

Biological Assessment of

River Oaks Advanced Wastewater Treatment Plant

Hillsborough County

NPDES #FL0027821

Sampled October 2002

March 2003

Biology Section

Bureau of Laboratories

Division of Resource Assessment and Management

Quality Manual No. 870346G

NELAC Certification No. E31780

Florida Department of Environmental Protection
Fifth Year Inspection Summary

Discharger:	River Oaks WWTP
County:	Hillsborough
NPDES Number:	FL0027821
Permit Expiration:	7/7/03

Toxics Sampling Inspection **(XSI)**

Date Sampled: 14 October 2002

Results: Cadmium and lead were detected in the effluent at levels below the minimum quantitation limit, but greater than the minimum detection limit. Aluminum, copper, iron, and zinc were also detected in the effluent. All metals detected complied with Class III Water Quality Criteria. Atrazine was detected in the effluent at a level below the minimum quantitation limit, but greater than the minimum detection limit.

Compliance Biomonitoring Inspection **(CBI)**

Date Sampled: 14 October 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 screening bioassays.

Water Quality Inspection **(WQI)**

Date Sampled: 14 October 2002

Results: Fecal and total coliforms were not detected in the effluent. Fecal and total coliforms were detected in the receiving waters at levels that complied with Class III Water Quality Criteria. Dissolved oxygen values at the Control and Test Sites did not meet Class III Water Quality Criteria (>5.0 DO as mg/L, see Table 1) (62-302.550(31) F.A.C.). Nutrient concentrations were similar at both the Control and Test Sites and were greater than 60% of typical values for Florida streams. Nitrate+nitrite concentration was slightly higher at the Test Site (1.1 mg/L) than the Control Site (0.84 mg/L) and appears to be attributed to the effluent from the facility. The AGP values at the Control Site (46.9 mg dry wt/L), Test Site (43.6 mg dry wt/L), and in the effluent sample (57.5 mg dry wt/L) were all at least eight times the suggested "problem" threshold (5.0 mg dry wt/L).

Impact Bioassessment Inspection **(IBI)**

Date Sampled: 14 October 2002

Results: Samples for periphyton algal identification and chlorophyll-a were only collected from the Test Site. No sample was collected for periphyton algal identification or determination of chlorophyll *a* concentration from the Control Site, because the periphytometer sampler was found out of the water upon retrieval. Hester-Dendy samplers were compromised at both the Control and Test Sites; therefore they were not submitted for analysis. The Control Site SCI score of 23 placed it in the "good" category, while the Test Site SCI score of 13 placed it in the "poor" category.

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 River Oaks Wastewater Treatment Plant is located in Hillsborough County, Florida (Appendix 1). This facility is an advanced wastewater treatment facility that uses an activated-sludge process designed to meet advanced wastewater treatment standards. The process at this plant includes flow equalization, preliminary screening, grit removal, and primary clarification followed by aeration and clarification. Wastewater then flows through denitrification tanks and clarification followed by filtration and chlorination (see Facility Summary in Appendix 2). The effluent is aerated, dechlorinated, and then discharged into Channel A. The design flow of the wastewater system is 10 million gallons per day (MGD). The mean flow at the time of this survey was approximately 5.0 MGD (Facility Summary in Appendix 2).

Surface Water Quality Criteria and facility permit limits are listed in Table 1. According to the facility's monthly operating reports, the plant has had numerous short-term excursions of the total residual chlorine limit for disinfection (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 Channel A approximately 100 meters upstream of the discharge) and a test site (located in Channel A approximately 100 meters downstream of the discharge). The hydrology of Channel A is variable. Flow is controlled by four Southwest Florida Water Management District weirs. There is one weir approximately 500 meters upstream of the Control Site that diverts water into Channel A. There are two other weirs in Rocky Creek, which usually flows south to Tampa Bay. However during high tides water will backflow over the weirs and back up into Rocky Creek and Channel A. There is a fourth weir approximately 1,000 meters southwest of the River Oaks outfall. When this weir is open, water will flow downstream into Tampa Bay via Cabbagehead Bayou (see map in Appendix 1). Detailed methods are given in Appendix 3. 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: Andrea Grainger, Cindy Hodgman, Melissa Gunter, and Peggy Morgan (DEP Southwest 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

- Cadmium and lead were detected in the effluent at levels below the minimum quantitation limit but greater than the minimum detection limit. Aluminum, copper, iron, and zinc were also detected in the effluent. All metals detected complied with Class III Water Quality Criteria (62-302 F.A.C.). Atrazine was detected in the effluent at a level below the minimum quantitation limit but greater than the minimum detection limit. Specific chemical results are reported in Table 1, and the results of all of the chemical analyses can be reviewed in Appendix 4.
- Effluent conductivity (µmhos/cm), pH (Standard Units), and dissolved oxygen (DO as mg/L) complied with Class III Water Quality Criteria (62-302 F.A.C.) and facility permit limits.
- Habitat assessment scores were 55 at both the Control and Test Sites, placing both sites in the marginal category. (Table 1, data sheets in Appendix 8).
- Conductivity (µmhos/cm) and pH (Standard Units) at the Test and Control Sites complied with Class III Water Quality Criteria (Table 1, 62-302.530 F.A.C.) and were within normal ranges. However, dissolved oxygen (DO in mg/L) values measured at the Control and Test Sites were below the Class III Water Quality Criteria (5.0 mg/L, 62-302.550 (31) F.A.C.). The Control Site dissolved oxygen was 3.6 mg/L and the Test Site measured 3.4 mg/L, but this does not appear to be attributed to the effluent.
- The effluent sample was not toxic to the fish, *Cyprinella leedsi,* or to the water flea, *Ceriodaphnia dubia,* during 48-hour acute screening bioassays (See Table 1 for percent mortality and Appendix 7 for bioassay bench sheets).
- Fecal and total coliforms were not detected in the effluent, but were detected in the receiving waters at levels that complied with Class III Water Quality Criteria (See Table 1 for results and Appendix 7 for laboratory worksheets).
- The effluent total nitrogen concentration was 2.27 mg/L (Table 1). Nutrient levels at the Test Site as compared to the Control Site were approximately the same, with the exception of nitrate+nitrite. The effluent nitrate+nitrite concentration (1.3 mg/L, Table 1) contributed to an increased concentration at the Test Site. Test Site levels of nitrate+nitrite were greater than 95% of values typical of Florida streams, while Control Site levels

