

Biological Assessment of

Gainesville Regional Utilities – Mainstreet WWTP

Alachua County

NPDES #FL0027261

Sampled April 2002 and September 2002

February 2003

Biology Section
Bureau of Laboratories
Division of Resource Assessment and Management

Quality Manual No. 870346G

Florida Department of Environmental Protection
Fifth Year Inspection Summary

Discharger:	GRU – Mainstreet Wastewater Treatment Plant
County:	Alachua
NPDES Number:	FL0027251
Permit Expiration:	10/14/2002

Toxics Sampling Inspection **(XSI)**

Date Sampled: 23 September 2002

Results: Copper, lead, nickel, and silver were found in the effluent at levels below the minimum quantitation limit and greater than the minimum detection limit. Aluminum, selenium, iron, and zinc were also detected, however all metals detected complied with Class III Water Quality Criteria. No organic constituents were detected in the effluent sample.

Compliance Biomonitoring Inspection **(CBI)**

Date Sampled: 23 September 2002

Results: The effluent sample was not toxic to the fish, *Cyprinella leedsi,* or to the water flea, *Ceriodaphnia dubia,* during the 48-hour acute bioassay.

Water Quality Inspection **(WQI)**

Date Sampled: 01 April 2002

Results: Fecal and total coliforms were detected in the effluent and in the receiving waters at levels that complied with Class III Water Quality Criteria and the facility's permit limits, with the exception of the Control Site where total coliform bacteria were detected at 2,500 counts/100mL (62-302.530(7) F.A.C.). With the exception of ammonia, nutrient levels at the Test Site were 1.7-4 times greater than levels measured at the Control Site. The AGP values at the downstream Test Site (133.0 mg dry weight/L) and in the effluent sample (132.0 mg dry weight/L) were 26 times greater than the "problem" threshold (5.0 mg dry wt/L), and 7 times greater than the AGP value measured at the Control Site (19.0 mg dry wt/L). This indicates that although there are other sources of nutrient enrichment affecting this portion of Sweetwater Branch, revealed by the elevated AGP at the Control Site, the Test Site is being additionally enriched by the GRU discharge.

Impact Bioassessment Inspection **(IBI)**

Date Sampled: 01 April 2002

Results: Periphyton data indicated a more degraded algal community downstream from the outfall. Periphyton chlorophyll *a* concentration was 5 times greater at the Test Site compared to the Control Site, an indication of nutrient enrichment. Shannon-Weaver diversity measured from Hester-Dendy samplers was higher at the Test Site compared to the Control Site (3.06 to 2.69). This increase could be attributed to the doubling in velocity at the Test Site. The Control Site SCI score of 21 placed it in the "good" category, while the Test Site SCI score of 19 placed it in the "poor" category. These scores are both on the margin of their categories.

Biological assessments are prepared by FDEP staff to provide information for review of NPDES permit renewal applications. Biological assessments, in conjunction with other information concerning the subject facility and its receiving-water body, are used to determine appropriate permit conditions.

Introduction

The GRU-Mainstreet Wastewater Treatment Plant is located in Alachua County, Florida (see Map in Appendix 1). This facility is an advanced secondary activated-sludge wastewater treatment plant (see Facility Summary in Appendix 2). The effluent is discharged into the Class III receiving waters of Sweetwater Branch. The design flow of the wastewater system is 7.5 million gallons per day (MGD). The actual flow during this survey was 5.4 MGD (Facility Summary in Appendix 2).

State Surface Water Quality Criteria and facility permit limits are listed in Table 1; Class III Water Quality Criteria follow Florida Administrative Code (FAC) 62-302. According to the facility's monthly operating reports, the plant has failed whole effluent toxicity tests for *Pimephales promelas* growth in samples collected on April 1, 3, and 5, 2001. In addition, samples collected on October 7, 9, and 11, 2001 had unacceptable chronic toxicity to *Ceriodaphnia dubia* due to poor neonate production. Subsequent resampling in both of these instances passed the whole effluent toxicity test (Appendix 2).

Methods

The purpose of this investigation was to determine the discharger's effects on the biota of the receiving waters. Chemical and biological comparisons were made between a control site (located in Sweetwater Branch approximately 20 meters upstream of the discharge, hereby referred to as the Control Site) and a test site (located in Sweetwater Branch approximately 50 meters downstream of the discharge, hereby referred to as the Test Site). Detailed methods are given in Appendix 3.

Effluent samples were collected on two different dates: April 1, 2002 and September 23, 2002. Effluent samples collected on April 1, 2002 were collected before dechlorination; thus biasing several chemical analyses, including the acute screening bioassay analyses. These parameters were resampled after dechlorination in September 2002 and these results are reported in Tables 1 and 2 and Appendix 4.

All field and laboratory biological methods followed Biology Section Standard Operating Procedures (SOPs, see http://www.floridadep.org/labs/qa/2002sops.htm for details) and met DEP quality assurance/quality control standards (see http://www.floridadep.org/labs/qa/index.htm).

The following personnel were involved in this investigation: Pat O'Connor (DEP Northeast District), and DEP Central Laboratory in Tallahassee. The report was reviewed by District representatives and the Point Source Studies Review Committee (Wayne Magley, Chuck Ziegmont and Michael Tanski).

Results and Discussion

- Copper, lead, nickel, and silver were found in the effluent at levels below the minimum quantitation limit and greater than the minimum detection limit. Aluminum, selenium, iron, and zinc were also detected, however all metals detected complied with Class III Water Quality Criteria. No organic pollutants were detected in the effluent. Specific chemical results are reported in Table 1, and a complete list of analytes can be reviewed in Appendix 4.
- Habitat assessment scores were 98 at the Control Site and 104 at the Test Site (see Table 1 for values, Appendix 8 for field sheets, and Appendix 5). These scores place both study sites in the suboptimal category. The Test Site received higher points for substrate availability, water velocity, and bank stability.
- Dissolved oxygen (DO in mg/L), pH (Standard Units), and conductivity (umhos/cm) at the Test and Control Sites complied with Class III Water Quality Criteria (Table 1, 62-302.530 F.A.C.).
- The effluent sample collected on September 23, 2002 was not toxic to the fish, *Cyprinella leedsi*, or to the invertebrate, *Ceriodaphnia dubia*, during 48-hour acute screening bioassays (see Table 1 for % mortality and Appendix 7 for bioassay benchsheets).
- Fecal and total coliforms were detected in the effluent and receiving waters at levels that complied with Class III Water Quality Criteria and facility permit limits, with the exception of the Control Site where total coliform bacteria were detected at 2,500 counts/100mL, exceeding the Class III Water Quality Criteria (2400 counts/100 mL, 62-302.530(7) F.A.C.) (See Table 1 for results and Appendix 7 for lab worksheets). The "B" qualifier indicated for the Test Site fecal coliform result means the number of colonies counted for that sample was outside the method indicated ideal ranges (20-60 colonies).
- The effluent total nitrogen concentration was 2.97 mg/L (Table 1). Effluent total phosphorus (0.50 mg/L), ortho-phosphate (0.46 mg/L), and nitrate+nitrite concentrations (2.1 mg/L, Table 1) contributed to levels measured at the Test Site. Nutrient levels measured at the Test Site were 1.7-4 times greater than those measured at the Control Site. Test Site ortho-phosphate and total phosphorus values were greater than 80% of typical Florida water values, and the nitrate+nitrite value was greater than 95% of typical values (see Appendix 6). Control Site ortho-phosphate and total phospho-

Table 1. Effluent limits, Class III Criteria and chemical, microbiological and toxicological data.

GRU-Mainstreet WWTP	Class III Criteria	Permit Limits	Effluent Sampled 9/23/02	Control Site Sampled 4/1/02	Test Site Sampled 4/1/02
Organic Constituents (µg/L)					
None detected				-	-
Metals (µg/L, Class III Criteria are less than or equal to the value given)					
Aluminum	≤ 1500	-	36	-	-
Arsenic	≤ 50	-	3.0 U	-	-
Cadmium	≤ 1.55 b	-	0.025 U	-	-
Chromium	≤ 286 b	-	2.0 U	-	-
Copper	≤ 16.6 b	-	1.1 I	-	-
Iron	≤ 1000	-	40	-	-
Lead	≤ 5.26 b	-	0.27 I	-	-
Nickel	≤ 220 b	-	3.3 I	-	-
Selenium	≤ 5	-	4.7	-	-
Silver	≤ 0.07	-	0.022 I	-	-
Zinc	≤ 148 b	-	18.6	-	-
Nutrients (mg/L)					
Ortho-phosphate	-	-	0.46	0.23	0.45
Total Phosphorus	-	-	0.50 A	0.31	0.52
Ammonia	-	≤ 4.87	0.035 A	0.055	0.045
Un-ionized Ammonia	≤ 0.02 s	-	≤ 0.02	≤ 0.02	≤ 0.02
Nitrate+Nitrite	-	-	2.1	0.36	1.4
Total Kjeldahl Nitrogen	-	-	0.87 A	0.37	0.80
Organic Nitrogen	-	≤ 3.5	0.84	0.32	0.76
Total Nitrogen	-	-	2.97	0.73	2.2
General Physical and Chemical Parameters					
Habitat Assessment	-	-	-	98	104
Dissolved Oxygen (mg/L)	≥ 5.0 s	≥ 6.0 s	8.8	7.7	8.0
pH (SU)	6.0-8.5 s	6.4-8.4	7.3	7.3	7.2
Conductivity (mmhos/cm)	1275 s	-	643	914	648
Temperature (°C)	-	-	27.3	22.2	23.7
Total Residual Chlorine (mg/L)	-	-	< 0.03	-	-
Total Suspended Solids (mg/L)	-	≤ 10 a	1	1	1
CBOD, 5 day (mg/L)	-	≤ 5.0 a	2 K	2 K	2 K
Flow (MGD)	-	7.5 a	-	-	-
Hardness (mg $CaCO_3$)	-	-	148	-	-
Toxicity (48-hour static, screening bioassay, percent mortality in 100% effluent)					
Bioassay - Water flea	-	≤ 10% mortalit	no mortality	-	-
Bioassay - Fish	-	≤ 10% mortalit	no mortality	-	-
Microbiology (Number of counts/100ml)					
Fecal Coliforms	≤ 800 s	≤ 800 s	10 K	500	56 B
Total Coliforms	≤ 2400 s	-	10K	2500	400

a - Annual average

b - Value is calculated based on hardness

s - Single sample

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

B - Results based on colony counts outside the acceptable range

I - Value reported is < the minimum quantitation limit, and ≥ the minimum detection limit

J - Estimated value

K - Actual value is known to be less than value given

Table 2. Measured and predicted algal growth potential (AGP) for total soluble inorganic nitrogen (TSIN) limitation

Location	AGP (measured, mg dry wt/L) Sampled 4/1/02	Predicted AGP (TSIN) ± 20%	Inorganic N:P ratio
Control	19.0	15.8 ± 3.2	1.8
Test	133.0	54.9 ± 14.1	3.2
Effluent	132.0	81.1 ± 16.0	4.6

rus values were greater than 70% of typical Florida water values, and the nitrate+nitrite value was greater than 80% of typical values.

- Algal growth potential (AGP) is a measure of nutrients available for algal growth (Miller *et al.* 1978). Raschke and Shultz (1987) found that AGP values above 5.0 mg dry weight/L represent a "problem" threshold for fresh receiving waters, implying nutrient enrichment. The AGP values of the Test Site sample (133.0 mg dry weight/L) and the effluent sample (132.0 mg dry weight/L) were 26 times greater than this threshold, and 7 times greater than the AGP value measured at the Control Site (19.0 mg dry wt/L, Table 2). This indicates nutrient enrichment related to the GRU discharge in this portion of Sweetwater Branch. There was no evidence of growth inhibition in the AGP data.

- There were differences between the Test and Control Sites with respect to the periphyton algal community composition (Table 3, Appendix 9). The percentage of blue-green algae at the Test Site was double that found at the Control Site, and the percentage of green algae at the Test Site was twenty-one times that found at the Control Site. Periphyton total taxa, Shannon-Weaver diversity, and percentage of diatoms were lower at the Test Site. These changes generally indicate a shift towards a more degraded algal community (Stevenson, R. J. and L. L. Bahls. 1999. Periphyton protocols). Periphyton chlorophyll *a* concentration was 5 times greater at the Test Site compared to the Control Site, an indication of nutrient enrichment. Phaeophytin measured at the Control Site was higher than that measured at the test site. Phaeophytin is a product of chlorophyll degradation; therefore the high phaeophytin values at the Control Site may indicate poor algal community health upstream.

- Quantitative measures of benthic macroinvertebrate assemblages from Hester-Dendy samplers were not indicative of degradation at the Test Site compared to the Control Site (Table 4 and Appendix 10). The Shannon-Weaver diversity was higher at the Test Site compared to the Control Site (3.06 to 2.69). This increase could be attributed to the doubling in velocity at the Test Site. However, the percentage of scrapers at the Test Site was three times greater than the percent found at the Control Site. This increase in algal scrapers is related to the greater algal growth, as seen in the AGP data, and the increase in chlorophyll-*a* at the Test Site.

- Qualitative measures of benthic macroinvertebrate assemblages from dipnet samples are summarized in Tables 5 and 6 and in Appendix 11. The Control Site SCI score of 21 placed it in the "good" category, and the Test Site SCI score of 19 placed it in the "poor" category. These scores are both on the margin of their categories. The slight difference in the SCI scores is due to a lower percent suspension feeders and filterers at the Test Site.

Summary

Biological community data suggests a slightly more degraded Test Site, compared to the Control Site. The Control Site AGP and SCI results suggest some existing nutrient enrichment above the GRU discharge in Sweetwater Branch. However, the levels of nutrients in the effluent are contributing to even more enrichment below the point of dis-

Table 3. Periphyton composition at control and test sites.

GRU Mainstreet WWTP	Control Site	Test Site
Number of Taxa	30	24
Shannon-Weaver Diversity	3.4	2.69
Chlorophyll *a* (mg/m^2)	0.46 AI	2.5
Phaeophytin (mg/m^2)	16 AJ	0
Algal Density ($number/cm^2$)	436,730	39,564
Number of Algal Units Identified	622	225
Percentage Composition:		
Blue-green algae	1.6	3.1
Green algae	1.0	21.3
Diatoms	97.4	75.6
Other	0	0

A - Value reported is the mean of two or more determinations
I - Value reported is < the minimum quantitation limit, and ? the minimum detection limit
J - Estimated value

Table 4. Macroinvertebrate Hester-Dendy Samples - Quantitative

GRU Mainstreet WWTP	Control Site	Test Site
Summary Statistics		
Shannon-Weaver Diversity	2.69	3.06
Number of Taxa	18	17
Florida Index	6	9
Number of EPT Taxa	0	2
Total Number of Individuals	164	325
Community Composition: Percent of total		
Coleoptera	0.0	0.6
Diptera	89.9	59.7
Ephemeroptera	0.0	0.0
Gastropoda	9.8	34.2
Odonata	0.0	0.3
Oligochaeta	0.0	0.0
Trichoptera	0.0	4.9
Functional Feeding Groups: Percent of total		
Burrowing Deposit Feeders	0.0	0.0
Predators	14.9	1.1
Surface Deposit Feeders	45.7	35.2
Suspension Feeders	1.2	4.9
Scrapers	9.8	34.5
Shredders	28.4	17.5
Unknown	0.0	6.8

charge. Test Site values for AGP, chlorophyll-*a*, nitrate+nitrite, ortho-phosphate, TKN, and total phosphorus are elevated compared to the Control Site.

