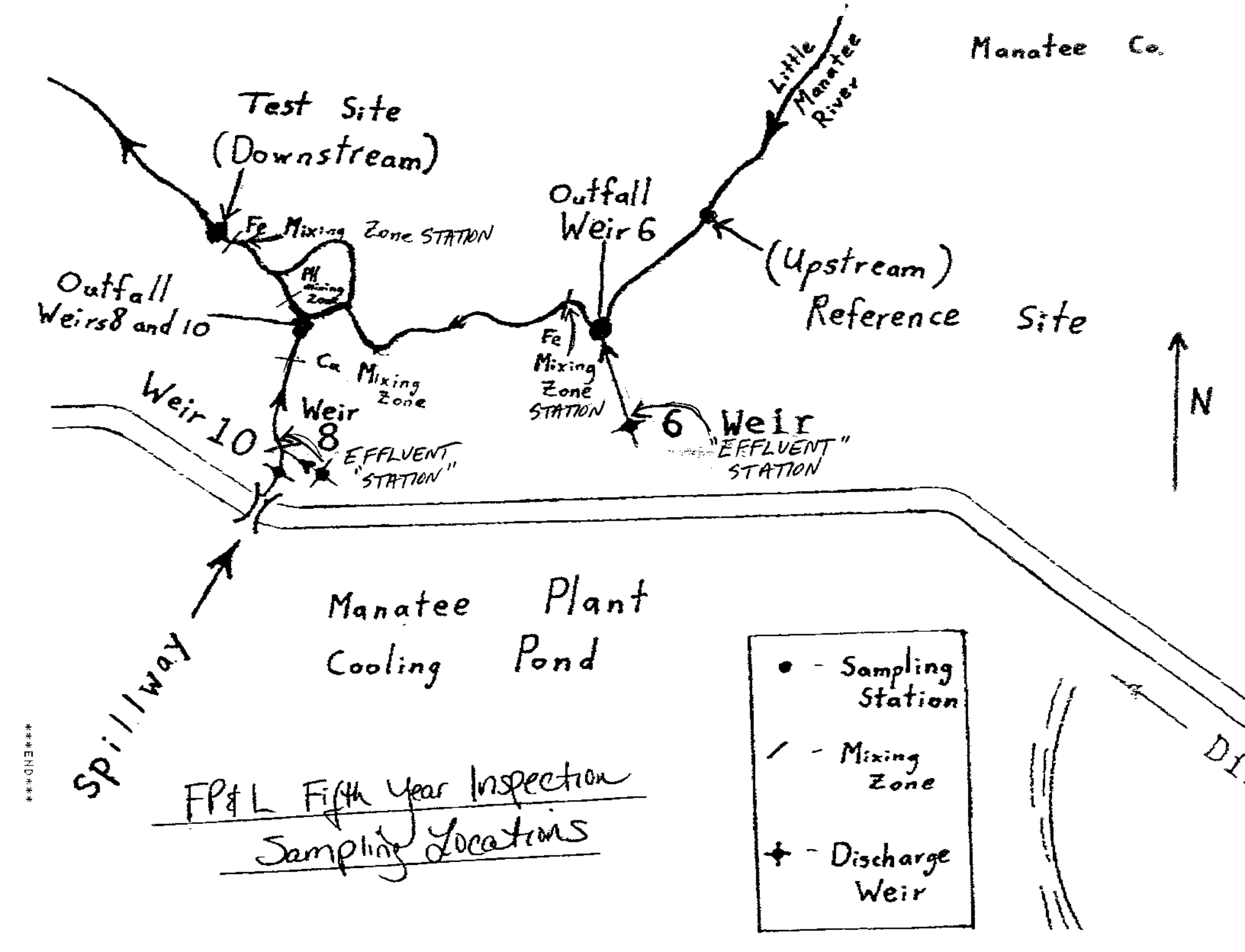
Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%
STREAMS (1617 stations)											
Phytoplankton Chlorophyll *a*	0.22	0.52	0.94	1.60	3.02	4.63	6.72	9.87	14.68	27.35	48.70
Periphyton Chlorophyll *a*	0.31	0.43	0.77	1.04	2.16	2.94	6.45	10.51	17.00	39.51	60.85
H-D Diversity	0.84	2.12	2.48	2.74	2.88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

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

FPL Manatee

Fifth year inspection. Samples collected 4-11-94.