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

River Oaks WWTP	Class III Criteria	Permit Limits	Effluent Samples	Control Site	Test Site
Organic Constituents (ug/L)					
Atrazine			0.060 I	-	-
Metals (ug/L unless otherwise noted, Class III Criteria are less than or equal to the value given)					
Aluminum	1500	-	68	-	-
Arsenic	50	-	3.0 U	-	-
Cadmium	1.94 b	-	0.087 I	-	-
Calcium (mg/L)	-	-	69.3	-	-
Chromium	150.90 b	-	2.0 U	-	-
Copper	16.74 b	-	3.4	-	-
Iron	1000	-	32	-	-
Lead	7.60 b	-	0.32 I	-	-
Magnesium (mg/L)	-	-	6.1	-	-
Nickel	93.03 b	-	2.0 U	-	-
Selenium	5.0	-	1.0 U	-	-
Silver	0.07	-	0.020 U	-	-
Zinc	213.89 b	-	34.8	-	-
Nutrients (mg/L)					
Ortho-phosphate	-	-	0.27	0.18	0.18
Total Phosphorus	-	1 a	0.27 A	0.31	0.22
Ammonia	-	-	0.053	0.15	0.16
Un-ionized Ammonia	≤ 0.02 s	-	< 0.02	< 0.02	< 0.02
Nitrate and Nitrite	-	-	1.3	0.84	1.1
Total Kjeldahl Nitrogen	-	-	0.97 A	1.6	1.2
Organic Nitrogen	-	-	0.917	1.45	1.04
Total Nitrogen	-	3 a	2.27	2.44	2.3
General Physical and Chemical Parameters					
Habitat Assessment	-	-	-	55	55
Dissolved Oxygen (mg/L)	≥ 5.0 s	5.0 s	6.2	3.6	3.4
pH (SU)	6.0-8.5 s	6.0-8.5 s	7.0	6.9	6.8
Conductivity (µmhos/cm)	1275 s	-	932	627	611
Temperature (°C)	-	-	30.4	29.0	28.6
Total Suspended Solids (mg/L)	-	5 a	1	28	2
Turbidity (NTU)	43	-	0.3	13.6	1.8
Residual Chlorine (mg/L)	≤ 0.01	≤ 0.01	≤ 0.01 U		
BOD, 5 day (mg/L)	-	5 s	2 U	3	2 U
CBOD, 5 day (mg/L)	-	5 a	2 U	-	-
Hardness (mg $CaCO_3$)	-	-	198.16	-	-
Toxicity (48-hour static, screening bioassay, percent mortality in 100% effluent)					
Bioassay - Water flea	-	NOEC 100%	0%	-	-
Bioassay - Fish	-	NOEC 100%	0%	-	-
Microbiology (Number of counts/100ml)					
Fecal Coliforms	800 s	25 s	1 K	15 K	50 K
Total Coliforms	2400 s	-	1 K	440	170 K

a - Annual average

b - Value is calculated based on hardness

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

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

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

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

s - Single sample

were higher than 90% of typical Florida streams (Appendix 6). Although nitrate+nitrite levels were already high at the Control Site, the plant is contributing additional nitrogen to the receiving waters. Turbidity, total suspended solids, and Total Kjeldahl nitrogen values were all higher at the Control Site, indicating an organic input that could be related to the variable hydrology in Channel A or a result of weed control that occurred during the week of this sampling event. DEP personnel were unaware of this activity until after the samples had been collected.

- Algal growth potential (AGP) is a measure of nutrients available for algal growth (Miller *et al.* 1978). Raschke and Shultz (1987) found that AGP above 5.0 mg dry weight/L represents a "problem" threshold for fresh receiving waters, implying nutrient enrichment. The AGP values measured for the Control Site (46.9 mg dry wt/L), Test Site (43.6 mg dry wt/L), and the effluent (57.5 mg dry wt/L) were above this threshold (Table 2). This indicates nutrient enrichment at the Control Site from inputs other than the River Oaks discharge, however the effluent AGP value indicates the discharge is contributing to the already high levels in Channel A. There was no evidence of growth inhibition in the AGP data (Table 2).
- Samples for periphyton identification were only collected from the Test Site. Results from this sample can be reviewed in Appendix 9. Test Site chlorophyll-*a* was below the detection limit. No samples were collected for periphyton identification or determination of periphyton chlorophyll *a* concentration at the Control Site, because the periphytometer was found out of the water on the day of collection.
- Hester-Dendy samplers were compromised at both the Control and Test Sites; therefore they were not submitted for analysis.
- Qualitative measures of benthic macroinvertebrate assemblages from dipnet samples are summarized in Tables 3 and 4 and in Appendix 10. The Control Site SCI score of 23 placed it in the "good" category, while the Test Site SCI score of 13 placed it in the "poor" category. The Control Site received more points for higher EPT taxa, higher Chironomid taxa, higher Florida Index taxa, and lower percent dominant taxa.

Summary

The effluent nitrate+nitrite concentration (1.3 mg/L) contributed to an increased concentration at the Test Site (1.1 mg/L) compared to the Control Site (0.84 mg/L). The AGP values measured for the Control Site (46.9 mg dry wt/L), Test Site (43.6 mg dry wt/L), and the effluent (57.5 mg dry wt/L) were all above the suggested "problem" threshold, indicating nutrient enrichment throughout Channel A. Qualitative benthic macroinvertebrate sampling reveals a shift towards a degraded community. These data indicate there is some nutrient enrichment occurring in this portion of Channel A, however the extent of the contribution from the River Oaks outfall cannot be fully determined from data collected for this survey.

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

Location	AGP (measured)	Predicted AGP (TSIN) ± 20%	Inorganic N:P ratio
Control (mg dry wt/L)	46.9	37.6 ± 7.5	5.5
Test (mg dry wt/L)	43.6	47.9 ± 9.6	7.0
Effluent (mg dry wt/L)	57.5	51.4 ± 10.3	5.0

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Table 3. Macroinvertebrate Dipnet Samples - Qualitative

River Oaks WWTP	Control Site	Test Site
Stream Condition Index (value)	23	13
Stream Condition Index (word)	Good	Poor
Stream Condition Index Metrics		
Florida Index	7	1
Number of EPT Taxa	3	1
Number of Taxa	24	16
Number of Chironomid Taxa	5	2
Percent Dominant Taxon	19.2	31.0
Percent Dipterans	17.0	13.0
Percent Suspension Feeders and Filterers	1.6	1.0
Total Number of Individuals	94	100
Community Composition: Percent of total		
Dominant Taxon (name)	*Palaemonetes* sp.	*Hyalella azteca*
Amphipoda	5.3	31.0
Decapoda	19.2	11.0
Diptera	17.0	13.0
Ephemeroptera	2.1	1.0
Gastropoda	21.3	28.0
Odonata	12.8	1.0
Oligochaeta	19.2	13.0
Trichoptera	1.1	0.0
Other	2.1	2.0
Functional Feeding Groups: Percent of total		
Browser/grazer	9.6	5.5
Burrowing Deposit Feeders	19.2	13.0
Predators	23.9	2.0
Surface Deposit Feeders	8.0	22.5
Suspension Feeders and Filterers	1.6	1.0
Scavengers	9.6	5.5
Scrapers	22.9	28.5
Shredders	5.3	22.0

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Table 4. Stream Condition Index Metrics: Peninsula, Summer Index

River Oaks WWTP: Control Site

Table 6. Stream Condition Index Metrics: Peninsula, Summer Index					
Metric:	Value	5	3	1	Score
Total Number of Taxa	24	≥26	25-14	<14	3
Number of EPT Taxa	3	≥4	3-2	<2	3
Number of Chironomid Taxa	5	≥7	6-4	<4	3
Percent Contribution of Dominant Taxon	19.2	≤29	30-64	>64	5
Percent Diptera	17	-	≤37	>37	3
Florida Index	7	≥7	6-4	<4	5
Percent Suspension Feeders and Filterers	1.6	-	≥7	<7	1
Total Score					23
Interpretation of Scores		Excellent			26-31
		Good			20-25
		Poor			13-19
		Very Poor			7-12

River Oaks WWTP: Test Site

Table 6. Stream Condition Index Metrics: Peninsula, Summer Index					
Metric:	Value	5	3	1	Score
Total Number of Taxa	16	≥26	25-14	<14	3
Number of EPT Taxa	1	≥4	3-2	<2	1
Number of Chironomid Taxa	2	≥7	6-4	<4	1
Percent Contribution of Dominant Taxon	31	≤29	30-64	>64	3
Percent Diptera	13	-	≤37	>37	3
Florida Index	1	≥7	6-4	<4	1
Percent Suspension Feeders and Filterers	1	-	≥7	<7	1
Total Score					13
Interpretation of Scores		Excellent			26-31
		Good			20-25
		Poor			13-19
		Very Poor			7-12