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Table 5. Macroinvertebrate Dipnet Samples - Qualitative

GRU Mainstreet WWTP	Control Site	Test Site
Stream Condition Index (value)	21	19
Stream Condition Index (word)	Good	Poor
Stream Condition Index Metrics		
Florida Index	11	9
Number of EPT Taxa	1	1
Number of Taxa	18	17
Number of Chironomid Taxa	9	7
Percent Dominant Taxon	31.3	33.0
Percent Dipterans	71.5	83.4
Percent Suspension Feeders and Filterers	32.3	4.91
Total Number of Individuals	144	112
Community Composition: Percent of total		
Coleoptera	3.5	2.7
Diptera	71.5	83.4
Ephemeroptera	0.0	0.0
Gastropoda	4.9	4.5
Odonata	3.5	1.8
Oligochaeta	2.8	0.9
Trichoptera	13.2	3.6
Functional Feeding Groups: Percent of total		
Burrowing Deposit Feeders	0.0	0.9
Predators	3.8	4.0
Surface Deposit Feeders	37.2	50.5
Suspension Feeders and Filterers	32.3	4.9
Scrapers	5.9	5.4
Shredders	12.9	27.2
Unknown	7.6	5.4

Table 6. Stream Condition Index Metrics: Peninsula, Summer Index

GRU Mainstreet - Control Site					
Metric:	Value	5	3	1	Score
Total Number of Taxa	18	≥26	25-14	<14	3
Number of EPT Taxa	1	≥4	3-2	<2	1
Number of Chironomid Taxa	9	≥7	6-4	<4	5
Percent Contribution of Dominant Taxon	31.25	≤29	30-64	>64	3
Percent Diptera	71.53	-	≤37	>37	1
Florida Index	11	≥7	6-4	<4	5
Percent Suspension Feeders and Filterers	32.29	-	≥7	<7	3
Total Score					**21**
Interpretation of Scores			Excellent		26-31
			Good		**20-25**
			Poor		13-19
			Very Poor		7-12

GRU Mainstreet - Test Site					
Metric:	Value	5	3	1	Score
Total Number of Taxa	17	≥26	25-14	<14	3
Number of EPT Taxa	1	≥4	3-2	<2	1
Number of Chironomid Taxa	7	≥7	6-4	<4	5
Percent Contribution of Dominant Taxon	33.04	≤29	30-64	>64	3
Percent Diptera	89.93	-	≤37	>37	1
Florida Index	9	≥7	6-4	<4	5
Percent Suspension Feeders and Filterers	4.91	-	≥7	<7	1
Total Score					**19**
Interpretation of Scores			Excellent		26-31
			Good		20-25
			Poor		**13-19**
			Very Poor		7-12

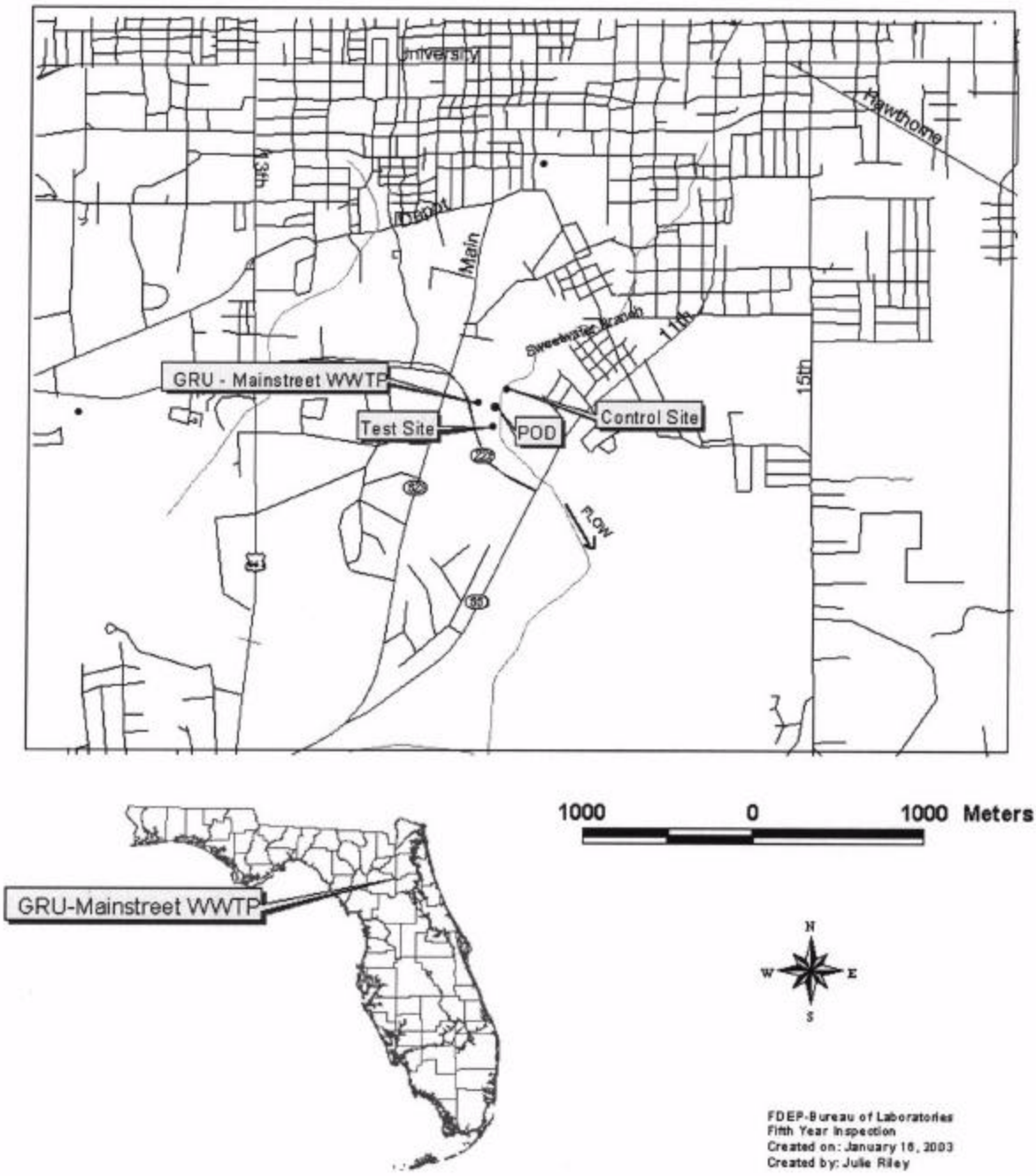
Appendices

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- Appendix 2. Facility summary
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- Appendix 4. Chemical analyses of effluent and receiving water.
- Appendix 5. Explanation of biological measurements
- Appendix 6. Typical values for selected parameters in Florida waters
- Appendix 7. Additional physical, chemical, toxicological and microbiological results
- Appendix 8. Habitat Assessment field sheets
- Appendix 9. Periphyton: Unit counts and taxa lists
- Appendix 10. Hester-Dendy multi-plate samplers: macroinvertebrate density and taxa lists
- Appendix 11. Dipnet samples: macroinvertebrate counts and taxa lists

Appendix 1

Map of Facility

GRU - Mainstreet WWTP



Appendix 2

State of Florida
Department of Environmental Protection
Facility Summary

Facility Name:GRU-Mainstreet WWTP		**Prepared By: Azeem Syed Date: 4/2/2002**
Location:200 S.E. 16th Avenue	**County:** Alachua	**District:** Northeast
Federal Permit No. FL0027251 Expiration Date:	**State GMS #:** **State Expiration Date:** N/A	**Facility Type:** Wastewater Treatment Plant
Function of Facility: Treatment of wastewater		
Description of treatment process: Advanced Secondary activated sludge Wastewater treatment plant		
Receiving Waters: Sweetwater Branch	**Classification:** Class III - Fresh	
Design Flow: 7.5 MGD	**Mean Flow: 5.948 MGD AADF**	**Flow during survey: 5.4 mgd**
Discharge is: Continuous		
Facility Mixing Zone Details: N/A		
List effluent limits:		

Parameter	**Limit**	**Describe special permit conditions and permit modifications:**
OUTFALL D001 Sweet Water Branch		
Flow (MGD)	7.5 MGD Annual Average Daily flow Monthly Average Report Only Daily Maximum Report Only	Monthly Report_
BOD Carbonaceous 5day, 20 C	5.0 mg/l Annual Average Monthly Average Report Only	
UOD Ultimate Oxygen Demand	52 mg/l Maximum	
Total Suspended Solids (mg/l)	10 mg/l Annual Average 10mg/l Monthly Average	
PH	6.4 SU Minimum 8.4 SU Maximum	

Fecal Coliform Bacteria	200/100ml Annual Average Report only Monthly Geometric mean 800/100ml of sample Maximum	
Chlorine, total residual for Dechlorination	0.01mg/l Maximum	
Chlorine total residual for disinfection	0.5mg/l Minimum	
Nitrogen, organic as N	3.5 mg/l Maximum	
Nitrogen, total TKN as N	Report only	
Nitrogen, total Ammonia as N	4.87 mg/l Maximum	
Oxygen, Dissolved (DO)	6 mg/l Minimum	
BOD, Carbonaceous 5 day 20C(influent)	Report only Monthly Average	
Solids, total suspended (influent) TSS, percent removal	Report Only 85% Monthly Average	
Quarterly Report Total Nitrogen, mg/l Organic Nitrogen, mg/l Nitrate + Nitrite Nitrogen mg/l	Quarterly Report Maximum Report Only Maximum Report only Maximum Report only	Quarterly Report

Hardness mg/l	Maximum Report only	
Total Phosphorous mg/l	Maximum Report only	
Ortho Phosphorous mg/l	Maximum Report only	
Total recoverable Zinc micrograms/l	Maximum Report only	
Total recoverable mercury micrograms/l	Maximum Report only	
CBOD5 mg/l	Maximum Report Only	
Total Ammonia as N (mg/l)	Maximum Report only	
Hardness mg/l	Maximum Report only	
TKN as N mg/l	Maximum Report Only	
Dissolved Oxygen mid depth, mg/l	Minimum Report Only	
pH (S.U.)	Minimum Report Only	
	Maximum Report only	
Temperature (°C) mid depth	Report only	
Specific Conductivity (umhos/cm)	Report only	
Silver micrograms/l	0.07 Maximum	
Lindane micrograms/l	0.063 Annual average	
	0.08 Maximum	

Unionized Ammonia micrograms/l Zinc, Mercury micrograms/l Whole effluent toxicity test using C. dubia (water flea) and C. leedsi (bannerfin shiner)	0.02 Maximum Report only Every six months Mortality not to exceed 10% for either species.	

Description of permitted outfall: Outfall D001 to Sweet water Branch

List permit violations (DMR data) and plant upsets that occurred at the plant within the past year:
No exceedances were noted.

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:
Plant effluent failed the whole effluent toxicity test for P. promelas growth in samples collected on April 1, 3 and 5, 2001, and again samples collected on October 7,9, and 11, 2001 showed unacceptable chronic toxicity to c. dubia neonate production. Subsequent resampling done both of these times passed the whole effluent toxicity test.

Discuss DMR trends to prior data; is the trend improving or declining: The trend appears to be relatively consistent.

Additional Information: N/A

Appendix 3

Methods

The purpose of this investigation was to determine the discharger's effects on the biota of the receiving waters. Chemical and biological comparisons were made between an upstream control site (located in Sweetwater Branch approximately 20 meters upstream of the discharge) and a downstream test site (located in the Sweetwater Branch approximately 50 meters downstream of the discharge). A habitat assessment was performed *in situ* to compare biological conditions at the upstream and downstream sites. The resulting scores were based upon the examinations of the physical structure and extent of disturbance at the study sites and aid in the interpretation of biological community data. Supplemental physical and chemical data were collected on the effluent and at both study sites. Data for this report were collected on April 1, 2002 and September 23, 2002.

The effluent was resampled on September 23, 2002 because it was collected from the inappropriate location on April 1, 2002. All samples were analyzed for nutrients, metals, organic constituents (base, neutral and acid extractables) and pesticides. Results for these analyses for samples collected on September 23, 2002 are reported here. The results from these analyses were compared with Water Quality Limits (FAC 62-302) and facility permit limits (Table 1, Appendix 2). A list of the analytes tested for, the minimum detection limit and the practical quantitation limit are given in Appendix 4. Methods used for all chemical analyses are on file at the FDEP Central Chemistry Laboratory in Tallahassee and may be viewed on the web at http://www.floridadep.org/labs/sop/index.htm.

Acute screening toxicity bioassays were performed on the effluent sample using the water flea, *Ceriodaphnia dubia,* and the fish, *Cyprinella leedsi* (Weber 1993). The effluent and water from control and test sites were analyzed for the presence and concentration of total and fecal coliform bacteria (APHA 1992, methods 9222 B, 9222 D).

An effluent sample and water samples from the control and test sites were autoclaved, filtered (0.45 μm), inoculated with the unicellular green alga, *Raphidocelis subcapitata* (formerly *Selenastrum capricornutum*), and incubated for 14 days (Miller et al. 1978). The algal growth potential (AGP) value is the peak growth of the alga within that 14-day period, recorded as mg dry weight/L (Miller et al. 1978). To measure possible inhibition of algal growth based on possible toxicants in effluent or site water, AGP results were compared to expected levels of dry weight production based on the nutrient content of the water (Miller et al. 1978, Appendix 5).

Periphyton were sampled at both control and test sites by incubating glass microscope slides in a standard periphytometer for 28 days (APHA 1992, Method 1033). Periphyton were subsampled and identified to the lowest practicable level, usually species. Periphyton assemblages were examined for (1) cell density, (2) community composition, (3) taxa richness, and (4) Shannon-Weaver Diversity Index. To estimate periphyton biomass, chlorophyll *a* concentration was measured on a subsample of the slides (APHA 1992, Method 10200H).