Manatee Co.
Little Manatee River
Test Site
(Downstream)
Fe Mixing Zone STATION
Outfall
Weir 6
(Upstream)
Reference Site
Outfall
Weirs 8 and 10
Ca Mixing Zone
Fe Mixing Zone STATION
Weir 10
Weir 8
EFFLUENT "STATION"
6 Weir
"EFFLUENT" STATION
N
Manatee Plant
Cooling Pond
Spillway
• - Sampling Station
/ - Mixing Zone
+ - Discharge Weir
FP&L Fifth Year Inspection
Sampling Locations

END

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name: FLORIDA POWER + LIGHT - MANATEE PLANT		Date Summary Prepared: 3/10/94
Location (attach detailed map): 5 MILES EAST OF PARRISH ON S.R. 62	County: MANATEE	District: SOUTHWEST
Federal Permit # and expiration date: FL0032174	State GMS # and State expiration date: 4041P20006	Facility Type: (Industrial) Municipal Federal Agricultural Other (list):

Function of facility:
POWER PLANT

Description of treatment process:
PRECIPITATION BASINS, NEUTRALIZATION BASINS, OIL/WATER SEPARATORS AND SLUDGE DRYING BASIN, WHICH DISCHARGES TO THE COOLING POND. THE DISCHARGE TO THE LITTLE MANATEE RIVER IS FROM COOLING POND SEEPAGE AND SEMI-ANNUAL GATE TESTING.

Receiving waters: LITTLE MANATEE RIVER	Classification: I II III

Design Flow:	Mean Flow:	Flow during survey:

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

therefore, the best time to sample is:

If facility has a mixing zone, give details (size, parameters affected, etc.):
SEE ATTACHED PAGE 9 OF 10, SPECIFIC CONDITIONS 30, 31, 32 AND 33

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

Parameter	Limit (units)
SEE ATTACHED PERMIT SPECIFIC CONDITION	

Describe special permit conditions and permit modifications:
SEE ATTACHED PERMIT SPECIFIC CONDITIONS

FPL, MANATEE PLANT
(Facility)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Description of permitted outfall(s):
2 PERMITTED OUTFALLS: WEIR 6, CONCRETE V-SHAPED WEIR DISCHARGES TO A DITCH, WHICH DISCHARGES TO THE LITTLE MANATEE RIVER: WEIRS 8 + 10, BOTH CONCRETE V-SHAPED WEIRS DISCHARGE TO A DITCH, WHICH DISCHARGES TO THE LITTLE MANATEE RIVER, THERE A THREE MIXING ZONES (SEE ATTACHMENT)

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: THERE HAVE BEEN THREE DISCHARGES FROM THE POND SEEPAGE RETURN SYSTEM DUE TO POWER OUTAGES. THE FIRST TWO, HAD ONLY IRON VIOLATIONS. THE DEPARTMENT HAS NOT RECIEVED THE RESULTS OF THE LAST DISCHARGE.