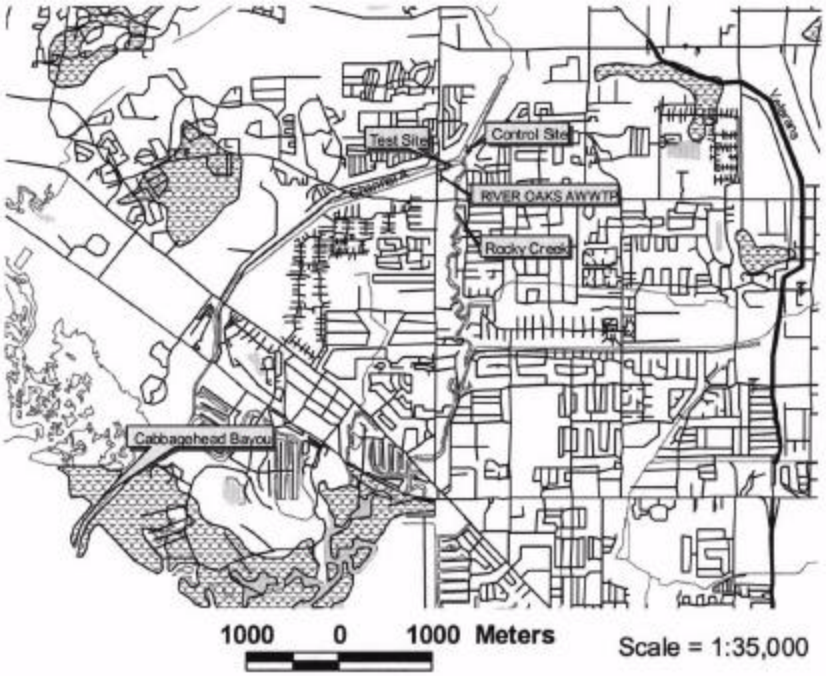
Appendices

- Appendix 1. Map of facility
- Appendix 2. Facility summary
- Appendix 3. Methods
- 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. Dipnet samples: macroinvertebrate counts and taxa lists

Appendix 1

Map of Facility

River Oaks AWWTP







SW District - Hillsborough County

Scale = 1:5,000

Fifth Year Inspection Program
FDEP- Bureau of Laboratories
Created by: Julie Riley
Created on: February 28, 2003

Appendix 2

Facility Summary

I. FYI-5 FACILITY SUMMARY SHEET

Facility name: River Oaks WWTP Date of Summary: 9/16/02

Location: See Page 3 of email County: Hillsborough District: SWD

NPDES Permit: FL0027821 Facility Type: Domestic Waste

State expiration date: 07/07/2003

Function of facility: Treatment and disposal of domestic wastewater

Description of treatment process: This is a 10.0 mgd activated sludge process designed to meet AWT standards for the discharge and public-access reuse standards for reclaimed water production. The process consists of flow equalization, preliminary screening, grit removal and primary clarification followed by aeration and clarification. The process then flows through denitrification tanks and clarification followed by filtration and chlorination. Flows reaching surface waters are first re-aerated and dechlorinated.

Receiving waters: Channel A to Rocky Creek to Old Tampa Bay or Channel A to Cabbage Head Bayou to Old Tampa Bay (see page 3 for more discussion).

Classification of water: III Freshwater

Design Flow: 10 mgd Mean Flow (12 month average): approx. 5.0 mgd Flow during survey:
Permitted – 10.0 mgd

Discharge is: Intermittent.

If facility has a mixing zone proved details (size and parameters): No mixing zone

List effluent limits (add or remove rows and columns):

Parameter	Minimum	Maximum
Flow		10 mgd
CBOD		5 mg/L – annual avg.
TSS		5 mg/L – annual avg.
pH	6.0 su	8.5 su
Fecal Coliform		25 CFUs/100ml
TRC - disinfection	1.0 mg/L	
TRC – dechlorination		0.01 mg/L
TN		3 mg/L – annual avg.
TP		1 mg/L – annual avg.
DO	5.0 mg/L	
Chronic Toxicity	NOEC =100%	

Describe special permit conditions and permit modifications:
The facility can send reclaimed water into an Aquifer Storage and Recovery well

Description of permitted outfall(s):
D001 – a 10.0 mgd outfall to Channel "A"
D002 – a 5.0 mgd outfall to Channel "A" that is shared with the Northwest Regional AWWTP

List permit violations (from DMR data or other sources) and plant upsets that occurred within past year:
This facility generally maintains compliance with the effluent limits imposed by the permit. There have been a number of short-term excursions of the total residual chlorine minimum limit for disinfection due to the swings back and forth through break-point chlorination. It is somewhat of an artifact of adding ammonia to inhibit the formation of chlorination by-products.

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Describe previous impact bioassessments, WQBELs, and previous or current enforcement actions:
Impact Bioassessment Inspection (IBI) was conducted 03/04/96. The Stream Condition Index (SCI) score placed the reference site and one of the test sites in the "excellent" category and the second test site in the "poor" category". Phytoplankton communities in Channel A were characterized by low algal density and very low biomass indicating that no nuisance algal blooms were occurring. However, the decreases in taxa richness and diversity observed between the reference site and the two test sites suggest a moderate disturbance.

Discuss comparability of DMR results to past DEP sampling results and whether there are trends (improving, declining) in the data set. If ambient monitoring is required by permit then discuss results:

Additional information : None

Staff contributing to this review:

Biologist: Andrea Grainger/Cindy Hodgman

Inspector: Joe Squitieri

II. RIVER OAKS WWTP TEST AND CONTROL SITE COMPARABILITY

The table below shows the physical and chemical comparability between the test and control sites on September 16, 2002.

Parameter	Control Site			Test Site		
	Top	Mid	Bottom	Top	Mid	Bottom
Depth (m)	0.1		0.6	0.1		0.6
Dissolved oxygen (mg/L)	5.23		2.92	5.23		4.87
Specific conductance (uS/cm)	237		239	239		244
Temperature (°C)	29.01		28.46	29.40		28.99
pH (SU)	6.48		6.51	6.70		6.67
Latitude/longitude	28° 1' 48.6" / 82° 34' 49.0"			28° 1' 45.8" / 82° 34' 51.2"		
Least wide riparian side	3m			3 m		
Artificially channelized	Yes, severe			Yes, severe		
Artificially impounded	Yes			Yes		
High water mark	0.3 m			0.3		
Canopy cover %	Open			Open		
Sediment odor	Chemical			Chemical		
Sediment oils	None			None		
Sediment deposition	Sand smothering moderate, silt is slight			sand and silt smothering slight		
System type	4th order			4th order		
Water odors	Chemical			Chemical		
Water surface oils	None			None		
Clarity	Turbid			Turbid		
Color	Tannic			Tannic		
Periphyton	Common			Common		
Fish	Common			Common		
Aquatic macrophytes	Common			Common		
Iron/sulfur bacteria	None			None		

The following vegetation was present at the test site at the time of HD deployment:

1. Submerged vegetation: *Ceratophyllum* spp (dominant), *Hydrilla* spp. (dominant) and *Nuphar* spp.
2. Floating vegetation: *Salvinia rotundifolia* (dominant), *Pistia stratiotes*, *Azolla carolinana* and *Lemna* spp.
3. Lower bank vegetation: *Ludwigia peruviana*

The following vegetation was present at the control site at the time of HD deployment:

1. Submerged vegetation: *Ceratophyllum* spp (dominant), *Hydrilla* spp. (dominant) and *Nuphar* spp.
4. Floating vegetation: *Salvinia rotundifolia* (dominant) and *Lemna* spp.
5. Lower bank vegetation: *Ludwigia peruviana*

There is a narrow shelf on each side of the bank that we can wade in but there is a precipitous drop within 2 meters. HDs were placed along shelves.