Benthic macroinvertebrates were collected from multiple substrates (*e.g.* snags, leaf packs, vegetation) using discrete dipnet sweeps (qualitative samples, method modified from Plafkin *et al.* 1989). Collections were also made with Hester-Dendy multi-plate samplers incubated for 28 days (quantitative samples, method modified from APHA 1992, method 10500.5). Benthic macroinvertebrates were sorted and identified to the lowest practical taxonomic level, usually species. Eight measures were calculated from benthic macroinvertebrate data to determine the effects of the discharge on receiving waters. These measures included: (1) taxa richness, (2) community composition, (3) functional feeding groups, (4) percent dominant taxon, (5) Shannon-Weaver Diversity Index, (6) the Florida Index, (7) the number of Ephemeroptera, Plecoptera and Trichoptera (EPT) taxa, and (8) the Stream Condition Index (SCI). For a discussion of each biological measure and its potential relationship to Florida Administrative Code, see Appendix 5.

Appendix 4

Chemical Analyses of Effluent and Receiving Waters

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
4/1/2002 12:00	CONTROL SITE	Bio-AGP/LimNut	Algal Growth Potential	19	mg DryWt/L		0.1	0.3
4/1/2002 12:00	CONTROL SITE	Bio-Chl-a	Chlorophyll-A, Monochromatic, Periphyton	0.46	mg/m2	AI	0.23	0.68
4/1/2002 12:00	CONTROL SITE	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
4/1/2002 12:00	CONTROL SITE	Bio-Chl-a	Phaeophytin-A, Monochromatic, Periphyton	16	mg/m2	AJ	0.23	0.68
4/1/2002 12:00	CONTROL SITE	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
4/1/2002 12:00	CONTROL SITE	Bio-Invertebrates	Macroinvert-FW-Qual-Dipnetx20-# Taxa	17	# Taxa			
4/1/2002 12:00	CONTROL SITE	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	11	# Taxa			
4/1/2002 12:00	CONTROL SITE	Bio-Peri/Phyto	Periphyton-Quantitative-# Diatom Taxa	20	#Taxa			
4/1/2002 12:00	CONTROL SITE	Bio-Peri/Phyto	Periphyton-Quantitative-# Wet Taxa	9	#Taxa			
4/1/2002 12:00	CONTROL SITE	Bio-Peri/Phyto	Phytoplankton-Quantitative-# Wet Taxa		#Taxa			
4/1/2002 12:00	CONTROL SITE	Bio-Peri/Phyto	Phytoplankton-Quantitative-#Diatom Taxa		#Taxa			
4/1/2002 12:00	CONTROL SITE	Nutrients-Liquid	Ammonia-N	0.055	mg N/L		0.01	0.02
4/1/2002 12:00	CONTROL SITE	Nutrients-Liquid	NO2NO3-N	0.36	mg N/L		0.004	0.01
4/1/2002 12:00	CONTROL SITE	Nutrients-Liquid	N_KJEL_TOT	0.37	mg N/L		0.06	0.2
4/1/2002 12:00	CONTROL SITE	Nutrients-Liquid	O-Phosphate-P	0.23	mg P/L		0.016	0.04
4/1/2002 12:00	CONTROL SITE	Nutrients-Liquid	Total-P	0.31	mg P/L		0.015	0.04
4/1/2002 12:00	CONTROL SITE REP. 1	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	10	# Taxa			
4/1/2002 12:00	CONTROL SITE REP. 2	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	10	# Taxa			
4/1/2002 14:00	EFFLUENT	Bio-AGP/LimNut	Algal Growth Potential	132	mg DryWt/L		0.1	0.3
4/1/2002 7:45	EQUIPMENT BLK	Bio-AGP/LimNut	Algal Growth Potential	0.758	mg DryWt/L		0.1	0.3
4/1/2002 10:40	TEST SITE	Bio-AGP/LimNut	Algal Growth Potential	113	mg DryWt/L		0.1	0.3
4/1/2002 10:40	TEST SITE	Bio-Chl-a	Chlorophyll-A, Monochromatic, Periphyton	2.5	mg/m2		0.088	0.26
4/1/2002 10:40	TEST SITE	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
4/1/2002 10:40	TEST SITE	Bio-Chl-a	Phaeophytin-A, Monochromatic, Periphyton	0	mg/m2		0.088	0.26
4/1/2002 10:40	TEST SITE	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
4/1/2002 10:40	TEST SITE	Bio-Invertebrates	Macroinvert-FW-Qual-Dipnetx20-# Taxa	16	# Taxa			
4/1/2002 10:40	TEST SITE	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	12	# Taxa			
4/1/2002 10:40	TEST SITE	Bio-Peri/Phyto	Periphyton-Quantitative-# Diatom Taxa	14	#Taxa			
4/1/2002 10:40	TEST SITE	Bio-Peri/Phyto	Periphyton-Quantitative-# Wet Taxa	10	#Taxa			
4/1/2002 10:40	TEST SITE	Bio-Peri/Phyto	Phytoplankton-Quantitative-# Wet Taxa		#Taxa			
4/1/2002 10:40	TEST SITE	Bio-Peri/Phyto	Phytoplankton-Quantitative-#Diatom Taxa		#Taxa			
4/1/2002 10:40	TEST SITE	Nutrients-Liquid	Ammonia-N	0.045	mg N/L		0.01	0.02
4/1/2002 10:40	TEST SITE	Nutrients-Liquid	NO2NO3-N	1.4	mg N/L		0.04	0.1
4/1/2002 10:40	TEST SITE	Nutrients-Liquid	N_KJEL_TOT	0.8	mg N/L		0.06	0.2
4/1/2002 10:40	TEST SITE	Nutrients-Liquid	O-Phosphate-P	0.45	mg P/L		0.02	0.05
4/1/2002 10:40	TEST SITE	Nutrients-Liquid	Total-P	0.52	mg P/L		0.015	0.04
4/1/2002 10:40	TEST SITE REP. 1	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	14	# Taxa			
4/1/2002 10:40	TEST SITE REP. 2	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	4	# Taxa			
9/23/2002 11:45	EFFLUENT	BNA-Water	1,2,4,5-Tetrachlorobenzene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	1,2,4-Trichlorobenzene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	1,2-Dichlorobenzene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	1,3,5-Trinitrobenzene	3.8	ug/L	U	3.8	15
9/23/2002 11:45	EFFLUENT	BNA-Water	1,3-Dichlorobenzene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	1,3-Dinitrobenzene	1.9	ug/L	U	1.9	7.5
9/23/2002 11:45	EFFLUENT	BNA-Water	1,4-Dichlorobenzene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	1,4-Naphthoquinone	19	ug/L	U	19	75
9/23/2002 11:45	EFFLUENT	BNA-Water	1-Naphthylamine	9.4	ug/L	U	9.4	38
9/23/2002 11:45	EFFLUENT	BNA-Water	2,3,4,6-Tetrachlorophenol	1.9	ug/L	U	1.9	7.5
9/23/2002 11:45	EFFLUENT	BNA-Water	2,4,5-Trichlorophenol	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	2,4,6-Trichlorophenol	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	2,4-Dichlorophenol	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	2,4-Dimethylphenol	47	ug/L	U	47	190
9/23/2002 11:45	EFFLUENT	BNA-Water	2,4-Dinitrophenol	14	ug/L	U	14	57
9/23/2002 11:45	EFFLUENT	BNA-Water	2,4-Dinitrotoluene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	2,6-Dichlorophenol	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	2,6-Dinitrotoluene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	2-Acetylaminofluorene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	2-Chloronaphthalene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	2-Chlorophenol	0.94	ug/L	U	0.94	3.8

Appendix 4 Continued

Chemical Analyses of Effluent and Receiving Waters

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
9/23/2002 11:45	EFFLUENT	BNA-Water	2-Methyl-4,6-dinitrophenol	2.8	ug/L	U	2.8	11
9/23/2002 11:45	EFFLUENT	BNA-Water	2-Methylnaphthalene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	2-Naphthylamine	9.4	ug/L	U	9.4	38
9/23/2002 11:45	EFFLUENT	BNA-Water	2-Nitroaniline	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	2-Nitrophenol	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	2-Picoline	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	3,3'-Dichlorobenzidine	38	ug/L	U	38	150
9/23/2002 11:45	EFFLUENT	BNA-Water	3,3'-Dimethylbenzidine	19	ug/L	U	19	75
9/23/2002 11:45	EFFLUENT	BNA-Water	3-Methylcholanthrene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	3-Nitroaniline	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	4,4'-DDD	1.4	ug/L	U	1.4	5.7
9/23/2002 11:45	EFFLUENT	BNA-Water	4,4'-DDE	1.4	ug/L	U	1.4	5.7
9/23/2002 11:45	EFFLUENT	BNA-Water	4,4'-DDT	1.4	ug/L	U	1.4	5.7
9/23/2002 11:45	EFFLUENT	BNA-Water	4-Aminobiphenyl	3.8	ug/L	U	3.8	15
9/23/2002 11:45	EFFLUENT	BNA-Water	4-Bromophenyl phenyl ether	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	4-Chloro-3-methylphenol	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	4-Chloroaniline	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	4-Chlorophenyl phenyl ether	1.9	ug/L	U	1.9	7.5
9/23/2002 11:45	EFFLUENT	BNA-Water	4-Nitroaniline	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	4-Nitrophenol	14	ug/L	U	14	57
9/23/2002 11:45	EFFLUENT	BNA-Water	5-Nitro-o-toluidine	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	7,12-Dimethylbenz(a)anthracene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Acenaphthene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Acenaphthylene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Acetophenone	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Aldrin	1.4	ug/L	U	1.4	5.7
9/23/2002 11:45	EFFLUENT	BNA-Water	Aniline	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Anthracene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Azobenzene/1,2-Diphenylhydrazine	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Benzidine	94	ug/L	U	94	380
9/23/2002 11:45	EFFLUENT	BNA-Water	Benzo(a)anthracene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Benzo(a)pyrene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Benzo(b)fluoranthene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Benzo(g,h,i)perylene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Benzo(k)fluoranthene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Benzyl alcohol	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Bis(2-chloroethoxy)methane	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Bis(2-chloroethyl)ether	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Bis(2-chloroisopropyl)ether	2.8	ug/L	U	2.8	11
9/23/2002 11:45	EFFLUENT	BNA-Water	Bis(2-ethylhexyl)phthalate	14	ug/L	U	14	57
9/23/2002 11:45	EFFLUENT	BNA-Water	Butyl benzyl phthalate	4.7	ug/L	U	4.7	19
9/23/2002 11:45	EFFLUENT	BNA-Water	Chrysene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Di-n-butyl phthalate	4.7	ug/L	U	4.7	19
9/23/2002 11:45	EFFLUENT	BNA-Water	Di-n-octyl phthalate	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Dibenzo(a,h)anthracene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Dibenzofuran	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Dieldrin	1.4	ug/L	U	1.4	5.7
9/23/2002 11:45	EFFLUENT	BNA-Water	Diethyl phthalate	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Dimethyl phthalate	47	ug/L	U	47	190
9/23/2002 11:45	EFFLUENT	BNA-Water	Dimethylaminoazobenzene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Dinoseb	3.8	ug/L	U	3.8	15
9/23/2002 11:45	EFFLUENT	BNA-Water	Diphenylamine	2.8	ug/L	U	2.8	11
9/23/2002 11:45	EFFLUENT	BNA-Water	Endosulfan I	3.8	ug/L	U	3.8	15
9/23/2002 11:45	EFFLUENT	BNA-Water	Endosulfan II	3.8	ug/L	U	3.8	15
9/23/2002 11:45	EFFLUENT	BNA-Water	Endosulfan sulfate	1.4	ug/L	U	1.4	5.7
9/23/2002 11:45	EFFLUENT	BNA-Water	Endrin	1.4	ug/L	U	1.4	5.7
9/23/2002 11:45	EFFLUENT	BNA-Water	Endrin aldehyde	3.8	ug/L	U	3.8	15
9/23/2002 11:45	EFFLUENT	BNA-Water	Ethyl methanesulfonate	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Fluoranthene	0.94	ug/L	U	0.94	3.8