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:
ENFORCEMENT: C.O. WAS SIGNED FOR WATER VIOLATIONS FROM POND SEEPAGE, A SERIES OF SUMPS AND COLLECTION PIPES WERE INSTALLED TO RETURN THIS WATER TO THE POND. CLOSED 5/25/93
BIOASSESSMENT 8+9/93: INCONCLUSIVE DUE TO THE LARGE NUMBER OF LOST SAMPLERS. (TAKEN BY THE FACILITY)

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set: NO PAST DER RESULTS AVAILABLE

Additional information:
FPC HAS PROPOSED ELIMINATION OF ALL DISCHARGES TO THE LITTLE MANATEE. A PLAN WILL BE FORTHCOMING

Staff contributing to this review (signature):

(Biologist)

(Inspector)

(Engineer)

(Biologist)

(Biologist)

(IW S/E)

FOR JEFF HICTON

SPECIFIC CONDITIONS: (cont'd)

9. When an in-house laboratory is used to analyze samples required pursuant to this permit the permittee is required to have the samples taken by a qualified technician following EPA and Department approved sampling procedures and chain-of-custody requirements. All chain-of-custody records must be retained on-site for at least five (5) years and made available to the Department immediately upon request.

10. This document satisfies Industrial Waste permitting requirements only and does not authorize construction or operation of this facility prior to obtaining all other permits required by Local, State and Federal Agencies.

11. The discharge to the Little Manatee River shall not exceed the effluent limitations and shall be monitored at Sample Points 16, 17 and 18, by the permittee as specified below; if there is no discharge, the sample shall be collected on the day of next discharge. The sample shall be taken at the point nearest the discharge prior to mixing with the receiving water body or at the edge of the mixing zone.

EFFLUENT LIMITATIONS/
WATER QUALITY STANDARDS

Effluent Characteristic	Min	30-Day Average	Max	Sampling Frequency	Sample Type
Flow (MGD)**	N/A	Report	Report	Weekly	Instantaneous
pH (Std Units)	6.0	N/A	8.5	Monthly	Grab
Dissolved Oxygen (mg/l)	5.0	N/A	N/A	Monthly	Grab
Specific Conductance (umhos/cm)	N/A	N/A	*	Monthly	Grab
Iron (mg/l)	N/A	N/A	1.0	Monthly	Grab
Copper (ug/l)	N/A	N/A	16	Monthly	Grab
Zinc (ug/l)	N/A	N/A	140	Monthly	Grab

* Total conductance shall not be increased more than 50% above background or to 1275 micromhos per centimeter, whichever is greater.

** Flow shall be monitored for at Sample Points 16 and 17. Flow at Sample Point 18 shall be calculated.

Florida Power & Light Company
P. O. Box 202
Parrish, FL 34219-0202
813 379-7311/776-1095
Fax 813 776-1304

(B.L)
Robert Wakefield
Lead Site Maintenance Tech.
Land Utilization

FPL Group company

SPECIFIC CONDITIONS: (cont'd)

12.(a). The permittee shall sample and analyze the cooling pond at Sample Point No. 4 as specified below.

REPORTING REQUIREMENTS

Effluent Characteristic	Monthly Maximum	Sampling Frequency	Sample Type
pH (Std Units)	Report	Monthly	Grab
Dissolved Oxygen (mg/l)	Report	Monthly	Grab
Specific Conductance (umhos/cm)	Report	Monthly	Grab
Iron (mg/l)	Report	Monthly	Grab
Copper (ug/l)	Report	Monthly	Grab
Zinc (ug/l)	Report	Monthly	Grab

12.(b). The permittee shall sample the discharge into the cooling pond at Sample Point No. 9 and analyze for the parameters as specified below.

REPORTING REQUIREMENTS

Effluent Characteristic	Min.	30-Day Average	Max.	Sampling Frequency	Sample Type
Flow (MGD)	N/A	Report	Report	Weekly	Calculation
pH (Std Units)	Report	N/A	Report	Monthly	Grab
Specific Conductance (umhos/cm)	N/A	N/A	Report	Monthly	Grab
Iron (mg/l)	N/A	N/A	Report	Monthly	Grab
Copper (ug/l)	N/A	N/A	Report	Monthly	Grab
Zinc (ug/l)	N/A	N/A	Report	Monthly	Grab
Arsenic (ug/l)	N/A	N/A	Report	Quarterly	*Composite
Barium (ug/l)	N/A	N/A	Report	Quarterly	*Composite
Cadmium (ug/l)	N/A	N/A	Report	Quarterly	*Composite
Chromium (ug/l)	N/A	N/A	Report	Quarterly	*Composite
Lead (ug/l)	N/A	N/A	Report	Quarterly	*Composite
Mercury (ug/l)	N/A	N/A	Report	Quarterly	*Composite
Selenium (ug/l)	N/A	N/A	Report	Quarterly	*Composite
Silver (ug/l)	N/A	N/A	Report	Quarterly	*Composite