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 a control site and a test site. A habitat assessment was performed *in situ* to compare biological conditions at the control and test 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.

The effluent was analyzed for nutrients, metals, organic constituents (base, neutral, and acid extractables) and pesticides. The results from these analyses were compared with Water Quality Limits (62-302 F.A.C.) 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, *Pseudokirchneriella subcapitata* (formerly *Selenastrum capricornutum*, USEPA 2002), 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 the test site 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.

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). 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 analysis of effluent and receiving water

Date Sampled	Site Location	Analysis Group	Component	Result	Units	Remark	MDL	PQL
10/14/2002	CONTROL SITE	Bio-Invertebrates	Macroinvert-FW-Qual-Dipnetx20-# Taxa	26	# Taxa			
10/14/2002 13:40	CONTROL SITE	Bio-AGP/LimNut	Algal Growth Potential	46.9	mg DryWt/L		0.1	0.3
10/14/2002 13:40	CONTROL SITE	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	110	ug/L		1.9	5.8
10/14/2002 13:40	CONTROL SITE	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	0	ug/L		1.9	5.8
10/14/2002 13:40	CONTROL SITE	Nutrients-Liquid	Ammonia-N	0.15	mg N/L		0.05	0.1
10/14/2002 13:40	CONTROL SITE	Nutrients-Liquid	NO2NO3-N	0.84	mg N/L		0.004	0.01
10/14/2002 13:40	CONTROL SITE	Nutrients-Liquid	N_KJEL_TOT	1.6	mg N/L		0.12	0.4
10/14/2002 13:40	CONTROL SITE	Nutrients-Liquid	O-Phosphate-P	0.18	mg P/L		0.008	0.02
10/14/2002 13:40	CONTROL SITE	Nutrients-Liquid	Total-P	0.31	mg P/L		0.015	0.04
10/14/2002 10:10	FIELD BLANK	BNA-Water	1,2,4,5-Tetrachlorobenzene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	1,2,4-Trichlorobenzene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	1,2-Dichlorobenzene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	1,3,5-Trinitrobenzene	3.8	ug/L	U	3.8	15
10/14/2002 10:10	FIELD BLANK	BNA-Water	1,3-Dichlorobenzene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	1,3-Dinitrobenzene	1.9	ug/L	U	1.9	7.6
10/14/2002 10:10	FIELD BLANK	BNA-Water	1,4-Dichlorobenzene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	1,4-Naphthoquinone	19	ug/L	U	19	76
10/14/2002 10:10	FIELD BLANK	BNA-Water	1-Naphthylamine	9.5	ug/L	U	9.5	38
10/14/2002 10:10	FIELD BLANK	BNA-Water	2,3,4,6-Tetrachlorophenol	1.9	ug/L	U	1.9	7.6
10/14/2002 10:10	FIELD BLANK	BNA-Water	2,4,5-Trichlorophenol	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	2,4,6-Trichlorophenol	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	2,4-Dichlorophenol	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	2,4-Dimethylphenol	48	ug/L	U	48	190
10/14/2002 10:10	FIELD BLANK	BNA-Water	2,4-Dinitrophenol	14	ug/L	U	14	57
10/14/2002 10:10	FIELD BLANK	BNA-Water	2,4-Dinitrotoluene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	2,6-Dichlorophenol	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	2,6-Dinitrotoluene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	2-Acetylaminofluorene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	2-Chloronaphthalene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	2-Chlorophenol	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	2-Methyl-4,6-dinitrophenol	2.9	ug/L	U	2.9	11
10/14/2002 10:10	FIELD BLANK	BNA-Water	2-Methylnaphthalene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	2-Naphthylamine	9.5	ug/L	U	9.5	38
10/14/2002 10:10	FIELD BLANK	BNA-Water	2-Nitroaniline	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	2-Nitrophenol	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	2-Picoline	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	3,3'-Dichlorobenzidine	38	ug/L	U	38	150
10/14/2002 10:10	FIELD BLANK	BNA-Water	3,3'-Dimethylbenzidine	19	ug/L	UJ	19	76
10/14/2002 10:10	FIELD BLANK	BNA-Water	3-Methylcholanthrene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	3-Nitroaniline	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	4,4'-DDD	1.4	ug/L	U	1.4	5.7
10/14/2002 10:10	FIELD BLANK	BNA-Water	4,4'-DDE	1.4	ug/L	U	1.4	5.7
10/14/2002 10:10	FIELD BLANK	BNA-Water	4,4'-DDT	1.4	ug/L	U	1.4	5.7
10/14/2002 10:10	FIELD BLANK	BNA-Water	4-Aminobiphenyl	3.8	ug/L	U	3.8	15
10/14/2002 10:10	FIELD BLANK	BNA-Water	4-Bromophenyl phenyl ether	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	4-Chloro-3-methylphenol	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	4-Chloroaniline	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	4-Chlorophenyl phenyl ether	1.9	ug/L	U	1.9	7.6
10/14/2002 10:10	FIELD BLANK	BNA-Water	4-Nitroaniline	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	4-Nitrophenol	14	ug/L	U	14	57
10/14/2002 10:10	FIELD BLANK	BNA-Water	5-Nitro-o-toluidine	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	7,12-Dimethylbenz(a)anthracene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Acenaphthene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Acenaphthylene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Acetophenone	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Aldrin	1.4	ug/L	U	1.4	5.7
10/14/2002 10:10	FIELD BLANK	BNA-Water	Aniline	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Anthracene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Azobenzene/1,2-Diphenylhydrazine	0.95	ug/L	U	0.95	3.8