Appendix 4 Continued

Chemical Analyses of Effluent and Receiving Waters

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
9/23/2002 11:45	EFFLUENT	BNA-Water	Fluorene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Heptachlor	1.4	ug/L	U	1.4	5.7
9/23/2002 11:45	EFFLUENT	BNA-Water	Heptachlor epoxide	1.4	ug/L	U	1.4	5.7
9/23/2002 11:45	EFFLUENT	BNA-Water	Hexachlorobenzene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Hexachlorobutadiene	2.8	ug/L	U	2.8	11
9/23/2002 11:45	EFFLUENT	BNA-Water	Hexachlorocyclopentadiene	2.8	ug/L	U	2.8	11
9/23/2002 11:45	EFFLUENT	BNA-Water	Hexachloroethane	2.8	ug/L	U	2.8	11
9/23/2002 11:45	EFFLUENT	BNA-Water	Hexachloropropene	1.9	ug/L	U	1.9	7.5
9/23/2002 11:45	EFFLUENT	BNA-Water	Indeno(1,2,3-cd)pyrene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Isophorone	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Isosafrole	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Methapyrilene	3.8	ug/L	U	3.8	15
9/23/2002 11:45	EFFLUENT	BNA-Water	Methyl methanesulfonate	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	N-Nitrosodi-n-butylamine	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	N-Nitrosodi-n-propylamine	1.9	ug/L	U	1.9	7.5
9/23/2002 11:45	EFFLUENT	BNA-Water	N-Nitrosodiethylamine	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	N-Nitrosodimethylamine	1.9	ug/L	U	1.9	7.5
9/23/2002 11:45	EFFLUENT	BNA-Water	N-Nitrosodiphenylamine	2.8	ug/L	U	2.8	11
9/23/2002 11:45	EFFLUENT	BNA-Water	N-Nitrosomethylethylamine	1.9	ug/L	U	1.9	7.5
9/23/2002 11:45	EFFLUENT	BNA-Water	N-Nitrosomorpholine	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	N-Nitrosopiperidine	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	N-Nitrosopyrrolidine	1.9	ug/L	U	1.9	7.5
9/23/2002 11:45	EFFLUENT	BNA-Water	Naphthalene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Nitrobenzene	1.9	ug/L	U	1.9	7.5
9/23/2002 11:45	EFFLUENT	BNA-Water	Nitroquinoline-1-oxide	19	ug/L	U	19	75
9/23/2002 11:45	EFFLUENT	BNA-Water	Pentachlorobenzene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Pentachloroethane	47	ug/L	U	47	190
9/23/2002 11:45	EFFLUENT	BNA-Water	Pentachloronitrobenzene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Pentachlorophenol	2.8	ug/L	U	2.8	11
9/23/2002 11:45	EFFLUENT	BNA-Water	Phenacetin	3.8	ug/L	U	3.8	11
9/23/2002 11:45	EFFLUENT	BNA-Water	Phenanthrene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Phenol	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Pyrene	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	Pyridine	3.8	ug/L	U	3.8	15
9/23/2002 11:45	EFFLUENT	BNA-Water	Safrole	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	BNA-Water	alpha-BHC	1.4	ug/L	U	1.4	5.7
9/23/2002 11:45	EFFLUENT	BNA-Water	beta-BHC	1.4	ug/L	U	1.4	5.7
9/23/2002 11:45	EFFLUENT	BNA-Water	delta-BHC	1.4	ug/L	U	1.4	5.7
9/23/2002 11:45	EFFLUENT	BNA-Water	gamma-BHC	1.4	ug/L	U	1.4	5.7
9/23/2002 11:45	EFFLUENT	BNA-Water	m,p-Cresols	1.9	ug/L	U	1.9	7.5
9/23/2002 11:45	EFFLUENT	BNA-Water	o-Cresol	1.9	ug/L	U	1.9	7.5
9/23/2002 11:45	EFFLUENT	BNA-Water	o-Toluidine	0.94	ug/L	U	0.94	3.8
9/23/2002 11:45	EFFLUENT	Bio-Toxicology	Bioassay-Acute-Screen-FW-C.dubia, LC50	100	LC50	L		
9/23/2002 11:45	EFFLUENT	Bio-Toxicology	Bioassay-Acute-Screen-FW-Fish, LC50	100	LC50	L		
9/23/2002 11:45	EFFLUENT	GC-Water	Alachlor	0.58	ug/L	U	0.58	2.32
9/23/2002 11:45	EFFLUENT	GC-Water	Ametryn	0.048	ug/L	U	0.048	0.192
9/23/2002 11:45	EFFLUENT	GC-Water	Atrazine	0.048	ug/L	U	0.048	0.192
9/23/2002 11:45	EFFLUENT	GC-Water	Azinphos Methyl	0.048	ug/L	U	0.048	0.192
9/23/2002 11:45	EFFLUENT	GC-Water	Bromacil	0.19	ug/L	U	0.19	0.76
9/23/2002 11:45	EFFLUENT	GC-Water	Butylate	0.19	ug/L	U	0.19	0.76
9/23/2002 11:45	EFFLUENT	GC-Water	Chlorpyrifos Ethyl	0.048	ug/L	U	0.048	0.192
9/23/2002 11:45	EFFLUENT	GC-Water	Chlorpyrifos Methyl	0.096	ug/L	U	0.096	0.384
9/23/2002 11:45	EFFLUENT	GC-Water	Diazinon	0.048	ug/L	U	0.048	0.192
9/23/2002 11:45	EFFLUENT	GC-Water	Ethion	0.048	ug/L	U	0.048	0.192
9/23/2002 11:45	EFFLUENT	GC-Water	Ethoprop	0.096	ug/L	U	0.096	0.384
9/23/2002 11:45	EFFLUENT	GC-Water	Fenamiphos	0.19	ug/L	U	0.19	0.76
9/23/2002 11:45	EFFLUENT	GC-Water	Fonofos	0.096	ug/L	U	0.096	0.384
9/23/2002 11:45	EFFLUENT	GC-Water	Hexazinone	0.096	ug/L	U	0.096	0.384
9/23/2002 11:45	EFFLUENT	GC-Water	Malathion	0.14	ug/L	U	0.14	0.56

Appendix 4 Continued

Chemical Analyses of Effluent and Receiving Waters

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
9/23/2002 11:45	EFFLUENT	GC-Water	Metalaxyl	0.24	ug/L	U	0.24	0.96
9/23/2002 11:45	EFFLUENT	GC-Water	Metolachlor	0.48	ug/L	U	0.48	1.92
9/23/2002 11:45	EFFLUENT	GC-Water	Metribuzin	0.096	ug/L	U	0.096	0.384
9/23/2002 11:45	EFFLUENT	GC-Water	Mevinphos	0.19	ug/L	U	0.19	0.76
9/23/2002 11:45	EFFLUENT	GC-Water	Naled	0.77	ug/L	U	0.77	3.08
9/23/2002 11:45	EFFLUENT	GC-Water	Norflurazon	0.096	ug/L	U	0.096	0.384
9/23/2002 11:45	EFFLUENT	GC-Water	Parathion Ethyl	0.14	ug/L	U	0.14	0.56
9/23/2002 11:45	EFFLUENT	GC-Water	Parathion Methyl	0.096	ug/L	U	0.096	0.384
9/23/2002 11:45	EFFLUENT	GC-Water	Phorate	0.048	ug/L	U	0.048	0.192
9/23/2002 11:45	EFFLUENT	GC-Water	Prometryn	0.14	ug/L	U	0.14	0.56
9/23/2002 11:45	EFFLUENT	GC-Water	Simazine	0.048	ug/L	U	0.048	0.192
9/23/2002 11:45	EFFLUENT	Metals-Water	Aluminum	36	ug/L		5	20
9/23/2002 11:45	EFFLUENT	Metals-Water	Arsenic	3	ug/L	U	3	12
9/23/2002 11:45	EFFLUENT	Metals-Water	Cadmium	0.025	ug/L	U	0.025	0.1
9/23/2002 11:45	EFFLUENT	Metals-Water	Calcium	34.5	mg/L		0.02	0.08
9/23/2002 11:45	EFFLUENT	Metals-Water	Chromium	2	ug/L	U	2	8
9/23/2002 11:45	EFFLUENT	Metals-Water	Copper	1.1	ug/L	I	0.75	3
9/23/2002 11:45	EFFLUENT	Metals-Water	Iron	40	ug/L		7	28
9/23/2002 11:45	EFFLUENT	Metals-Water	Lead	0.27	ug/L	I	0.1	0.4
9/23/2002 11:45	EFFLUENT	Metals-Water	Magnesium	15.1	mg/L		0.01	0.04
9/23/2002 11:45	EFFLUENT	Metals-Water	Nickel	3.3	ug/L	I	1.5	6
9/23/2002 11:45	EFFLUENT	Metals-Water	Selenium	4.7	ug/L		1	4
9/23/2002 11:45	EFFLUENT	Metals-Water	Silver	0.022	ug/L	I	0.02	0.08
9/23/2002 11:45	EFFLUENT	Metals-Water	Zinc	18.6	ug/L		2	8
9/23/2002 11:45	EFFLUENT	Nutrients-Liquid	Ammonia-N	0.035	mg N/L	A	0.01	0.02
9/23/2002 11:45	EFFLUENT	Nutrients-Liquid	NO2NO3-N	2.1	mg N/L		0.08	0.2
9/23/2002 11:45	EFFLUENT	Nutrients-Liquid	N_KJEL_TOT	0.87	mg N/L	A	0.06	0.2
9/23/2002 11:45	EFFLUENT	Nutrients-Liquid	O-Phosphate-P	0.46	mg P/L		0.04	0.1
9/23/2002 11:45	EFFLUENT	Nutrients-Liquid	Total-P	0.5	mg P/L	A	0.015	0.04
9/23/2002 12:00	EQUIP BLK	BNA-Water	1,2,4,5-Tetrachlorobenzene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	1,2,4-Trichlorobenzene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	1,2-Dichlorobenzene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	1,3,5-Trinitrobenzene	4.9	ug/L	U	4.9	20
9/23/2002 12:00	EQUIP BLK	BNA-Water	1,3-Dichlorobenzene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	1,3-Dinitrobenzene	2.4	ug/L	U	2.4	9.8
9/23/2002 12:00	EQUIP BLK	BNA-Water	1,4-Dichlorobenzene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	1,4-Naphthoquinone	24	ug/L	U	24	98
9/23/2002 12:00	EQUIP BLK	BNA-Water	1-Naphthylamine	12	ug/L	U	12	49
9/23/2002 12:00	EQUIP BLK	BNA-Water	2,3,4,6-Tetrachlorophenol	2.4	ug/L	U	2.4	9.8
9/23/2002 12:00	EQUIP BLK	BNA-Water	2,4,5-Trichlorophenol	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	2,4,6-Trichlorophenol	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	2,4-Dichlorophenol	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	2,4-Dimethylphenol	61	ug/L	U	61	240
9/23/2002 12:00	EQUIP BLK	BNA-Water	2,4-Dinitrophenol	18	ug/L	U	18	73
9/23/2002 12:00	EQUIP BLK	BNA-Water	2,4-Dinitrotoluene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	2,6-Dichlorophenol	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	2,6-Dinitrotoluene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	2-Acetylaminofluorene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	2-Chloronaphthalene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	2-Chlorophenol	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	2-Methyl-4,6-dinitrophenol	3.7	ug/L	U	3.7	15
9/23/2002 12:00	EQUIP BLK	BNA-Water	2-Methylnaphthalene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	2-Naphthylamine	12	ug/L	U	12	49
9/23/2002 12:00	EQUIP BLK	BNA-Water	2-Nitroaniline	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	2-Nitrophenol	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	2-Picoline	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	3,3'-Dichlorobenzidine	49	ug/L	U	49	200
9/23/2002 12:00	EQUIP BLK	BNA-Water	3,3'-Dimethylbenzidine	24	ug/L	U	24	98
9/23/2002 12:00	EQUIP BLK	BNA-Water	3-Methylcholanthrene	1.2	ug/L	U	1.2	4.9

Appendix 4 Continued

Chemical Analyses of Effluent and Receiving Waters

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
9/23/2002 12:00	EQUIP BLK	BNA-Water	3-Nitroaniline	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	4,4'-DDD	1.8	ug/L	U	1.8	7.3
9/23/2002 12:00	EQUIP BLK	BNA-Water	4,4'-DDE	1.8	ug/L	U	1.8	7.3
9/23/2002 12:00	EQUIP BLK	BNA-Water	4,4'-DDT	1.8	ug/L	U	1.8	7.3
9/23/2002 12:00	EQUIP BLK	BNA-Water	4-Aminobiphenyl	4.9	ug/L	U	4.9	20
9/23/2002 12:00	EQUIP BLK	BNA-Water	4-Bromophenyl phenyl ether	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	4-Chloro-3-methylphenol	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	4-Chloroaniline	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	4-Chlorophenyl phenyl ether	2.4	ug/L	U	2.4	9.8
9/23/2002 12:00	EQUIP BLK	BNA-Water	4-Nitroaniline	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	4-Nitrophenol	18	ug/L	U	18	73
9/23/2002 12:00	EQUIP BLK	BNA-Water	5-Nitro-o-toluidine	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	7,12-Dimethylbenz(a)anthracene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Acenaphthene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Acenaphthylene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Acetophenone	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Aldrin	1.8	ug/L	U	1.8	7.3
9/23/2002 12:00	EQUIP BLK	BNA-Water	Aniline	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Anthracene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Azobenzene/1,2-Diphenylhydrazine	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Benzidine	120	ug/L	U	120	490
9/23/2002 12:00	EQUIP BLK	BNA-Water	Benzo(a)anthracene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Benzo(a)pyrene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Benzo(b)fluoranthene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Benzo(g,h,i)perylene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Benzo(k)fluoranthene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Benzyl alcohol	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Bis(2-chloroethoxy)methane	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Bis(2-chloroethyl)ether	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Bis(2-chloroisopropyl)ether	3.7	ug/L	U	3.7	15
9/23/2002 12:00	EQUIP BLK	BNA-Water	Bis(2-ethylhexyl)phthalate	18	ug/L	U	18	73
9/23/2002 12:00	EQUIP BLK	BNA-Water	Butyl benzyl phthalate	6.1	ug/L	U	6.1	24
9/23/2002 12:00	EQUIP BLK	BNA-Water	Chrysene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Di-n-butyl phthalate	6.1	ug/L	U	6.1	24
9/23/2002 12:00	EQUIP BLK	BNA-Water	Di-n-octyl phthalate	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Dibenzo(a,h)anthracene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Dibenzofuran	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Dieldrin	1.8	ug/L	U	1.8	7.3
9/23/2002 12:00	EQUIP BLK	BNA-Water	Diethyl phthalate	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Dimethyl phthalate	61	ug/L	U	61	240
9/23/2002 12:00	EQUIP BLK	BNA-Water	Dimethylaminoazobenzene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Dinoseb	4.9	ug/L	U	4.9	20
9/23/2002 12:00	EQUIP BLK	BNA-Water	Diphenylamine	3.7	ug/L	U	3.7	15
9/23/2002 12:00	EQUIP BLK	BNA-Water	Endosulfan I	4.9	ug/L	U	4.9	20
9/23/2002 12:00	EQUIP BLK	BNA-Water	Endosulfan II	4.9	ug/L	U	4.9	20
9/23/2002 12:00	EQUIP BLK	BNA-Water	Endosulfan sulfate	1.8	ug/L	U	1.8	7.3
9/23/2002 12:00	EQUIP BLK	BNA-Water	Endrin	1.8	ug/L	U	1.8	7.3
9/23/2002 12:00	EQUIP BLK	BNA-Water	Endrin aldehyde	4.9	ug/L	U	4.9	20
9/23/2002 12:00	EQUIP BLK	BNA-Water	Ethyl methanesulfonate	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Fluoranthene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Fluorene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Heptachlor	1.8	ug/L	U	1.8	7.3
9/23/2002 12:00	EQUIP BLK	BNA-Water	Heptachlor epoxide	1.8	ug/L	U	1.8	7.3
9/23/2002 12:00	EQUIP BLK	BNA-Water	Hexachlorobenzene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Hexachlorobutadiene	3.7	ug/L	U	3.7	15
9/23/2002 12:00	EQUIP BLK	BNA-Water	Hexachlorocyclopentadiene	3.7	ug/L	U	3.7	15
9/23/2002 12:00	EQUIP BLK	BNA-Water	Hexachloroethane	3.7	ug/L	U	3.7	15
9/23/2002 12:00	EQUIP BLK	BNA-Water	Hexachloropropene	2.4	ug/L	U	2.4	9.8
9/23/2002 12:00	EQUIP BLK	BNA-Water	Indeno(1,2,3-cd)pyrene	1.2	ug/L	U	1.2	4.9