* The sample type should be 5 day composite, i.e. daily samples collected for five days and composited on a flow weighted basis.

SPECIFIC CONDITIONS: (cont'd)

13.(a). The permittee shall sample Sample Points 12, 13 and 14, and analyze for the parameters as specified below.

REPORTING REQUIREMENTS

Effluent Characteristic	Min.	30-Day Average	Max.	Sampling Frequency	Sample Type
Flow (MGD)*	N/A	Report	Report	Weekly	Instantaneous
pH (Std Units)	Report	N/A	Report	Monthly	Grab
Specific Conductance (umhos/cm)	N/A	N/A	Report	Monthly	Grab
Iron (mg/l)	N/A	N/A	Report	Monthly	Grab
Copper (ug/l)	N/A	N/A	Report	Monthly	Grab
Zinc (ug/l)	N/A	N/A	Report	Monthly	Grab
Dissolved Oxygen (mg/l)	Report	N/A	N/A	Monthly	Grab

* Flow shall be monitored weekly at Sample Point 13 by utilizing a river level measuring device which sends a signal to a recording device at the pumping station. The flow at Sample Point 12 (upstream) shall be calculated using flow measurements at Sample Point 13 and subtracting out flow measurements from Sample Point 17. The flow at Sample Point 14 (downstream) shall be calculated using flow measurements at Sample Point 13 and adding in flow measurements from Sample Points 16, 18 and 19.

13.(b). Flow measurements at the weirs shall be calculated within ± 10% per the plant's NPDES permit.

14. Upon discharge from the spillways (Sample Points 5 and 19), written report including reason for discharge, duration and volume shall be submitted to the Department and Manatee County Public Health Unit.

The permittee shall obtain grab samples of the discharge during gate opening, except during emergencies when the sample shall be taken during the first day of discharge, at Sample Points 5 and 19 and analyze for all of the parameters listed below.

REPORTING REQUIREMENTS

Effluent Characteristic	Maximum	Sampling Frequency	Sample Type
pH (Std Units)	Report	Gate Test	Grab
Dissolved Oxygen (mg/l)	Report	Gate Test	Grab
Specific Conductance (umhos/cm)	Report	Gate Test	Grab
Iron (mg/l)	Report	Gate Test	Grab
Copper (ug/l)	Report	Gate Test	Grab
Zinc (ug/l)	Report	Gate Test	Grab
Flow (MGD)	Report	Gate Test	Calculation

SPECIFIC CONDITIONS: (cont'd)

29. The permittee is granted an exemption from ground water monitoring, according to Section 17-522.600(9)(b), F.A.C. provided the discharge does not cause a violation of the primary drinking water standards at any private or public water supply well outside of the installation's property boundary. However, the Department reserves the right to request regular sampling of the discharge prior to contact with ground waters to ensure the applicable water quality criteria and standards are being met.

30. Pursuant to the provisions of Section 17-4.244, F.A.C., a zone of mixing for iron, extending a distance of 1300 feet down the drainage ditch of Weir 6 until intersecting the Little Manatee River and then proceeds downstream in the river for 86 feet, is granted by the Department.

31. Pursuant to the provisions of Section 17-4.244, F.A.C., a zone of mixing for iron, extending a distance of 1700 feet down the channel of Weirs 8 and 10 until intersecting with the Little Manatee River and then proceeds downstream in the river for 168 feet, is granted by the Department.