Appendix 4 - Continued

Date Sampled	Site Location	Analysis Group	Component	Result	Units	Remark	MDL	PQL
10/14/2002 10:10	FIELD BLANK	BNA-Water	Benzidine	95	ug/L	U	95	380
10/14/2002 10:10	FIELD BLANK	BNA-Water	Benzo(a)anthracene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Benzo(a)pyrene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Benzo(b)fluoranthene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Benzo(g,h,i)perylene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Benzo(k)fluoranthene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Benzyl alcohol	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Bis(2-chloroethoxy)methane	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Bis(2-chloroethyl)ether	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Bis(2-chloroisopropyl)ether	2.9	ug/L	U	2.9	11
10/14/2002 10:10	FIELD BLANK	BNA-Water	Bis(2-ethylhexyl)phthalate	14	ug/L	U	14	57
10/14/2002 10:10	FIELD BLANK	BNA-Water	Butyl benzyl phthalate	4.8	ug/L	U	4.8	19
10/14/2002 10:10	FIELD BLANK	BNA-Water	Chrysene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Di-n-butyl phthalate	4.8	ug/L	U	4.8	19
10/14/2002 10:10	FIELD BLANK	BNA-Water	Di-n-octyl phthalate	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Dibenzo(a,h)anthracene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Dibenzofuran	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Dieldrin	1.4	ug/L	U	1.4	5.7
10/14/2002 10:10	FIELD BLANK	BNA-Water	Diethyl phthalate	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Dimethyl phthalate	48	ug/L	U	48	190
10/14/2002 10:10	FIELD BLANK	BNA-Water	Dimethylaminoazobenzene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Dinoseb	3.8	ug/L	U	3.8	15
10/14/2002 10:10	FIELD BLANK	BNA-Water	Diphenylamine	2.9	ug/L	U	2.9	11
10/14/2002 10:10	FIELD BLANK	BNA-Water	Endosulfan I	3.8	ug/L	U	3.8	15
10/14/2002 10:10	FIELD BLANK	BNA-Water	Endosulfan II	3.8	ug/L	U	3.8	15
10/14/2002 10:10	FIELD BLANK	BNA-Water	Endosulfan sulfate	1.4	ug/L	U	1.4	5.7
10/14/2002 10:10	FIELD BLANK	BNA-Water	Endrin	1.4	ug/L	U	1.4	5.7
10/14/2002 10:10	FIELD BLANK	BNA-Water	Endrin aldehyde	3.8	ug/L	U	3.8	15
10/14/2002 10:10	FIELD BLANK	BNA-Water	Ethyl methanesulfonate	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Fluoranthene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Fluorene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Heptachlor	1.4	ug/L	U	1.4	5.7
10/14/2002 10:10	FIELD BLANK	BNA-Water	Heptachlor epoxide	1.4	ug/L	U	1.4	5.7
10/14/2002 10:10	FIELD BLANK	BNA-Water	Hexachlorobenzene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Hexachlorobutadiene	2.9	ug/L	U	2.9	11
10/14/2002 10:10	FIELD BLANK	BNA-Water	Hexachlorocyclopentadiene	2.9	ug/L	U	2.9	11
10/14/2002 10:10	FIELD BLANK	BNA-Water	Hexachloroethane	2.9	ug/L	U	2.9	11
10/14/2002 10:10	FIELD BLANK	BNA-Water	Hexachloropropene	1.9	ug/L	U	1.9	7.6
10/14/2002 10:10	FIELD BLANK	BNA-Water	Indeno(1,2,3-cd)pyrene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Isophorone	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Isosafrole	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Methapyrilene	3.8	ug/L	U	3.8	15
10/14/2002 10:10	FIELD BLANK	BNA-Water	Methyl methanesulfonate	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	N-Nitrosodi-n-butylamine	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	N-Nitrosodi-n-propylamine	1.9	ug/L	U	1.9	7.6
10/14/2002 10:10	FIELD BLANK	BNA-Water	N-Nitrosodiethylamine	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	N-Nitrosodimethylamine	1.9	ug/L	U	1.9	7.6
10/14/2002 10:10	FIELD BLANK	BNA-Water	N-Nitrosodiphenylamine	2.9	ug/L	U	2.9	11
10/14/2002 10:10	FIELD BLANK	BNA-Water	N-Nitrosomethylethylamine	1.9	ug/L	U	1.9	7.6
10/14/2002 10:10	FIELD BLANK	BNA-Water	N-Nitrosomorpholine	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	N-Nitrosopiperidine	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	N-Nitrosopyrrolidine	1.9	ug/L	U	1.9	7.6
10/14/2002 10:10	FIELD BLANK	BNA-Water	Naphthalene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Nitrobenzene	1.9	ug/L	U	1.9	7.6
10/14/2002 10:10	FIELD BLANK	BNA-Water	Nitroquinoline-1-oxide	19	ug/L	U	19	76
10/14/2002 10:10	FIELD BLANK	BNA-Water	Pentachlorobenzene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Pentachloroethane	48	ug/L	U	48	190
10/14/2002 10:10	FIELD BLANK	BNA-Water	Pentachloronitrobenzene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Pentachlorophenol	2.9	ug/L	U	2.9	11

Appendix 4 - Continued

Date Sampled	Site Location	Analysis Group	Component	Result	Units	Remark	MDL	PQL
10/14/2002 10:10	FIELD BLANK	BNA-Water	Phenacetin	3.8	ug/L	U	3.8	11
10/14/2002 10:10	FIELD BLANK	BNA-Water	Phenanthrene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Phenol	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Pyrene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	Pyridine	3.8	ug/L	U	3.8	15
10/14/2002 10:10	FIELD BLANK	BNA-Water	Safrole	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	BNA-Water	alpha-BHC	1.4	ug/L	U	1.4	5.7
10/14/2002 10:10	FIELD BLANK	BNA-Water	beta-BHC	1.4	ug/L	U	1.4	5.7
10/14/2002 10:10	FIELD BLANK	BNA-Water	delta-BHC	1.4	ug/L	U	1.4	5.7
10/14/2002 10:10	FIELD BLANK	BNA-Water	gamma-BHC	1.4	ug/L	U	1.4	5.7
10/14/2002 10:10	FIELD BLANK	BNA-Water	m,p-Cresols	1.9	ug/L	U	1.9	7.6
10/14/2002 10:10	FIELD BLANK	BNA-Water	o-Cresol	1.9	ug/L	U	1.9	7.6
10/14/2002 10:10	FIELD BLANK	BNA-Water	o-Toluidine	0.95	ug/L	U	0.95	3.8
10/14/2002 10:10	FIELD BLANK	Bio-AGP/LimNut	Algal Growth Potential	0.245	mg DryWt/L	I	0.1	0.3
10/14/2002 10:10	FIELD BLANK	GC-Water	Alachlor	0.57	ug/L	U	0.57	2.28
10/14/2002 10:10	FIELD BLANK	GC-Water	Ametryn	0.048	ug/L	U	0.048	0.192
10/14/2002 10:10	FIELD BLANK	GC-Water	Atrazine	0.048	ug/L	U	0.048	0.192
10/14/2002 10:10	FIELD BLANK	GC-Water	Azinphos Methyl	0.048	ug/L	U	0.048	0.192
10/14/2002 10:10	FIELD BLANK	GC-Water	Bromacil	0.19	ug/L	U	0.19	0.76
10/14/2002 10:10	FIELD BLANK	GC-Water	Butylate	0.19	ug/L	U	0.19	0.76
10/14/2002 10:10	FIELD BLANK	GC-Water	Chlorpyrifos Ethyl	0.048	ug/L	U	0.048	0.192
10/14/2002 10:10	FIELD BLANK	GC-Water	Chlorpyrifos Methyl	0.095	ug/L	U	0.095	0.38
10/14/2002 10:10	FIELD BLANK	GC-Water	Diazinon	0.048	ug/L	U	0.048	0.192
10/14/2002 10:10	FIELD BLANK	GC-Water	Ethion	0.048	ug/L	U	0.048	0.192
10/14/2002 10:10	FIELD BLANK	GC-Water	Ethoprop	0.095	ug/L	U	0.095	0.38
10/14/2002 10:10	FIELD BLANK	GC-Water	Fenamiphos	0.19	ug/L	U	0.19	0.76
10/14/2002 10:10	FIELD BLANK	GC-Water	Fonofos	0.095	ug/L	U	0.095	0.38
10/14/2002 10:10	FIELD BLANK	GC-Water	Hexazinone	0.095	ug/L	U	0.095	0.38
10/14/2002 10:10	FIELD BLANK	GC-Water	Malathion	0.14	ug/L	U	0.14	0.56
10/14/2002 10:10	FIELD BLANK	GC-Water	Metalaxyl	0.24	ug/L	U	0.24	0.96
10/14/2002 10:10	FIELD BLANK	GC-Water	Metolachlor	0.48	ug/L	U	0.48	1.92
10/14/2002 10:10	FIELD BLANK	GC-Water	Metribuzin	0.095	ug/L	U	0.095	0.38
10/14/2002 10:10	FIELD BLANK	GC-Water	Mevinphos	0.19	ug/L	U	0.19	0.76
10/14/2002 10:10	FIELD BLANK	GC-Water	Naled	0.76	ug/L	U	0.76	3.04
10/14/2002 10:10	FIELD BLANK	GC-Water	Norflurazon	0.095	ug/L	U	0.095	0.38
10/14/2002 10:10	FIELD BLANK	GC-Water	Parathion Ethyl	0.14	ug/L	U	0.14	0.56
10/14/2002 10:10	FIELD BLANK	GC-Water	Parathion Methyl	0.095	ug/L	U	0.095	0.38
10/14/2002 10:10	FIELD BLANK	GC-Water	Phorate	0.048	ug/L	U	0.048	0.192
10/14/2002 10:10	FIELD BLANK	GC-Water	Prometryn	0.14	ug/L	U	0.14	0.56
10/14/2002 10:10	FIELD BLANK	GC-Water	Simazine	0.048	ug/L	U	0.048	0.192
10/14/2002 10:10	FIELD BLANK	Metals-Water	Aluminum	10	ug/L	U	10	40
10/14/2002 10:10	FIELD BLANK	Metals-Water	Arsenic	3	ug/L	U	3	12
10/14/2002 10:10	FIELD BLANK	Metals-Water	Cadmium	0.025	ug/L	U	0.025	0.1
10/14/2002 10:10	FIELD BLANK	Metals-Water	Calcium	0.04	mg/L	U	0.04	0.12
10/14/2002 10:10	FIELD BLANK	Metals-Water	Chromium	2	ug/L	U	2	8
10/14/2002 10:10	FIELD BLANK	Metals-Water	Copper	1.5	ug/L	U	0.75	3
10/14/2002 10:10	FIELD BLANK	Metals-Water	Iron	7	ug/L	U	7	28
10/14/2002 10:10	FIELD BLANK	Metals-Water	Lead	0.1	ug/L	U	0.1	0.4
10/14/2002 10:10	FIELD BLANK	Metals-Water	Magnesium	0.01	mg/L	U	0.01	0.04
10/14/2002 10:10	FIELD BLANK	Metals-Water	Nickel	2	ug/L	U	2	8
10/14/2002 10:10	FIELD BLANK	Metals-Water	Selenium	1	ug/L	U	1	4
10/14/2002 10:10	FIELD BLANK	Metals-Water	Silver	0.02	ug/L	U	0.02	0.08
10/14/2002 10:10	FIELD BLANK	Metals-Water	Zinc	2	ug/L	U	2	8
10/14/2002 10:10	FIELD BLANK	Nutrients-Liquid	Ammonia-N	0.018	mg N/L	I	0.01	0.02
10/14/2002 10:10	FIELD BLANK	Nutrients-Liquid	NO2NO3-N	0.004	mg N/L	U	0.004	0.01
10/14/2002 10:10	FIELD BLANK	Nutrients-Liquid	N_KJEL_TOT	0.06	mg N/L	U	0.06	0.2
10/14/2002 10:10	FIELD BLANK	Nutrients-Liquid	O-Phosphate-P	0.004	mg P/L	U	0.004	0.01
10/14/2002 10:10	FIELD BLANK	Nutrients-Liquid	Total-P	0.015	mg P/L	U	0.015	0.04
10/14/2002 10:20	OUTFALL	BNA-Water	1,2,4,5-Tetrachlorobenzene	0.95	ug/L	U	0.95	3.8