Appendix 4 Continued

Chemical Analyses of Effluent and Receiving Waters

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
9/23/2002 12:00	EQUIP BLK	BNA-Water	Isophorone	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Isosafrole	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Methapyrilene	4.9	ug/L	U	4.9	20
9/23/2002 12:00	EQUIP BLK	BNA-Water	Methyl methanesulfonate	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	N-Nitrosodi-n-butylamine	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	N-Nitrosodi-n-propylamine	2.4	ug/L	U	2.4	9.8
9/23/2002 12:00	EQUIP BLK	BNA-Water	N-Nitrosodiethylamine	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	N-Nitrosodimethylamine	2.4	ug/L	U	2.4	9.8
9/23/2002 12:00	EQUIP BLK	BNA-Water	N-Nitrosodiphenylamine	3.7	ug/L	U	3.7	15
9/23/2002 12:00	EQUIP BLK	BNA-Water	N-Nitrosomethylethylamine	2.4	ug/L	U	2.4	9.8
9/23/2002 12:00	EQUIP BLK	BNA-Water	N-Nitrosomorpholine	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	N-Nitrosopiperidine	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	N-Nitrosopyrrolidine	2.4	ug/L	U	2.4	9.8
9/23/2002 12:00	EQUIP BLK	BNA-Water	Naphthalene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Nitrobenzene	2.4	ug/L	U	2.4	9.8
9/23/2002 12:00	EQUIP BLK	BNA-Water	Nitroquinoline-1-oxide	24	ug/L	U	24	98
9/23/2002 12:00	EQUIP BLK	BNA-Water	Pentachlorobenzene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Pentachloroethane	61	ug/L	U	61	240
9/23/2002 12:00	EQUIP BLK	BNA-Water	Pentachloronitrobenzene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Pentachlorophenol	3.7	ug/L	U	3.7	15
9/23/2002 12:00	EQUIP BLK	BNA-Water	Phenacetin	4.9	ug/L	U	4.9	15
9/23/2002 12:00	EQUIP BLK	BNA-Water	Phenanthrene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Phenol	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Pyrene	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	Pyridine	4.9	ug/L	U	4.9	20
9/23/2002 12:00	EQUIP BLK	BNA-Water	Safrole	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	BNA-Water	alpha-BHC	1.8	ug/L	U	1.8	7.3
9/23/2002 12:00	EQUIP BLK	BNA-Water	beta-BHC	1.8	ug/L	U	1.8	7.3
9/23/2002 12:00	EQUIP BLK	BNA-Water	delta-BHC	1.8	ug/L	U	1.8	7.3
9/23/2002 12:00	EQUIP BLK	BNA-Water	gamma-BHC	1.8	ug/L	U	1.8	7.3
9/23/2002 12:00	EQUIP BLK	BNA-Water	m,p-Cresols	2.4	ug/L	U	2.4	9.8
9/23/2002 12:00	EQUIP BLK	BNA-Water	o-Cresol	2.4	ug/L	U	2.4	9.8
9/23/2002 12:00	EQUIP BLK	BNA-Water	o-Toluidine	1.2	ug/L	U	1.2	4.9
9/23/2002 12:00	EQUIP BLK	GC-Water	Alachlor	0.58	ug/L	U	0.58	2.32
9/23/2002 12:00	EQUIP BLK	GC-Water	Ametryn	0.048	ug/L	U	0.048	0.192
9/23/2002 12:00	EQUIP BLK	GC-Water	Atrazine	0.048	ug/L	U	0.048	0.192
9/23/2002 12:00	EQUIP BLK	GC-Water	Azinphos Methyl	0.048	ug/L	U	0.048	0.192
9/23/2002 12:00	EQUIP BLK	GC-Water	Bromacil	0.19	ug/L	U	0.19	0.76
9/23/2002 12:00	EQUIP BLK	GC-Water	Butylate	0.19	ug/L	U	0.19	0.76
9/23/2002 12:00	EQUIP BLK	GC-Water	Chlorpyrifos Ethyl	0.048	ug/L	U	0.048	0.192
9/23/2002 12:00	EQUIP BLK	GC-Water	Chlorpyrifos Methyl	0.096	ug/L	U	0.096	0.384
9/23/2002 12:00	EQUIP BLK	GC-Water	Diazinon	0.048	ug/L	U	0.048	0.192
9/23/2002 12:00	EQUIP BLK	GC-Water	Ethion	0.048	ug/L	U	0.048	0.192
9/23/2002 12:00	EQUIP BLK	GC-Water	Ethoprop	0.096	ug/L	U	0.096	0.384
9/23/2002 12:00	EQUIP BLK	GC-Water	Fenamiphos	0.19	ug/L	U	0.19	0.76
9/23/2002 12:00	EQUIP BLK	GC-Water	Fonofos	0.096	ug/L	U	0.096	0.384
9/23/2002 12:00	EQUIP BLK	GC-Water	Hexazinone	0.096	ug/L	U	0.096	0.384
9/23/2002 12:00	EQUIP BLK	GC-Water	Malathion	0.14	ug/L	U	0.14	0.56
9/23/2002 12:00	EQUIP BLK	GC-Water	Metalaxyl	0.24	ug/L	U	0.24	0.96
9/23/2002 12:00	EQUIP BLK	GC-Water	Metolachlor	0.48	ug/L	U	0.48	1.92
9/23/2002 12:00	EQUIP BLK	GC-Water	Metribuzin	0.096	ug/L	U	0.096	0.384
9/23/2002 12:00	EQUIP BLK	GC-Water	Mevinphos	0.19	ug/L	U	0.19	0.76
9/23/2002 12:00	EQUIP BLK	GC-Water	Naled	0.77	ug/L	U	0.77	3.08
9/23/2002 12:00	EQUIP BLK	GC-Water	Norflurazon	0.096	ug/L	U	0.096	0.384
9/23/2002 12:00	EQUIP BLK	GC-Water	Parathion Ethyl	0.14	ug/L	U	0.14	0.56
9/23/2002 12:00	EQUIP BLK	GC-Water	Parathion Methyl	0.096	ug/L	U	0.096	0.384
9/23/2002 12:00	EQUIP BLK	GC-Water	Phorate	0.048	ug/L	U	0.048	0.192
9/23/2002 12:00	EQUIP BLK	GC-Water	Prometryn	0.14	ug/L	U	0.14	0.56
9/23/2002 12:00	EQUIP BLK	GC-Water	Simazine	0.048	ug/L	U	0.048	0.192

Appendix 4 Continued

Chemical Analyses of Effluent and Receiving Waters

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
9/23/2002 12:00	EQUIP BLK	Metals-Water	Aluminum	5	ug/L	U	5	20
9/23/2002 12:00	EQUIP BLK	Metals-Water	Arsenic	3	ug/L	U	3	12
9/23/2002 12:00	EQUIP BLK	Metals-Water	Cadmium	0.025	ug/L	U	0.025	0.1
9/23/2002 12:00	EQUIP BLK	Metals-Water	Calcium	0.02	mg/L	U	0.02	0.08
9/23/2002 12:00	EQUIP BLK	Metals-Water	Chromium	2	ug/L	U	2	8
9/23/2002 12:00	EQUIP BLK	Metals-Water	Copper	0.75	ug/L	U	0.75	3
9/23/2002 12:00	EQUIP BLK	Metals-Water	Iron	7	ug/L	U	7	28
9/23/2002 12:00	EQUIP BLK	Metals-Water	Lead	0.1	ug/L	U	0.1	0.4
9/23/2002 12:00	EQUIP BLK	Metals-Water	Magnesium	0.01	mg/L	U	0.01	0.04
9/23/2002 12:00	EQUIP BLK	Metals-Water	Nickel	1.5	ug/L	U	1.5	6
9/23/2002 12:00	EQUIP BLK	Metals-Water	Selenium	1	ug/L	U	1	4
9/23/2002 12:00	EQUIP BLK	Metals-Water	Silver	0.02	ug/L	U	0.02	0.08
9/23/2002 12:00	EQUIP BLK	Metals-Water	Zinc	2	ug/L	U	2	8
9/23/2002 12:00	EQUIP BLK	Nutrients-Liquid	Ammonia-N	0.01	mg N/L	U	0.01	0.02
9/23/2002 12:00	EQUIP BLK	Nutrients-Liquid	NO2NO3-N	0.004	mg N/L	U	0.004	0.01
9/23/2002 12:00	EQUIP BLK	Nutrients-Liquid	N_KJEL_TOT	0.06	mg N/L	U	0.06	0.2
9/23/2002 12:00	EQUIP BLK	Nutrients-Liquid	O-Phosphate-P	0.004	mg P/L	U	0.004	0.01
9/23/2002 12:00	EQUIP BLK	Nutrients-Liquid	Total-P	0.015	mg P/L	U	0.015	0.04

Appendix 5

Explanation of Biological Measures

(1) Habitat Assessment:

Eight aspects of the physical structure and extent of disturbance are ranked, with 20 possible points for each factor (FDEP SOP FT 3100, based on Plafkin *et al.*, 1989 and Barbour and Stribling, 1994). The Habitat Assessment score includes types and amounts of benthic substrates, water velocity, amount of sand or silt accumulation, extent of artificial channelization, bank stability, and riparian zone width and vegetation type. All scores are summed to yield an overall Habitat Assessment score. Habitat Assessment score ranges from 11-160 and overall habitat quality is assigned to one of four categories: Optimal (120-160 points), Suboptimal (80-119 points), Marginal (40-79 points), and Poor (11-39 points).

(2) Effluent and Water Samples from Control and Test Sites

Algal Growth Potential (AGP): The effluent and water from control and test sites are autoclaved, filtered (0.45μm), inoculated with the unicellular green alga, *Rhapidocelis subcapitata* (formerly *Selenastrum capricornutum),* and incubated for 14 days. The algal growth potential (AGP) value is the peak growth of the alga within that 14-day period, recorded as mg dry weight/L (Miller *et al.* 1978). Raschke and Shultz (1987) found that an AGP above 5.0 mg dry weight/L represents a "problem" threshold for fresh receiving waters, implying nutrient enrichment. High AGP values may constitute one line of evidence for violation of FAC 62-302.530(47), FAC 62-302.530(48)(a) and/or 62-302.530(48)(b).

The concentration of nutrients in a water sample may be used to calculate the expected yield of AGP under the assumption that other required nutrients (e.g. silicon, micronutrients) are present in excess (Miller *et al.* 1978). The expected amount of production is calculated as 38 times the total soluble inorganic nitrogen (nitrate and nitrite plus ammonia) under nitrogen limitation or 430 times the ortho-phosphate (OP) concentration under phosphorus limitation with an error of ± 20%. When the ratio of nitrogen to phosphorus (N: P) is less than 11:1, nitrogen limitation of algal production is likely. When the N: P ratio is above 11:1, phosphorus limitation is likely. Production of lower biomass than expected may be evidence of growth inhibition related to toxic compounds present in the water sample tested and may be a violation of FAC 62-302.530(62).

(3) Algal Phytoplankton and Periphyton Assemblages

Chlorophyll *a* Content: Chlorophyll *a* content is measured in both phytoplankton and periphyton samples to estimate algal biomass (APHA 1992, modified from *Standard Methods* 10200H). High algal biomass implies nutrient stress (Stevenson and Bahls 1999) and may be a violation of FAC 62-302.530(47), 62-302.530(48)(a) and/or 62-302.530(48)(b).

Cell Density: Cell density is estimated as number/ml for phytoplankton samples and number/cm^2 for periphyton samples (APHA 1992, modified from *Standard Methods* 10200F and 10900G).

Taxa richness: Taxa richness is the number of distinct algal taxa present in a sample. Stress tends to reduce the number of different types of algae present in a sample, but moderate nutrient enrichment of nutrient poor waters may sometimes be correlated with increased algal taxa richness (Stevenson and Bahls 1999).

Community Composition: Shifts in relative proportions of major groups of algae downstream of a point source, compared to upstream, control conditions, may indicate negative effects of a discharge (Stevenson and Bahls 1999) and may constitute violations of FAC 62-302.530(47), 62-302.530(48)(a) 62-302.530(48)(b) and/or 62-302.530(62).

Shannon-Weaver Diversity Index: This index is specified in the Florida Administrative Code 62-302 as a measure of biological integrity. Low diversity scores are undesirable. Where diversity is low, only a few taxa are abundant as compared to an area where many taxa are present with more equitable abundance among taxa (Magurran 1988). Low diversity scores related to a facility's effluent may constitute violations of FAC 62-302.530(47), 62-302.530(48)(a) 62-302.530(48)(b) and/or 62-302.530(62).

(4) Benthic Macroinvertebrate Assemblages

Taxa richness: Taxa richness is the number of distinct macroinvertebrate taxa present in a sample. Stress, habitat destruction and pollution tend to reduce the number of different types of organisms present (Karr and Chu 1998). Decreases in taxa richness related to a facility's effluent may constitute violations of FAC 62-302.530(47), 62-302.530(48)(a) 62-302.530(48)(b) and/or 62-302.530(62).

Percent Contribution of Dominant Taxon: Percent contribution of the dominant taxon is calculated by dividing the number of individuals in the most abundant taxa by the total number of individuals counted. Percent contribution of the dominant taxon tends to increase with increasing perturbation (Plafkin *et al.*, 1989). Increases in the percent contribution of the dominant taxon related to a facility's effluent may constitute violations of FAC 62-302.530(47), 62-302.530(48)(a) and/or 62-302.530(48)(b).

Shannon-Weaver Diversity Index: This index is specified in the Florida Administrative Code 62-302 as a measure of biological integrity. Low diversity scores are undesirable. Where diversity is low, only a few taxa are abundant as compared to an area where many taxa are present in equitable abundance among taxa (Magurran 1988). A difference of 25% in Shannon-Weaver diversity between results from Hester-Dendy multiplate samplers incubated for 28 days at test and control sites constitutes a violation of FAC 62-302.530(11).

The Florida Index: Some organisms become rare or absent as the intensity or duration of disturbance increases. The Florida Index assigns points to stream-dwelling macroinvertebrates based on their ranked sensitivity to pollution (Beck 1954). A site with a high Florida Index score is considered healthy (Ross 1990). Decreases in Florida Index points related to a facility's effluent may constitute violations of FAC 62-302.530(47), 62-302.530(48)(a) 62-302.530(48)(b) and/or 62-302.530(62).

Ephemeroptera/Plecoptera/Trichoptera (EPT) Taxa: This value is the number of EPT taxa present. More EPT taxa are usually present in unpolluted waters (Plafkin *et al.*, 1989, Wallace *et al.*, 1996). Decreases in the number of EPT taxa related to a facility's effluent may constitute violations of FAC 62-302.530(47), 62-302.530(48)(a) 62-302.530(48)(b) and/or 62-302.530(62).

Community Composition: Shifts in proportions of major groups of organisms downstream of a point source, compared to upstream, control conditions, may indicate negative effects of a discharge (Karr and Chu 1998). Shifts in community composition related to a facility's effluent may constitute violations of FAC 62-302.530(47), 62-302.530(48)(a) 62-302.530(48)(b) and/or 62-302.530(62).