32. Pursuant to the provisions of Section 17-4.244, F.A.C., a zone of mixing for copper, extending a distance of 547 feet downstream from Weir 10 in the spillway channel, is granted by the Department.

33. Pursuant to the provisions of Section 17-4.244, F.A.C., a zone of mixing for pH, extending a distance of 1700 feet down the channel of Weirs 8 and 10 until intersecting with the Little Manatee River and then proceeds downstream in the river for 46 feet, is granted by the Department.

34. The permittee shall operate in accordance with the conditions and the provisions of Permit No. IO41-150259C until the closed-loop recycling system is operational.

35. Prior to June 1, 1993 and upon completion of construction of the closed-loop recycling system, the permittee shall submit to the Department's Southwest District Office a completed "Certification of Completion of Construction" form (Attachment B) signed and sealed by the engineer of record.

36. This facility is exempted from meeting the mixing zone length limitations within the toe ditch seepage ditches, which transport the toe ditch seepage from Weirs 8 and 10 and Weir 6 to the Little Manatee River, pursuant to Rule 17-4.244(1)(c), F.A.C.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/DD/Y):	TIME	RECEIVING BODY OF WATER:

REMARKS:	LOCATION:	FIELD ID/NAME: TEST

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
100%						

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

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

Point-Source Pollution (list location and describe): FPL - Weirs 6, 9, 10 outfalls from Lake Barnett Cooling Reservoir

Estimated System Width (range, m): 10	Estimated System Depth (range, m): <1		yes
High Water Mark (m above bed): 2	Velocity (range, m/s): 0.25	Impounded ☐	
		Channelized ☐	

Canopy Cover % : Open : ☐ Lightly Shaded (11-45%): ☐ Moderately Shaded (46-80%): ☐ Heavily Shaded: ☑

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Riffles			
Leaf Packs				Sand	90	10	Sweeps
Aquatic Vegetation				Mud/Muck/Silt			
Rock or Shell Rubble				Benthic leaf mats			
Undercut Banks/Roots	10	10	Sweeps	Other:			

WATER QUALITY

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):			Secchi (m):
Top		22.07	7.13	7.46	566			DST 1 m
Mid-depth								
Bottom								

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

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

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

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

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

Weather Conditions: Partly Cloudy Warm + Windy 85°

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

SAMPLING TEAM:	SIGNATURE:	DATE:

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:
		4-11-94	

REMARKS:	LOCATION:	FIELD ID/NAME:
	FPL -	

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover — 10	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 — 21	Max. observed: >0.3 m/sec. but < 1 m/sec 23-30 points	Max. observed; 0.1 to 0.3 m/sec 16-22 points	Max. observed; 0.05 to 0.1 m/sec 8-15 points	Max. observed; <0.05 m/sec, or spate occurring; > 2 m/sec 0-7 points
Artificial Channel/ Flow Alteration — 15	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 — 5	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 — 10	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.	66

COMMENTS: HD's were buried. Periphyton rock was lost. River bottom gets scoured quite frequently. Although this location is completely wooded, watershed has alot of farming way up

ANALYSIS DATE:	ANALYST:	SIGNATURE:
4/11/94	L. Fucaro	Lat Fucaro

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/DY): 4-14-94	TIME	RECEIVING BODY OF WATER:

REMARKS:	LOCATION:	FIELD ID/NAME:

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
100%						

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

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

Point-Source Pollution (list location and describe): None — Substantial farming activities however,

Estimated System Width (range, m): 10	Estimated System Depth (range, m): 1		yes
High Water Mark (m above bed): 2	Velocity (range, m/s): 0.33	Impounded ☐	
		Channelized ☐	

Canopy Cover % : Open : ☐ Lightly Shaded (11-45%): ☐ Moderately Shaded (46-80%): ☑ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	15	3		Riffles			
Leaf Packs				Sand	80	8	
Aquatic Vegetation				Mud/Muck/Silt			
Rock or Shell Rubble				Benthic leaf mats			
Undercut Banks/Roots	5	3 4		Other:			