Appendix 4 - Continued

Date Sampled	Site Location	Analysis Group	Component	Result	Units	Remark	MDL	PQL
10/14/2002 10:20	OUTFALL	BNA-Water	1,2,4-Trichlorobenzene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	1,2-Dichlorobenzene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	1,3,5-Trinitrobenzene	3.8	ug/L	U	3.8	15
10/14/2002 10:20	OUTFALL	BNA-Water	1,3-Dichlorobenzene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	1,3-Dinitrobenzene	1.9	ug/L	U	1.9	7.6
10/14/2002 10:20	OUTFALL	BNA-Water	1,4-Dichlorobenzene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	1,4-Naphthoquinone	19	ug/L	U	19	76
10/14/2002 10:20	OUTFALL	BNA-Water	1-Naphthylamine	9.5	ug/L	U	9.5	38
10/14/2002 10:20	OUTFALL	BNA-Water	2,3,4,6-Tetrachlorophenol	1.9	ug/L	U	1.9	7.6
10/14/2002 10:20	OUTFALL	BNA-Water	2,4,5-Trichlorophenol	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	2,4,6-Trichlorophenol	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	2,4-Dichlorophenol	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	2,4-Dimethylphenol	48	ug/L	U	48	190
10/14/2002 10:20	OUTFALL	BNA-Water	2,4-Dinitrophenol	14	ug/L	U	14	57
10/14/2002 10:20	OUTFALL	BNA-Water	2,4-Dinitrotoluene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	2,6-Dichlorophenol	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	2,6-Dinitrotoluene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	2-Acetylaminofluorene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	2-Chloronaphthalene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	2-Chlorophenol	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	2-Methyl-4,6-dinitrophenol	2.9	ug/L	U	2.9	11
10/14/2002 10:20	OUTFALL	BNA-Water	2-Methylnaphthalene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	2-Naphthylamine	9.5	ug/L	U	9.5	38
10/14/2002 10:20	OUTFALL	BNA-Water	2-Nitroaniline	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	2-Nitrophenol	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	2-Picoline	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	3,3'-Dichlorobenzidine	38	ug/L	U	38	150
10/14/2002 10:20	OUTFALL	BNA-Water	3,3'-Dimethylbenzidine	19	ug/L	UJ	19	76
10/14/2002 10:20	OUTFALL	BNA-Water	3-Methylcholanthrene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	3-Nitroaniline	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	4,4'-DDD	1.4	ug/L	U	1.4	5.7
10/14/2002 10:20	OUTFALL	BNA-Water	4,4'-DDE	1.4	ug/L	U	1.4	5.7
10/14/2002 10:20	OUTFALL	BNA-Water	4,4'-DDT	1.4	ug/L	U	1.4	5.7
10/14/2002 10:20	OUTFALL	BNA-Water	4-Aminobiphenyl	3.8	ug/L	U	3.8	15
10/14/2002 10:20	OUTFALL	BNA-Water	4-Bromophenyl phenyl ether	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	4-Chloro-3-methylphenol	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	4-Chloroaniline	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	4-Chlorophenyl phenyl ether	1.9	ug/L	U	1.9	7.6
10/14/2002 10:20	OUTFALL	BNA-Water	4-Nitroaniline	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	4-Nitrophenol	14	ug/L	U	14	57
10/14/2002 10:20	OUTFALL	BNA-Water	5-Nitro-o-toluidine	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	7,12-Dimethylbenz(a)anthracene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Acenaphthene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Acenaphthylene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Acetophenone	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Aldrin	1.4	ug/L	U	1.4	5.7
10/14/2002 10:20	OUTFALL	BNA-Water	Aniline	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Anthracene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Azobenzene/1,2-Diphenylhydrazine	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Benzidine	95	ug/L	U	95	380
10/14/2002 10:20	OUTFALL	BNA-Water	Benzo(a)anthracene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Benzo(a)pyrene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Benzo(b)fluoranthene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Benzo(g,h,i)perylene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Benzo(k)fluoranthene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Benzyl alcohol	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Bis(2-chloroethoxy)methane	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Bis(2-chloroethyl)ether	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Bis(2-chloroisopropyl)ether	2.9	ug/L	U	2.9	11