Functional Feeding Groups: Environmental degradation may differentially affect groups of invertebrates based on how the group feeds (e.g. predators, deposit feeders, etc.). In Florida, pollution may be responsible for reducing the numbers of filter feeders (FDEP 1994) and shredders (EA Engineering 1994). Changes in the proportions of functional feeding groups related to a facility's effluent may constitute violations of FAC 62-302.530(47), 62-302.530(48)(a) 62-302.530(48)(b) and/or 62-302.530(62).

The Stream Condition Index (SCI): The SCI is a composite macroinvertebrate metric (Barbour *et al.* 1996a, b) developed for Florida. Using data from qualitative dipnet samples, the SCI assigns points to seven parameters, depending on how closely each parameter approaches an expected reference condition (Barbour *et al.* 1996a, b and FDEP SOP FS 7420, LT 7200). Points are summed to yield a final SCI score (range 7-33, depending on region and index period). Included in the calculation of SCI are taxa richness, number of EPT taxa, number of Chironomid taxa, percent contribution of the dominant taxon, the Florida Index, percent contribution of Diptera, and the percent contribution of suspension and filter feeders. Scores are broken into four ordinal groups: Excellent, Good, Poor and Very Poor. A decrease in ordinal SCI score from a control to a test site may be evidence of degradation related to a facility's effluent. An SCI score of "Poor" or "Very Poor" related to a facility's effluent may constitute violations of FAC 62-302.530(47), 62-302.530(48)(a) 62-302.530(48)(b) and/or 62-302.530(62).

Appendix 6

Typical Values for Selected Parameters in Florida Waters

Percentile Distribution (1617 stations)

CONTROL SITE

Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%	Measured
Periphyton Chlorophyll *a* (mg/m^2)	0.31	**0.43**	0.77	1.04	2.16	2.94	6.45	10.51	17.00	39.51	60.85	**0.45**
Hester-Dendy Diversity	0.84	2.12	**2.48**	2.74	2.88	3.09	3.25	3.40	3.52	3.76	3.90	**2.69**
Hester-Dendy Taxa Richness	6	6.5	9	11.5	13	15	**17**	21.5	26	29	32	**18**
Dipnet Taxa Richness	9	12	**17**	20	22	24.5	26	28	31	37	53	**18**
Total Kjeldahl Nitrogen	0.30	**0.39**	0.56	0.73	0.87	1.00	1.11	1.26	1.49	1.93	2.80	**0.37**
Ammonia	0.02	0.02	0.04	**0.05**	0.06	0.08	0.11	0.14	0.20	0.34	0.60	**0.055**
Nitrate plus nitrite	0.01	0.01	0.03	0.05	0.07	0.10	0.14	0.20	**0.32**	0.64	1.05	**0.36**
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	0.18	**0.25**	0.39	0.74	1.51	**0.31**
Orthophosphate	0.01	0.01	0.03	0.04	0.05	0.08	0.11	**0.17**	0.27	0.59	1.37	**0.23**
Turbidity (NTU)	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	10.45	16.30	-

TEST SITE

Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%	Measured
Periphyton Chlorophyll *a* (mg/m^2)	0.31	0.43	0.77	1.04	**2.16**	2.94	6.45	10.51	17.00	39.51	60.85	**2.5**
Hester-Dendy Diversity	0.84	2.12	2.48	2.74	2.88	**3.09**	3.25	3.40	3.52	3.76	3.90	**3.06**
Hester-Dendy Taxa Richness	6	6.5	9	11.5	13	15	**17**	21.5	26	29	32	**17**
Dipnet Taxa Richness	9	12	**17**	20	22	24.5	26	28	31	37	53	**17**
Total Kjeldahl Nitrogen	0.30	0.39	0.56	**0.73**	0.87	1.00	1.11	1.26	1.49	1.93	2.80	**0.80**
Ammonia	0.02	0.02	**0.04**	0.05	0.06	0.08	0.11	0.14	0.20	0.34	0.60	**0.045**
Nitrate plus nitrite	0.01	0.01	0.03	0.05	0.07	0.10	0.14	0.20	0.32	0.64	**1.05**	**1.4**
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	0.18	0.25	**0.39**	0.74	1.51	**0.52**
Orthophosphate	0.01	0.01	0.03	0.04	0.05	0.08	0.11	0.17	**0.27**	0.59	1.37	**0.45**
Turbidity (NTU)	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	10.45	16.30	-

Taxa richness and diversity values are for benthic macroinvertebrates. Hester-Dendy sample= benthic macroinvertebrates collected from a standardized multi-plate sampler. Dipnet taxa richness = number of taxa collected in standardized dipnet sweep samples. Diversity = Shannon-Weaver H'. NTU = Nephelometric turbidity units. Adapted from Joe Hand, FDER, personal communication, 1991 (data collected 1980-1989).

Appendix 7

Additional physical, chemical, toxicological and microbiological results

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHEAST DISTRICT
7825 BAYMEADOWS WAY, SUIT B-200 **Comp.QAP # 880236**
JACKSONVILLE, FL 32256-7577

SAMPLE ID : 021409 STATION : DATE: 09/23/02 TIME: 11:45
SAMPLE SOURCE GRU Main St. SAMPLER: O'Connor/Bank
STATION LOCATION: Effluent
PROGRAM MOD.: DW COMPLIANCE: ☒ ENFORCEMENT: ☐
FIELD MEASUREMENTS

Tot. Depth:		Sample Depth:	1.5	W.Temp. °C:	27.28
Conductivity: µmoh/cm (EPA 120.1) :	643	Diss. Oxygen (EPA 360.1)	8.79	EPA 170.1	
Stream Velocity:		Salinity:	0.3	T.R.C.:	
pH:(EPA 150.1)	7.27	Secchi:		EPA 330.5	

WEATHER CONDITIONS:

LABORATORY MEASUREMENTS

Turbidity (NTU) : EPA 180.1		Color (PtCo): EPA 110.2			
pH (standard unit): EPA 150.1		Conductivity(µmohs/cm) EPA 120.1			

The following values are in mg/L

B.O.D : EPA 405.1		C.B.O.D : SM 5210-B	2 K	C.O.D : EPA 410.4	
Tot. S.S : EPA 160.2	1	Vol. S.S: EPA 160.4	1	Fix. S.S :	1 K
Tot.Solids : EPA 160.3		T.D.S EPA 160.1			
T. Alkalinity: EPA 310.1		Settleable Matter: EPA 160.5		Diss. Oxygen: EPA 360.2	

COMMENTS:

Sample Custody

Sample Released to:	Biipin Adhyaru	Date:	09/23/2002
Preservation:	Ice	Time:	15:30
Reported by:	Bipin Adhyaru	Date::	10/03/2002

K = Actual value is known to be less than the value given.
A = Value is the mean of two or more determinations.
O = Sampled, but analysis lost or not performed.
Q = Sample held beyond the accepted holding time.
T = Value reported is less than the laboratory method detection limit.
U = Indicates that the compound was analyzed for but not detected.
Y = The laboratory analysis was from an unpreserved or improperly preserved sample.
REJ = Data is rejected and should not be used.
L = Off - scale high. Actual value is known to be greater than value given
J = Estimated value; value not accurate.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHEAST DISTRICT
7825 BAYMEADOWS WAY, SUIT B-200 **Comp.QAP # 880236**
JACKSONVILLE, FL 32256-7577

SAMPLE ID : 021410 STATION : DATE: 09/23/02 TIME: 12:00
SAMPLE SOURCE GRU Main St. SAMPLER: O'Connor/Bank
STATION LOCATION: Equipment Blank
PROGRAM MOD.: DW COMPLIANCE: ☒ ENFORCEMENT: ☐
FIELD MEASUREMENTS

Tot. Depth:		Sample Depth:		W.Temp. °C:	25.07
Conductivity: µmoh/cm (EPA 120.1) :	1	Diss. Oxygen (EPA 360.1)		EPA 170.1	
Stream Velocity:		Salinity:		T.R.C.:	
pH:(EPA 150.1)	6.45	Secchi:		EPA 330.5	

WEATHER CONDITIONS:

LABORATORY MEASUREMENTS

Turbidity (NTU) : EPA 180.1		Color (PtCo): EPA 110.2			
pH (standard unit): EPA 150.1		Conductivity(µmohs/cm) EPA 120.1			

The following values are in mg/L

B.O.D : EPA 405.1		C.B.O.D : SM 5210-B	2 K	C.O.D : EPA 410.4	
Tot. S.S : EPA 160.2	1 K	Vol. S.S: EPA 160.4	1 K	Fix. S.S :	1 K
Tot.Solids : EPA 160.3		T.D.S EPA 160.1			
T. Alkalinity: EPA 310.1		Settleable Matter: EPA 160.5		Diss. Oxygen: EPA 360.2	

COMMENTS:

Sample Custody
Sample Released to: Biipin Adhyaru Date: 09/23/2002

Preservation: Ice Time: 15:30

Reported by: Bipin Adhyaru Date:: 10/03/2002

K = Actual value is known to be less than the value given.
A = Value is the mean of two or more determinations.
O = Sampled, but analysis lost or not performed.
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T = Value reported is less than the laboratory method detection limit.
U = Indicates that the compound was analyzed for but not detected.
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REJ = Data is rejected and should not be used.
L = Off - scale high. Actual value is known to be greater than value given
J = Estimated value; value not accurate.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHEAST DISTRICT
7825 BAYMEADOWS WAY, SUIT B-200 **Comp.QAP # 880236**
JACKSONVILLE, FL 32256-7577

SAMPLE ID : 020242 STATION : DATE: 04/01/02 TIME: 12:00
SAMPLE SOURCE GRU Main street SAMPLER: O'Connor/Kallemeyn
STATION LOCATION: Sweetwater creek above GRU main st. POD
PROGRAM MOD.: DW COMPLIANCE: ☒ ENFORCEMENT: ☐
FIELD MEASUREMENTS

Tot. Depth:	1.5	Sample Depth:	0.7	W.Temp. °C:	22.23
Conductivity: µmoh/cm (EPA 120.1) :	914	Diss. Oxygen (EPA 360.1)	7.69	EPA 170.1	
Stream Velocity:		Salinity:	0.5	T.R.C.: mg/L	
pH:(EPA 150.1)	7.28	Secchi:	0.6 L	EPA 330.5	

WEATHER CONDITIONS: Rain in early morning hours

LABORATORY MEASUREMENTS

Turbidity (NTU) : EPA 180.1		Color (PtCo): EPA 110.2			
pH (standard unit): EPA 150.1		Conductivity(µmohs/cm) EPA 120.1			

The following values are in mg/L

B.O.D : EPA 405.1		C.B.O.D : SM 5210-B	2 K	C.O.D : EPA 410.4	
Tot. S.S : EPA 160.2	1	Vol. S.S: EPA 160.4	1 K	Fix. S.S :	1
Oil & Grease : EPA 413.1		T.D.S EPA 160.1		Tot.Hardness : EPA 130.2	
T. Alkalinity: EPA 310.1		Settleable Matter: EPA 160.5		Diss. Oxygen: EPA 360.2	

COMMENTS:

Sample Custody

Sample Released to:	Tom Kallemeyn	Date:	04/01/2002
Preservation:	Ice	Time:	16:30
Reported by:	Bipin Adhyaru	Date::	04/08/2002

K = Actual value is known to be less than the value given.
A = Value is the mean of two or more determinations.
O = Sampled, but analysis lost or not performed.
Q = Sample held beyond the accepted holding time.
T = Value reported is less than the laboratory method detection limit.
U = Indicates that the compound was analyzed for but not detected.
Y = The laboratory analysis was from an unpreserved or improperly preserved sample.
REJ = Data is rejected and should not be used.
L = Off - scale high. Actual value is known to be greater than value given
J = Estimated value; value not accurate.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHEAST DISTRICT
7825 BAYMEADOWS WAY, SUIT B-200 **Comp.QAP # 880236**
JACKSONVILLE, FL 32256-7577

SAMPLE ID : 020241 STATION : DATE: 04/01/02 TIME: 10:40
SAMPLE SOURCE GRU Main street SAMPLER: O'Connor/Kallemeyn
STATION LOCATION: Sweetwater creek below GRU main st. POD
PROGRAM MOD.: DW COMPLIANCE: ☒ ENFORCEMENT: ☐
FIELD MEASUREMENTS

Tot. Depth:	1.5	Sample Depth:	0.8	W.Temp. °C:	23.67
Conductivity: µmoh/cm (EPA 120.1) :	648	Diss. Oxygen (EPA 360.1)	7.95	EPA 170.1	
Stream Velocity:		Salinity:	0.3	T.R.C.: mg/L	
pH:(EPA 150.1)	7.22	Secchi:		EPA 330.5	

WEATHER CONDITIONS: Rain in early morning hours

LABORATORY MEASUREMENTS

Turbidity (NTU) : EPA 180.1		Color (PtCo): EPA 110.2			
pH (standard unit): EPA 150.1		Conductivity(µmohs/cm) EPA 120.1			

The following values are in mg/L

B.O.D : EPA 405.1		C.B.O.D : SM 5210-B	2 K	C.O.D : EPA 410.4	
Tot. S.S : EPA 160.2	1	Vol. S.S: EPA 160.4	1	Fix. S.S :	1 K
Oil & Grease : EPA 413.1		T.D.S EPA 160.1		Tot.Hardness : EPA 130.2	
T. Alkalinity: EPA 310.1		Settleable Matter: EPA 160.5		Diss. Oxygen: EPA 360.2	

COMMENTS:

Sample Custody
Sample Released to: Tom Kallemeyn Date: 04/01/2002

Preservation: Ice Time: 16:30

Reported by: Bipin Adhyaru Date:: 04/08/2002

K = Actual value is known to be less than the value given.
A = Value is the mean of two or more determinations.
O = Sampled, but analysis lost or not performed.
Q = Sample held beyond the accepted holding time.
T = Value reported is less than the laboratory method detection limit.
U = Indicates that the compound was analyzed for but not detected.
Y = The laboratory analysis was from an unpreserved or improperly preserved sample.
REJ = Data is rejected and should not be used.
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J = Estimated value; value not accurate.