WATER QUALITY

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):			Secchi (m
Top	1	22.71	7.19	7.88	566			0.5
Mid-depth	/	/	/	/	/			/
Bottom	/	/	/	/	/			1.0

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

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

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

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

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

Weather Conditions: Partly Cloudy 85°

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

SAMPLING TEAM:	SIGNATURE:	DATE:
[illegible] / Stephen Schaal	[illegible]	

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:
[illegible]		4-11-94	[illegible]

REMARKS:	LOCATION: [illegible]	FIELD ID/NAME:
	[illegible]	

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 24	Max. observed: >0.3 m/sec. but < 1 m/sec **23-30 points**	Max. observed; 0.1 to 0.3 m/sec **16-22 points**	Max. observed; 0.05 to 0.1 m/sec **8-15 points**	Max. observed; <0.05 m/sec, or spate occurring; > 2 m/sec **0-7 points**
Artificial Channel/ Flow Alteration 15	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 9	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 10	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.	[illegible]

COMMENTS: Although the location was completely wooded, watershed has extensive farming and ranching activities.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
4/11/94	P. Fricano	P. Fricano

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: FP+L Manatee
Location: FPL - Manatee
County: Manatee
Contact/District: Pat Fricano / SW
NPDES Permit #: FL00 32174 **Outfall #:**
94 APR -12 -28 77302

Sample Collection: Date 4-11-94 Time 1030
Test Beginning: Date 4-12-94 Time 1400
Test Ending: Date 4-14-94 Time 1430
Organism Batch #: 12 **Diluent Batch #:** #13
Organism Age: <24hrs
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 @ 9.0	24.0 @ 24.0	8.3 @ 24.1	980 @ 1,000 9760 @ 10,000 @ 23.8 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.4 @ 24.4	8.3 @ 24.5	985 @ 1,000 9840 @ 10,000 @ 24.2 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	24.0 @ 24.1	8.3 @ 24.5	980 @ 1,000 9820 @ 10,000 @ 24.0 °C

		Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm)		
Conc.	Chamber #	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	5	5	5	8.2		8.2	23.1		23.6	8.1		8.0	180		245
Control	B	5	5	5			8.3			23.5			7.9			200
Control	C	5	5	5			8.3			23.5			8.0			200
Control	D	5	5	5			8.3			23.5			8.0			200
100%	A	5	5	5	6.9		9.0	23.0		23.5	8.3		8.7	480		505
100%	B	5	5	5			9.0			23.4			8.9			515
100%	C	5	5	5			9.0			23.3			8.8			515
100%	D	5	5	5			9.0			23.3			8.9			525
Measured/Loaded by:		TR	TM	MF	TR		MF	TR		MF	TR		MF	TR		MF
Recorded by:		TR	TR	MF	TR		MF	TR		MF	TR		MF	TR		MF

Investigators' Signatures

Robin G. Ridler
Tina Mikelsky
Marshall Faircloth

Reviewer

Water Quality Parameters	Salt Water/ Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			0.0	—	LC-SS
Lab Total Residual Cl2:	<0.03	<0.03	<0.03	DR-100	TR
Alkalinity:	125	70	25	Phtch	TR
Hardness:	120	80	110	Hach	TR
Total Ammonia:	<0.017	<0.017	<0.017	Orion	MF

Ammonia Meter #98136 Ammonia Meter Slope: -56.4 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

form updated 7/8/93

Sample Source: FP+L Manatee
Location: FPL - Manatee
County: Manatee
Contact/District: Pat Fricano / SW
NPDES Permit #: FL00 32174 Outfall #:
94-APR-12-28 77302

Sample Collection: Date 4-11-94 Time 1030
Test Beginning: Date 4-12-94 Time 1400
Test Ending: Date 4-14-94 Time 1430
Organism Batch #: 14 Diluent Batch #: Well
Organism Age: 10 days
Test Organism: Cyprinella leedsi