Appendix 4 - Continued

Date Sampled	Site Location	Analysis Group	Component	Result	Units	Remark	MDL	PQL
10/14/2002 10:20	OUTFALL	BNA-Water	Bis(2-ethylhexyl)phthalate	14	ug/L	U	14	57
10/14/2002 10:20	OUTFALL	BNA-Water	Butyl benzyl phthalate	4.8	ug/L	U	4.8	19
10/14/2002 10:20	OUTFALL	BNA-Water	Chrysene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Di-n-butyl phthalate	4.8	ug/L	U	4.8	19
10/14/2002 10:20	OUTFALL	BNA-Water	Di-n-octyl phthalate	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Dibenzo(a,h)anthracene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Dibenzofuran	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Dieldrin	1.4	ug/L	U	1.4	5.7
10/14/2002 10:20	OUTFALL	BNA-Water	Diethyl phthalate	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Dimethyl phthalate	48	ug/L	U	48	190
10/14/2002 10:20	OUTFALL	BNA-Water	Dimethylaminoazobenzene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Dinoseb	3.8	ug/L	U	3.8	15
10/14/2002 10:20	OUTFALL	BNA-Water	Diphenylamine	2.9	ug/L	U	2.9	11
10/14/2002 10:20	OUTFALL	BNA-Water	Endosulfan I	3.8	ug/L	U	3.8	15
10/14/2002 10:20	OUTFALL	BNA-Water	Endosulfan II	3.8	ug/L	U	3.8	15
10/14/2002 10:20	OUTFALL	BNA-Water	Endosulfan sulfate	1.4	ug/L	U	1.4	5.7
10/14/2002 10:20	OUTFALL	BNA-Water	Endrin	1.4	ug/L	U	1.4	5.7
10/14/2002 10:20	OUTFALL	BNA-Water	Endrin aldehyde	3.8	ug/L	U	3.8	15
10/14/2002 10:20	OUTFALL	BNA-Water	Ethyl methanesulfonate	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Fluoranthene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Fluorene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Heptachlor	1.4	ug/L	U	1.4	5.7
10/14/2002 10:20	OUTFALL	BNA-Water	Heptachlor epoxide	1.4	ug/L	U	1.4	5.7
10/14/2002 10:20	OUTFALL	BNA-Water	Hexachlorobenzene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Hexachlorobutadiene	2.9	ug/L	U	2.9	11
10/14/2002 10:20	OUTFALL	BNA-Water	Hexachlorocyclopentadiene	2.9	ug/L	U	2.9	11
10/14/2002 10:20	OUTFALL	BNA-Water	Hexachloroethane	2.9	ug/L	U	2.9	11
10/14/2002 10:20	OUTFALL	BNA-Water	Hexachloropropene	1.9	ug/L	U	1.9	7.6
10/14/2002 10:20	OUTFALL	BNA-Water	Indeno(1,2,3-cd)pyrene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Isophorone	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Isosafrole	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Methapyrilene	3.8	ug/L	U	3.8	15
10/14/2002 10:20	OUTFALL	BNA-Water	Methyl methanesulfonate	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	N-Nitrosodi-n-butylamine	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	N-Nitrosodi-n-propylamine	1.9	ug/L	U	1.9	7.6
10/14/2002 10:20	OUTFALL	BNA-Water	N-Nitrosodiethylamine	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	N-Nitrosodimethylamine	1.9	ug/L	U	1.9	7.6
10/14/2002 10:20	OUTFALL	BNA-Water	N-Nitrosodiphenylamine	2.9	ug/L	U	2.9	11
10/14/2002 10:20	OUTFALL	BNA-Water	N-Nitrosomethylethylamine	1.9	ug/L	U	1.9	7.6
10/14/2002 10:20	OUTFALL	BNA-Water	N-Nitrosomorpholine	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	N-Nitrosopiperidine	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	N-Nitrosopyrrolidine	1.9	ug/L	U	1.9	7.6
10/14/2002 10:20	OUTFALL	BNA-Water	Naphthalene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Nitrobenzene	1.9	ug/L	U	1.9	7.6
10/14/2002 10:20	OUTFALL	BNA-Water	Nitroquinoline-1-oxide	19	ug/L	U	19	76
10/14/2002 10:20	OUTFALL	BNA-Water	Pentachlorobenzene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Pentachloroethane	48	ug/L	U	48	190
10/14/2002 10:20	OUTFALL	BNA-Water	Pentachloronitrobenzene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Pentachlorophenol	2.9	ug/L	U	2.9	11
10/14/2002 10:20	OUTFALL	BNA-Water	Phenacetin	3.8	ug/L	U	3.8	11
10/14/2002 10:20	OUTFALL	BNA-Water	Phenanthrene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Phenol	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Pyrene	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	Pyridine	3.8	ug/L	U	3.8	15
10/14/2002 10:20	OUTFALL	BNA-Water	Safrole	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	BNA-Water	alpha-BHC	1.4	ug/L	U	1.4	5.7
10/14/2002 10:20	OUTFALL	BNA-Water	beta-BHC	1.4	ug/L	U	1.4	5.7
10/14/2002 10:20	OUTFALL	BNA-Water	delta-BHC	1.4	ug/L	U	1.4	5.7
10/14/2002 10:20	OUTFALL	BNA-Water	gamma-BHC	1.4	ug/L	U	1.4	5.7