STATE OF FLORIDA
DEPT. OF ENVIRONMENTAL PROTECTION
NORTHEAST DISTRICT

Division of Water Facilities
Surface Water Section

MICROBIOLOGICAL ANALYSIS REPORT

NAME OF SURVEY			COLLECTOR
GRU WWTP			O'Connor
DATE: COLLECTED	**RECEIVED**	**PROCESS START**	**COMPLETED**
09/23/02	16:00 09/23/02	17:40 09/23/02	09/23/02
SURVEY TYPE	**SAMPLE TYPE**	**COUNTY**	**ANALYTICAL METHOD**
5 th Year	DW		Membrane Filter
ANALYST	**COMMENTS**		
Kallemeyn			

LAB NO.	STORET NO.	SITE LOCATION	COLL TIME	SET UP TIME	TOTAL COLIFORM		FECAL COLIFORM	
					#/100ML	CODE	#/100ML	CODE
021409		GRU Main street Final Effluent	11:55	17:50	10	K	10	K

RESULTS APPROVED BY:	DATE
O'Connor	

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STATE OF FLORIDA
DEPT. OF ENVIRONMENTAL PROTECTION
NORTHEAST DISTRICT

Division of Water Facilities
Surface Water Section

MICROBIOLOGICAL ANALYSIS REPORT

NAME OF SURVEY			COLLECTOR
GRU WWTP			O'Connor/Kallemeyn
DATE: COLLECTED	**RECEIVED**	**PROCESS START**	**COMPLETED**
04/01/02	16:30 04/01/02	16:30 04/01/02	04/01/02
SURVEY TYPE	**SAMPLE TYPE**	**COUNTY**	**ANALYTICAL METHOD**
5 th Year	DW		Membrane Filter
ANALYST	**COMMENTS**		
Kallemeyn			

LAB NO.	STORET NO.	SITE LOCATION	COLL TIME	SET UP TIME	TOTAL COLIFORM #/100ML	TOTAL COLIFORM CODE	FECAL COLIFORM #/100ML	FECAL COLIFORM CODE
020241		Sweetwater Br. Below GRU Main street POD	13:25	17:30	400		56	B
020242		Sweetwater Br. Above GRU Main street POD	13:10	17:30	2500		500	
020243		GRU Main street POD Final Effluent	14:00	17:30	20	B	10	K

RESULTS APPROVED BY:	DATE
Tom Kallemeyn	

PAGE 1

Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the GRU-Mainstreet WWTP, 200 S.E. 16th Avenue, Gainesville, Alachua County, Florida, NPDES# FL0027251, performed from 24 to 26 September 2002.

Facility:	**GRU-Mainstreet WWTP**		**NPDES # FL0027251**	Facility Type: **WWTP**		**Analysts:**	Jacquelyn Brynda
Location:	200 S.E. 16th Avenue, Gainesville		Contact/District:	O'Conner/NE			Joshua Ayres
County:	Alachua		Test type:	static acute screen			Christa Pierini
Sample Collection Date:	9/23/2002	Time: 1145	# tests:	2	Receiving Water: Sweetwater Branch		Marshall Faircloth
Test Beginning Date:	9/24/2002	Time: 1600	Chlorination Type:	Chlorinated	Class III Fresh		James Daniels
Test Ending Date:	9/26/2002	Time: 1400		sample collected after dechlorination	**Page 1 of 1**	**Reviewer:**	David Whiting

Organism: ***Ceriodaphnia dubia*** Life stage: <24 hours

Concentrations	Sample/Diluent Volume(mL)	SURVIVAL # Alive 0 hr	24 hr	48 hr	pH 0 hour	24 hour	48 hour	Temperature[A] 0 hour	24 hour	48 hour	Dissolved Oxygen 0 hour	24 hour	48 hour	Conductivity Uncorrected µs 0 hour	48 hour
Control A	0/20	5	5	5	8.1	-	8.1	24.4	-	24.7	7.5	-	8.2	175	205
Control B	0/20	5	5	5	-	-	8.1	-	-	24.5	-	-	8.2	-	205
Control C	0/20	5	5	5	-	-	8.1	-	-	24.4	-	-	8.3	-	200
Control D	0/20	5	5	5	-	-	8.1	-	-	24.3	-	-	8.3	-	210
100% A	20/0	5	5	5	7.6	-	8.4	24.1	-	24.4	7.5	-	8.3	525	720
100% B	20/0	5	5	5	-	-	8.4	-	-	24.4	-	-	8.4	-	720
100% C	20/0	5	5	5	-	-	8.4	-	-	24.4	-	-	8.3	-	715
100% D	20/0	5	5	5	-	-	8.4	-	-	24.3	-	-	8.3	-	755

[A] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 24.5-26.0C
Incubator #3 temperature range for the test period was 24.0-25.0C

LIMS	
Job number:	TLH-2002-09-24-06
sample number:	624038

Data Transcription Verification	
date:	12/16/2002
by:	Cathy Oaks
	Brad Richardson

Total Residual CL2	mg/L	Method
Field:	-	-
Lab:	<0.03	Hach

Ammonia	Total (mg/L)	Unionized (mg/L)
Control water (fish):	<0.017	<0.017
Control water (water flea):	<0.017	<0.017
100% Sample:	<0.017	<0.017

Organism: ***Cyprinella leedsi*** Life stage: 11 days

Concentrations	Sample/Diluent Volume(mL)	SURVIVAL # Alive 0 hr	24 hr	48 hr	pH 0 hour	24 hour	48 hour	Temperature[B] 0 hour	24 hour	48 hour	Dissolved Oxygen 0 hour	24 hour	48 hour	Conductivity Uncorrected µs 0 hour	48 hour
Control A	0/500	5	5	5	7.9	8.2	8.4	25.0	23.8	25.0	7.7	7.6	8.2	285	270
Control B	0/500	5	5	5	7.9	8.2	8.4	25.0	23.6	24.7	7.7	7.6	8.1	280	275
Control C	0/500	5	5	5	7.9	8.2	8.4	25.0	23.5	24.5	7.7	7.7	8.2	270	280
Control D	0/500	5	5	5	7.9	8.2	8.4	25.0	23.5	24.4	7.7	7.7	8.2	270	275
100% A	500/0	5	5	5	7.5	7.9	8.2	25.1	23.5	24.3	7.8	7.7	8.3	570	620
100% B	500/0	5	5	5	7.5	7.9	8.2	25.2	23.3	24.5	7.8	7.6	8.3	606	635
100 % C	500/0	5	5	5	7.5	7.9	8.2	25.2	23.3	24.6	7.8	7.7	8.2	615	655
100% D	500/0	5	5	5	7.5	7.9	8.2	25.2	23.5	24.5	7.7	7.6	8.2	620	640

[B] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 24.5-26.0C
Incubator #3 temperature range for the test period was 24.0-25.0C

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control water (fish):	134	158
Control water (water flea):	86	100
100% Sample:	100	182

Appendix 8

Habitat Assessment Field Sheets

FDEP-SOP-001/01: Form FD 9000-3 (June 1, 2001)

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y): 4/1/02	TIME: 1245	RECEIVING BODY OF WATER:
REMARKS:	COUNTY: Alachua	LOCATION: Sweetwater creek Above GLN MANUST POD	FIELD ID/NAME: Control Site	

RIPARIAN ZONE/STREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
1				60	30	5	R

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

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

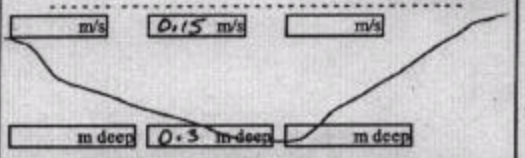
Width of riparian vegetation (m) On least buffered side: 10 m

List & map dominant Vegetation on back

Artificially Channelized ☐ no ☐ ☒ ☐ (recent, severe | some recovery | mostly recovered)

Artificially Impounded ☐ yes (more sinuous)

Typical Width (m) Depth (m)/Velocity (m/sec) Transect: 1-2 m wide



High Water Mark: 1.5 (m above present water level) + 0.3 (present depth in m) = 1.8 (m above bed)

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

SEDIMENT/SUBSTRATE

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

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

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

Substrate Type	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand	10	3	
(Leaf Packs of Mats)	1	5	D/Pnet	Mud/Muck/Silt			
Aquatic Vegetation		POS	Dipnet	Other: Bedrock		2	
(Rock or Shell Rubble)	5	5	Dipnet	Other:			
(Undercut banks/Roots)	2	5	Dipnet	*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (umho/cm) Or Salinity (ppt):			Secchi (m):
Top								0.6
Mid-depth	0.2	22.23	7.28	7.69	914			
Bottom								

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

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

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

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

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

Weather Conditions/Notes: Rain in Early AM #45 Clear warm 80°

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

SAMPLING TEAM: Calloway O'Kon

SIGNATURE: [signature]

DATE: 4/1/02

FDEP-SOP-001/01: Form FD 9000-5 (June 1, 2001)

STREAM/RIVER HABITAT ASSESSMENT FIELD SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y): 4/1/02	RECEIVING BODY OF WATER:

REMARKS:	COUNTY: Alachua	LOCATION: S West Water Creek above GRU main St POD	FIELD ID/NAME: control site

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components **Substrate Diversity** 14	Four or more productive habitats present (snags, tree roots/undercut banks, aquatic vegetation, leaf packs (partially decayed), rock). 20 19 18 17 16	Three productive habitats present. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	Two productive habitats present. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	One or less productive habitat. Lack of habitat is obvious, substrates unstable or smothered. 5 4 3 2 1
Substrate Availability 6	Greater than 30% productive habitat present at site. 20 19 18 17 16	16% to 30% productive habitat, by aerial extent. 15 14 13 12 11	6% to 15% productive habitat 10 9 8 7 6	Less than 5% productive habitat. 5 4 3 2 1
Water Velocity 13	Max. observed at typical transect: > 0.25 m/sec. But < 1 m/sec 20 19 18 17 16	Max. observed at typical transect: 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed at typical transect: 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed at typical transect: <0.05 m/sec. Or spate occurring: > 1 m/sec 5 4 3 2 1
Habitat Smothering 11 Primary Score 44	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of the habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, as severe problem, pools absent 5 4 3 2 1
Secondary Habitat Components **Artificial Channelization** 13	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	Many have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Bank Stability Right Bank 5 Left Bank 5	Stable. No evidence of erosion or bank failure. Little potential for future problems. 10 9	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 8 7 6	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 5 4	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 3 2 1
Riparian Buffer Zone Width Right Bank 6 Left Bank 9	Width of native vegetation (least buffered side) greater than 18 m 10 9	Width of native vegetation (least buffered side) 12m to 18 m 8 7 6	Width of native vegetation 6 to 12 m. human activities still close to system 5 4	Less than 6 m of native buffer zone due to intensive human activities 3 2 1
Riparian Zone Vegetation Quality Right Bank 8 Left Bank 8 Secondary Score 53	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody machrophytes. Normal, expected plant community for given sunlight & habitat conditions. 10 9	50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 8 7 6	25% to 50% of riparian ozone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 5 4	Less than 25% of streambank surfaces are vegetated and/or poor plant community (e.g. grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 3 2 1

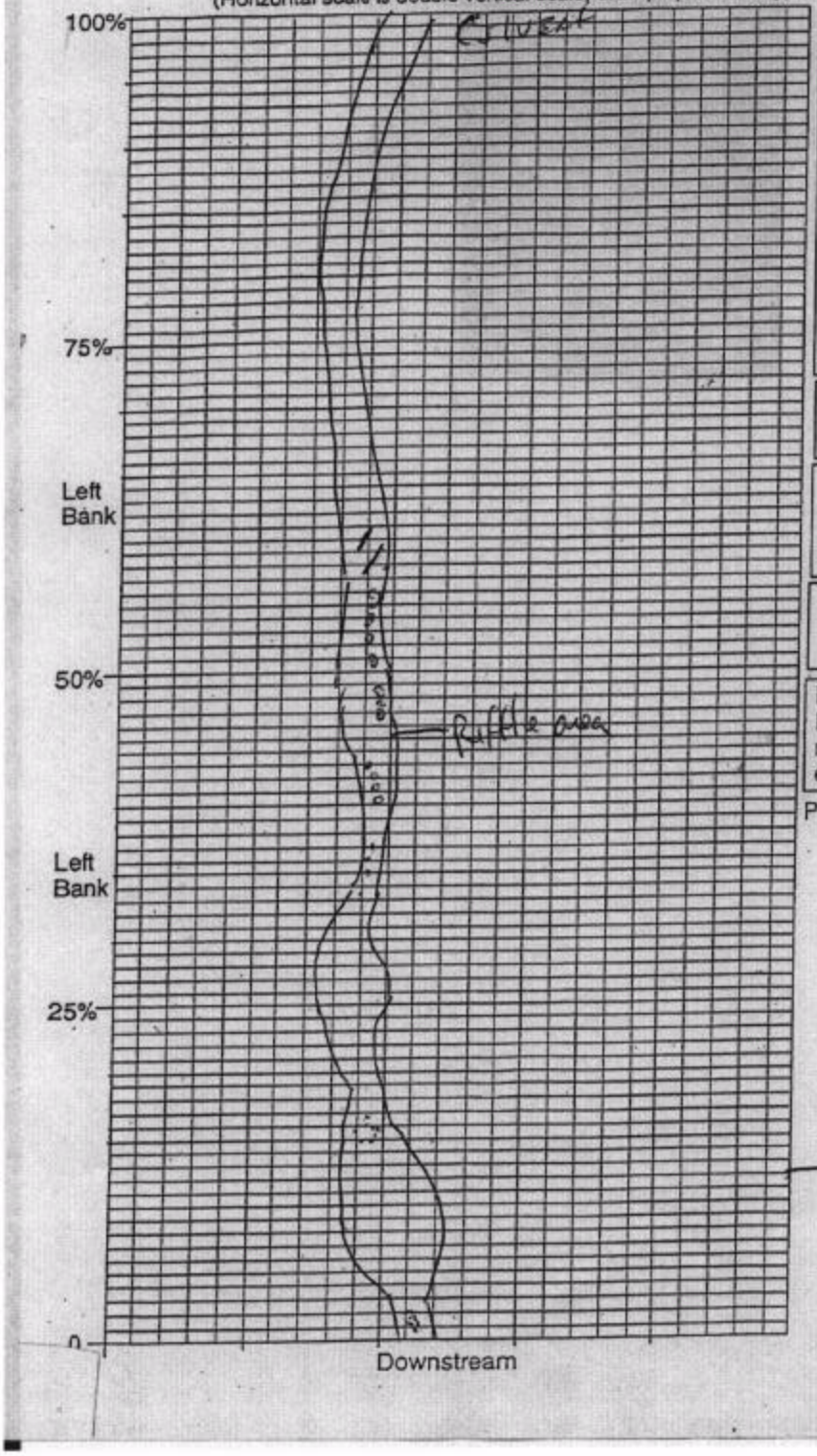
TOTAL SCORE 97

ANALYSIS DATE: 4/1/02	ANALYST: P O Conner	SIGNATURE:

4/1/02

Site Map / Habitat Sketch

Length of grid represents 100m of stream (not linear meters).
(Horizontal scale is double vertical scale, draw proportionately).



Field ID: Control Site

Substrates: Code key, draw proportionate habitat abundance.

- Snags
- Roots/undercut banks
- Leaf Packs (or mats)
- ~~Macrophytes~~
- Rock Rubble

Velocity:
Note where velocity measures were taken.