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

Test Number: 2 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 @ 9.0	24.0 @ 24.0	8.3 @ 24.1	980 @ 1,000 9760 @ 10,000 @ 23.8 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.4 @ 24.4	8.3 @ 24.5	985 @ 1,000 9840 @ 10,000 @ 24.2 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	24.0 @ 24.1	8.3 @ 24.5	980 @ 1,000 9820 @ 10,000 @ 24.0 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
Control A	29	5	5	5	7.9	8.2	8.4	22.7	23.8	23.5	8.2	7.9	8.1	240	245	245
Control B	44	5	5	5	7.9	8.2	8.4			23.5	8.2	7.9	8.0	240	245	245
100% A	263	5	5	5	6.7	7.1	7.7	21.8	23.9	23.6	8.7	8.0	8.1	500	520	520
100% B	22	5	5	5	6.7	7.1	7.7			23.5	8.7	8.0	8.1	500	520	520
Measured/Loaded by:		TR	TM	MF	TR	TM	MF	TR	TM	MF	TR	TM	MF	TR	TM	MF
Recorded by:		TR	TM	MF	TR	TR	MF	TR	TR	MF	TR	TR	MF	TR	TR	MF

Investigators' Signatures

Reviewer

Water Quality Parameters	Salt Water/ (Well Water)	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			0.0	—	LC-SS
Lab Total Residual Cl2:	<0.03	<0.03	<0.03	DR-100	TR
Alkalinity:	125	70	25	Hach	TR
Hardness:	120	80	110	Hach	TR
Total Ammonia:	0.017	<0.017	0.017	Orion	MF

Ammonia Meter #98136 Ammonia Meter Slope: -56.4 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

form updated 7/8/93

FPL - Manatee

Reference REFERENCE SITE

Calculation and Interpretation of the Stream Invertebrate Index for Florida (SIIF)
(Draft Version 1994)

Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	Panhandle (65, 75a) 5	3	1	Score	Peninsula (75b, c, d) 5	3	1	Score
Number of Taxa	≥ 31	16–30	0–15		≥ 27	14–26	0–13	5
EPT Index	≥ 7	4–6	0–3			≥ 4	0–3	1
% Contribution of Dominant Taxon		≤ 20	> 20			≤ 37	> 37	3
Florida Index	≥ 18	9–17	0–8		≥ 7	4–6	0–3	5
% Diptera		≤ 38	> 38			≤ 32	> 32	1
% Suspension feeders/ Collector-Filterers	≥ 12	7–11	0–6		≥ 8	4–7	0–3	5
% Shredders		≥ 10	0–9			≥ 13	0–12	1
% Crustacean/Mollusks (Peninsula only) 10.2	–	–	–			≥ 16	0–15	3
# Crustacean/Mollusks (Peninsula only)	–	–	–			≥ 4	0–3	3
Total Score	**Panhandle**				**Peninsula**			27
Interpretation of Score	**No Impairment**			**29-23**	**No Impairment**			**33-27**
	Moderate Impairment			**22-15**	**Moderate Impairment**			**26-17**
	Severe Degradation			**14-7**	**Severe Degradation**			**16-9**

Just TEST SITE

Calculation and Interpretation of the Stream Invertebrate Index for Florida (SIIF)
(Draft Version 1994)

Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	Panhandle (65, 75a) 5	3	1	Score	Peninsula (75b, c, d) 5	3	1	Score
Number of Taxa	≥ 31	16–30	0–15		≥ 27	14–26	0–13	3
EPT Index	≥ 7	4–6	0–3			≥ 4	0–3	1
% Contribution of Dominant Taxon		≤ 20	> 20			≤ 37	> 37	3
Florida Index	≥ 18	9–17	0–8		≥ 7	4–6	0–3	5
% Diptera		≤ 38	> 38			≤ 32	> 32	1
% Suspension feeders/ Collector-Filterers	≥ 12	7–11	0–6		≥ 8	4–7	0–3	5
% Shredders		≥ 10	0–9			≥ 13	0–12	1
% Crustacean/Mollusks (Peninsula only) 4.8	–	–	–			≥ 16	0–15	3
# Crustacean/Mollusks (Peninsula only)	–	–	–			≥ 4	0–3	3
Total Score	**Panhandle**				**Peninsula**			25
Interpretation of Score	**No Impairment**			**29-23**	**No Impairment**			**33-27**
	Moderate Impairment			**22-15**	**Moderate Impairment**			**26-17**
	Severe Degradation			**14-7**	**Severe Degradation**			**16-9**

Benthic macroinvertebrate taxa list for Florida Power and Light - Manatee Plant, collected via 20 discrete dip net sweeps in the Little Manatee River, on 11 April, 1994.

	Reference Site	Test Site
Coleoptera		
Dineutus sp.	8	–
Dubiraphia sp.	–	12
Microcylloepus pusillus	16	48
Stenelmis sp.	16	132
Decapoda		
Procambarus sp.	–	12
Diptera		
Cricotopus bicinctus	8	–
Cricotopus/Orthocladius grp. sp.	8	–
Hemerodromia sp.	48	12
Labrundinia pilosella	–	12
Nanocladius sp.	8	–
Pentaneura inconspicua	8	–
Polypedilum illinoense	32	–
Polypedilum sp.	–	12
Rheotanytarsus distinctissimus grp.	152	372
Rheotanytarsus exiguus grp.	208	204
Tanytarsus sp. C (Epler)	–	12
Thienemanniella sp.	24	–
Undetermined Dipteran pupae	56	–
Ephemeroptera		
Baetis propinquus	8	–
Gastropoda		
Amnicola dalli johnsoni	–	228
Amnicola sp.	24	168
Ferrissia sp.	16	24
Pyrogophorus platyrachis	56	324
Undetermined Ancylidae sp.	–	36
Odonata		
Argia sedula	–	36
Dromogomphus spinosus	8	–
Enallagma cardenium	8	–
Ischnura posita	8	–
Macromia taeniolata	8	12
Neurocordulia alabamensis	–	72

Oligochaeta		
Dero trifida	–	12
Eclipidrilus sp.	–	36
Nais communis	8	–
Nais pardalis	8	–
Slavina appendiculata	16	24
Pelecypoda		
Corbicula manilensis	80	12
Sphaerium or *Musculium* sp.	24	12
Rhynchocoela		
Prostoma rubrum	96	–
Trichoptera		
Cheumatopsyche sp.	200	–
Hydropsyche sp.	56	–
Undetermined Hydropsychidae	8	–
Undetermined Trichopteran pupa	8	–
Total	1232	1824

Phytoplankton taxa list and densities (#/mL) for Florida Power and Light – Manatee Plant, collected via subsurface grabs in the Little Manatee River, on 11 April, 1994.

	Reference Site	Test Site
Diatoms		
Achnanthes sp.	–	35
Melosira sp.	–	106
Navicula sp.	289	247
Nitzschia sp.	217	247
Pinnularia sp.	36	–
Synedra sp.	36	35
Unidentified pennate diatom	36	35
Chlorophyta		
Chlamydomonas sp.	36	141
Elakatothrix sp.	–	35
Cyanophyta		
Chroococcus sp.	–	35
Oscillatoria sp.	–	35
Total	650	951

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

1	2	3	11	12	17	18	19	20
Transaction Code		NPDES NUMBER		YR/MO/DA		Insp Type	Inspector	Fac Type
N	5	FL0032174		940411		B	S	2

Remarks

21 66

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

1	2	3	11	12	17	18	19	20
Transaction Code		NPDES NUMBER		YR/MO/DA		Insp Type	Inspector	Fac Type
N	5	FL0032174		940411		X	S	2

Remarks

21 66