Habitat Smothering:
Note areas (on map) where sand or silt is smothering substrates, limiting habitability.

Bank Stability:
Note areas (on map) with unstable, eroding banks.

Riparian Buffer Width:
Note areas (on map) where natural vegetaton is altered or eliminated.

Plants observed/other notes:

FDEP-SOP-001/01: Form FD 9000-3 (June 1, 2001)

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
		4/1/02	1105	

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
	ALACHUA	Sweetwater Creek DOWNGRD MAIN ST. POND	TEST SITE

RIPARIAN ZONE/STREAM FEATURES

Predominant Land-Use in Watershed (specify relative percent in each category): 1 MILE Upstream

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
1				60	30	5	4

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

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

Width of riparian vegetation (m) On least buffered side: 6 m

List & map dominant Vegetation on back

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

Artificially Impounded ☐ yes more sinuous

Typical Width (m) Depth (m)/Velocity (m/sec) Transect: 3-4 m wide

m/s 0.5 m/s m/s

m deep 0.6 m deep m deep

High Water Mark: 1.5 (m above present water level) + 0.6 (present depth in m) = 2.1 (m above bed)

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

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ~~No Effluent~~

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

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

Substrate Type	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand	3-50	3	Dipnet
Leaf Packs of Mats	1	5	Dipnet	Mud/Muck/Silt			
Aquatic Vegetation				Other: Bedrock	3-40	2	Dipnet
Rock or Shell Rubble	7	5	Dipnet	Other:			
Undercut banks/Roots	2	3	Dipnet				

Draw aerial view sketch of habitats found in 100 m section

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (umho/cm) Or Salinity (ppt):			Secchi (m):
Top								
Mid-depth	0.2	23.61	7.22	7.95	648			0.6
Bottom								

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

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

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

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

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

Weather Conditions/Notes:

Clear Warm 80° RAIN IN Early Arches

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

SAMPLING TEAM: Kallemeyn, Downie

SIGNATURE:

DATE: 4/1/02

FDEP-SOP-001/01: Form FD 9000-5 (June 1, 2001)

STREAM/RIVER HABITAT ASSESSMENT FIELD SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		4/1/02	

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
	ALACHUA	SWEETWATER BR BELOW GRUMMAN ST POD	TEST SITE

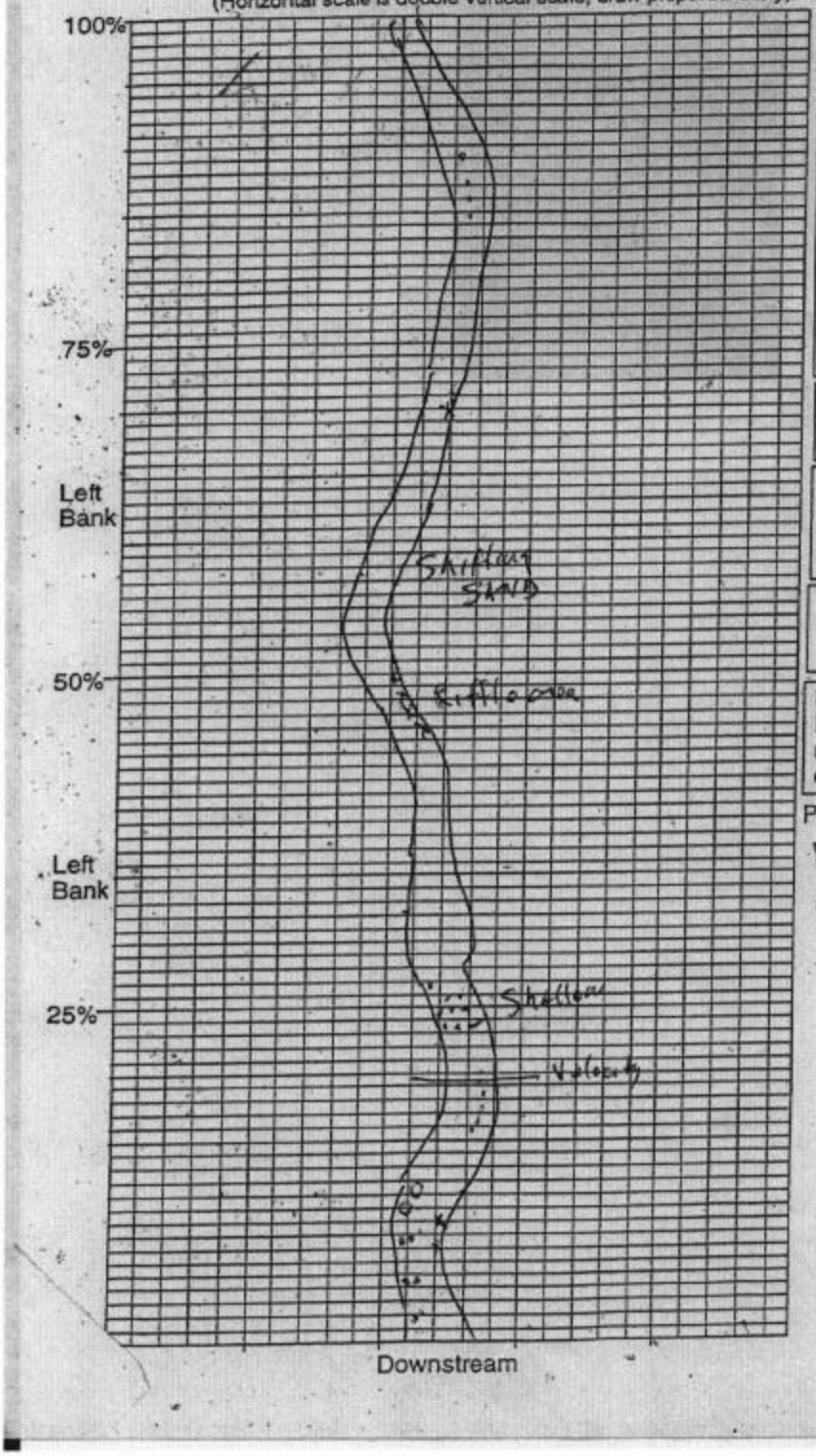
Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components **Substrate Diversity** 14	Four or more productive habitats present (snags, tree roots/undercut banks, aquatic vegetation, leaf packs (partially decayed), rock). 20 19 18 17 16	Three productive habitats present. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 (14) 13 12 11	Two productive habitats present. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	One or less productive habitat. Lack of habitat is obvious, substrates unstable or smothered. 5 4 3 2 1
Substrate Availability 8	Greater than 30% productive habitat present at site. 20 19 18 17 16	16% to 30% productive habitat, by aerial extent. 15 14 13 12 11	6% to 15% productive habitat 10 9 8 7 6	Less than 5% productive habitat. 5 4 3 2 1
Water Velocity 16	Max. observed at typical transect: > 0.25 m/sec. But < 1 m/sec 20 19 18 17 16	Max. observed at typical transect: 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed at typical transect: 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed at typical transect: <0.05 m/sec. Or spate occurring: > 1 m/sec 5 4 3 2 1
Habitat Smothering 11 Primary Score 49	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of the habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, as severe problem, pools absent 5 4 3 2 1
Secondary Habitat Components **Artificial Channelization** 13	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	Many have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Bank Stability Right Bank 6 Left Bank 7	Stable. No evidence of erosion or bank failure. Little potential for future problems. 10 9	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 8 7 6	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 5 4	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 3 2 1
Riparian Buffer Zone Width Right Bank 8 Left Bank 5	Width of native vegetation (least buffered side) greater than 18 m 10 9	Width of native vegetation (least buffered side) 12m to 18 m 8 7 6	Width of native vegetation 6 to 12 m. human activities still close to system 5 4	Less than 6 m of native buffer zone due to intensive human activities 3 2 1
Riparian Zone Vegetation Quality Right Bank 8 Left Bank 8 Secondary Score 55	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody machrophytes. Normal, expected plant community for given sunlight & habitat conditions. 10 9	50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 8 7 6	25% to 50% of riparian ozone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 5 4	Less than 25% of streambank surfaces are vegetated and/or poor plant community (e.g. grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 3 2 1

TOTAL SCORE 104

ANALYSIS DATE:	ANALYST:	SIGNATURE:
4/1/02	P O'CONNOR	Patricia O'Connor

Site Map / Habitat Sketch

Length of grid represents 100m of stream (not linear meters).
(Horizontal scale is double vertical scale, draw proportionately).



Field ID: Test Site

Substrates: Code key, draw proportionate habitat abundance.

- / Snags
- xx Roots/undercut banks
- OO Leaf Packs (or mats)
- Macrophytes
- Rock Rubble
- _____
- _____

Velocity:
Note where velocity measures were taken.

Habitat Smothering:
Note areas (on map) where sand or silt is smothering substrates, limiting habitability.

Bank Stability:
Note areas (on map) with unstable, eroding banks.

Riparian Buffer Width:
Note areas (on map) where natural vegetaton is altered or eliminated.

Plants observed/other notes:

Deeply Incised
Velocity 0.3 m/s

Appendix 9

Density (number/cm^2) and taxa list for periphyton collected from glass microscope slides incubated for 28 days upstream and downstream of GRU-Mainstreet facility discharge, April 1, 2002.

	Control Site	Test Site
Bacillariophyceae:		
Achnanthes clevei	10532	176
Achnanthes delicatula	4915	176
Achnanthes exigua	11936	703
Achnanthes lanceolata	68107	1407
Achnanthes rupestoides	18958	-
Cocconeis placentula	108831	18639
Amphora sp.	1404	-
Eunotia sp.	13341	6682
Eunotia monodon	-	176
Gomphonema sp.	101810	-
Gomphonema parvulum	4915	-
Capartogramma crucicula	1404	-
Hippodonta capitata	3511	-
Navicula sp.	-	176
Navicula constans	8426	-
Navicula cryptocephala	11936	176
Navicula elginensis	1404	-
Navicula minima	20362	176
Navicula viridula	3511	-
Navicula viridula rostellata	-	176
Pinnularia sp.	1404	-
Nitzschia sp.	10532	528
Nitzschia amphibia	-	528
Synedra sp.	16851	176
Synedra ulna	1404	-
Chlorophyceae:		
Protoderma sp.	-	176
Stigeoclonium sp.	1404	528
Stigeoclonium nanum	-	5451
Characium sp.	702	-
Chlamydomonas sp.	-	352
Protococcus sp.	-	176
Oedogonium sp.	702	-
Chlorella sp.	702	1407
Oocystis sp.	702	-
Scenedesmus bijuga	-	352
Cyanophyceae:		
Aphanocapsa sp.	-	176
Anabaena sp.	1404	-
Lyngbya sp.	1404	879
Oscillatoria sp.	-	176
Cyanobium parvum	2809	-
Cyanobium plancticum	1404	-

Appendix 10

Benthic macroinvertebrates collected from Hester-Dendy artificial substrates incubated upstream and downstream of the GRU-Mainstreet facility for 28 days (April 1, 2002). Taxa collected and density (individuals/m^2) rounded to the nearest individual (n = 3 samples).

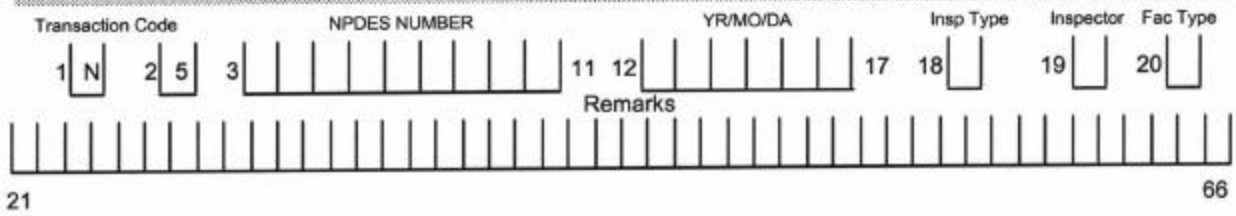
	Control Site	Test Site
Arachnida:		
Acariformes		
Hygrobates sp.	-	3
Insecta:		
Coleoptera		
Microcylloepus pusillus	-	5
Diptera		
Chironomidae	58	58
Chironomus sp.	11	130
Cricotopus bicinctus	16	45
Dicrotendipes modestus	3	-
Goeldichironomus sp.	3	-
Goeldichironomus holoprasinus	5	-
Hemerodromia sp.	3	8
Kiefferulus sp.	50	-
Labrundinia sp.	3	-
Orthocladius annectens	-	3
Paratanytarsus sp.	3	-
Polypedilum sp.	3	3
Polypedilum fallax	3	-
Polypedilum illinoense grp.	13	167
Polypedilum scalaenum grp.	3	11
Polypedilum tritum	3	-
Rheocricotopus robacki	204	77
Tanytarsus sp. u epler	5	-
Thienemanniella	-	8
Thienemanniella xena	-	5
Tipulidae	3	-
Hemiptera		
Microvelia sp.	3	-
Odonata		
Coenagrionidae	-	3
Trichoptera		
Cheumatopsyche sp.	-	29
Hydropsyche sp.	-	5
Hydropsychidae	-	8
Mollusca:		
Gastropoda		
Ancylidae	16	26
Hebetancylus excentricus	19	21
Micromenetus sp.	-	5
Physella sp.	8	220
Gastropoda	-	21

Appendix 11

Qualitative benthic macroinvertebrate collections (n = 20 discrete dipnet sweeps) upstream and downstream of GRU-Mainstreet facility (April 1, 2002). Taxa lists and number of individuals counted.

	Control Site	Test Site
Annelida:		
Oligochaeta		
Nais communis complex	3	-
Haber speciosus	1	-
Eclipidrilus sp.	-	1
Nemertea		
Prostoma sp.	-	1
Crustacea:		
Amphipoda	-	1
Decapoda		
Cambaridae	1	1
Insecta:		
Coleoptera		
Microcylloepus pusillus	5	2
Peltodytes sp.	-	1
Diptera		
Atrichopogon sp.	-	1
Chironomidae	6	6
Chironomus sp.	6	23
Cricotopus sp.	3	-
Cricotopus bicinctus	-	8
Kiefferulus sp.	1	-
Polypedilum sp.	1	-
Polypedilum illinoense grp.	21	37
Rheocricotopus robacki	11	15
Stenochironomus sp.	1	-
Tanytarsus sp.	1	-
Tanytarsus sp. l epler	6	-
Tanytarsus sp. u epler	44	3
Thienemanniella xena	-	1
Simulium sp.	2	-
Odonata		
Argia sp.	5	2
Trichoptera		
Cheumatopsyche sp.	19	3
Hydropsychidae	-	1
Mollusca:		
Gastropoda		
Physella sp.	6	5
Micromenetus dilatatus avus	1	-
	144	112

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)