Appendix 4 - Continued

Date Sampled	Site Location	Analysis Group	Component	Result	Units	Remark	MDL	PQL
10/14/2002 10:20	OUTFALL	BNA-Water	m,p-Cresols	1.9	ug/L	U	1.9	7.6
10/14/2002 10:20	OUTFALL	BNA-Water	o-Cresol	1.9	ug/L	U	1.9	7.6
10/14/2002 10:20	OUTFALL	BNA-Water	o-Toluidine	0.95	ug/L	U	0.95	3.8
10/14/2002 10:20	OUTFALL	Bio-AGP/LimNut	Algal Growth Potential	57.45	mg DryWt/L	A	0.1	0.3
10/14/2002 10:20	OUTFALL	Bio-Toxicology	Bioassay-Acute-Screen-FW-C.dubia, LC50	100	LC50	L		
10/14/2002 10:20	OUTFALL	Bio-Toxicology	Bioassay-Acute-Screen-FW-Fish, LC50	100	LC50	L		
10/14/2002 10:20	OUTFALL	GC-Water	Alachlor	0.57	ug/L	U	0.57	2.28
10/14/2002 10:20	OUTFALL	GC-Water	Ametryn	0.048	ug/L	U	0.048	0.192
10/14/2002 10:20	OUTFALL	GC-Water	Atrazine	0.06	ug/L	I	0.048	0.192
10/14/2002 10:20	OUTFALL	GC-Water	Azinphos Methyl	0.048	ug/L	U	0.048	0.192
10/14/2002 10:20	OUTFALL	GC-Water	Bromacil	0.19	ug/L	U	0.19	0.76
10/14/2002 10:20	OUTFALL	GC-Water	Butylate	0.19	ug/L	U	0.19	0.76
10/14/2002 10:20	OUTFALL	GC-Water	Chlorpyrifos Ethyl	0.048	ug/L	U	0.048	0.192
10/14/2002 10:20	OUTFALL	GC-Water	Chlorpyrifos Methyl	0.095	ug/L	U	0.095	0.38
10/14/2002 10:20	OUTFALL	GC-Water	Diazinon	0.048	ug/L	U	0.048	0.192
10/14/2002 10:20	OUTFALL	GC-Water	Ethion	0.048	ug/L	U	0.048	0.192
10/14/2002 10:20	OUTFALL	GC-Water	Ethoprop	0.095	ug/L	U	0.095	0.38
10/14/2002 10:20	OUTFALL	GC-Water	Fenamiphos	0.19	ug/L	U	0.19	0.76
10/14/2002 10:20	OUTFALL	GC-Water	Fonofos	0.095	ug/L	U	0.095	0.38
10/14/2002 10:20	OUTFALL	GC-Water	Hexazinone	0.095	ug/L	U	0.095	0.38
10/14/2002 10:20	OUTFALL	GC-Water	Malathion	0.14	ug/L	U	0.14	0.56
10/14/2002 10:20	OUTFALL	GC-Water	Metalaxyl	0.24	ug/L	U	0.24	0.96
10/14/2002 10:20	OUTFALL	GC-Water	Metolachlor	0.48	ug/L	U	0.48	1.92
10/14/2002 10:20	OUTFALL	GC-Water	Metribuzin	0.095	ug/L	U	0.095	0.38
10/14/2002 10:20	OUTFALL	GC-Water	Mevinphos	0.19	ug/L	U	0.19	0.76
10/14/2002 10:20	OUTFALL	GC-Water	Naled	0.76	ug/L	U	0.76	3.04
10/14/2002 10:20	OUTFALL	GC-Water	Norflurazon	0.095	ug/L	U	0.095	0.38
10/14/2002 10:20	OUTFALL	GC-Water	Parathion Ethyl	0.14	ug/L	U	0.14	0.56
10/14/2002 10:20	OUTFALL	GC-Water	Parathion Methyl	0.095	ug/L	U	0.095	0.38
10/14/2002 10:20	OUTFALL	GC-Water	Phorate	0.048	ug/L	U	0.048	0.192
10/14/2002 10:20	OUTFALL	GC-Water	Prometryn	0.14	ug/L	U	0.14	0.56
10/14/2002 10:20	OUTFALL	GC-Water	Simazine	0.048	ug/L	U	0.048	0.192
10/14/2002 10:20	OUTFALL	Metals-Water	Aluminum	68	ug/L		10	40
10/14/2002 10:20	OUTFALL	Metals-Water	Arsenic	3	ug/L	U	3	12
10/14/2002 10:20	OUTFALL	Metals-Water	Cadmium	0.087	ug/L	I	0.025	0.1
10/14/2002 10:20	OUTFALL	Metals-Water	Calcium	69.3	mg/L		0.04	0.12
10/14/2002 10:20	OUTFALL	Metals-Water	Chromium	2	ug/L	U	2	8
10/14/2002 10:20	OUTFALL	Metals-Water	Copper	3.4	ug/L		0.75	3
10/14/2002 10:20	OUTFALL	Metals-Water	Iron	32	ug/L		7	28
10/14/2002 10:20	OUTFALL	Metals-Water	Lead	0.32	ug/L	I	0.1	0.4
10/14/2002 10:20	OUTFALL	Metals-Water	Magnesium	6.1	mg/L		0.01	0.04
10/14/2002 10:20	OUTFALL	Metals-Water	Nickel	2	ug/L	U	2	8
10/14/2002 10:20	OUTFALL	Metals-Water	Selenium	1	ug/L	U	1	4
10/14/2002 10:20	OUTFALL	Metals-Water	Silver	0.02	ug/L	U	0.02	0.08
10/14/2002 10:20	OUTFALL	Metals-Water	Zinc	34.8	ug/L		2	8
10/14/2002 10:20	OUTFALL	Nutrients-Liquid	Ammonia-N	0.053	mg N/L		0.01	0.02
10/14/2002 10:20	OUTFALL	Nutrients-Liquid	NO2NO3-N	1.3	mg N/L		0.02	0.05
10/14/2002 10:20	OUTFALL	Nutrients-Liquid	N_KJEL_TOT	0.97	mg N/L	A	0.12	0.4
10/14/2002 10:20	OUTFALL	Nutrients-Liquid	O-Phosphate-P	0.27	mg P/L		0.02	0.05
10/14/2002 10:20	OUTFALL	Nutrients-Liquid	Total-P	0.27	mg P/L	A	0.015	0.04
10/14/2002 12:40	RIVER OAKS	Metals-Water	Aluminum	87	ug/L		10	40
10/14/2002 12:40	RIVER OAKS	Metals-Water	Arsenic	3	ug/L	U	3	12
10/14/2002 12:40	RIVER OAKS	Metals-Water	Cadmium	0.025	ug/L	U	0.025	0.1
10/14/2002 12:40	RIVER OAKS	Metals-Water	Calcium	0.04	mg/L	U	0.04	0.12
10/14/2002 12:40	RIVER OAKS	Metals-Water	Chromium	2	ug/L	U	2	8
10/14/2002 12:40	RIVER OAKS	Metals-Water	Copper	0.93	ug/L	I	0.75	3
10/14/2002 12:40	RIVER OAKS	Metals-Water	Iron	38	ug/L		7	28
10/14/2002 12:40	RIVER OAKS	Metals-Water	Lead	0.1	ug/L	U	0.1	0.4
10/14/2002 12:40	RIVER OAKS	Metals-Water	Magnesium	0.01	mg/L	U	0.01	0.04

Appendix 4 - Continued

Date Sampled	Site Location	Analysis Group	Component	Result	Units	Remark	MDL	PQL
10/14/2002 12:40	RIVER OAKS	Metals-Water	Nickel	23.9	ug/L		2	8
10/14/2002 12:40	RIVER OAKS	Metals-Water	Selenium	1	ug/L	U	1	4
10/14/2002 12:40	RIVER OAKS	Metals-Water	Silver	0.02	ug/L	U	0.02	0.08
10/14/2002 12:40	RIVER OAKS	Metals-Water	Zinc	5	ug/L	U	2	8
10/14/2002 12:40	RIVER OAKS	Nutrients-Liquid	Ammonia-N	0.011	mg N/L	I	0.01	0.02
10/14/2002 12:40	RIVER OAKS	Nutrients-Liquid	NO2NO3-N	0.004	mg N/L	U	0.004	0.01
10/14/2002 12:40	RIVER OAKS	Nutrients-Liquid	N_KJEL_TOT	0.06	mg N/L	U	0.06	0.2
10/14/2002 12:40	RIVER OAKS	Nutrients-Liquid	Total-P	0.015	mg P/L	U	0.015	0.04
10/15/2002 12:50	RIVER OAKS	Metals-Water	Aluminum	125	ug/L	A	10	40
10/15/2002 12:50	RIVER OAKS	Metals-Water	Arsenic	3	ug/L	U	3	12
10/15/2002 12:50	RIVER OAKS	Metals-Water	Cadmium	0.08	ug/L	I	0.025	0.1
10/15/2002 12:50	RIVER OAKS	Metals-Water	Calcium	68.9	mg/L	A	0.04	0.12
10/15/2002 12:50	RIVER OAKS	Metals-Water	Chromium	2	ug/L	U	2	8
10/15/2002 12:50	RIVER OAKS	Metals-Water	Copper	3	ug/L	A	0.75	3
10/15/2002 12:50	RIVER OAKS	Metals-Water	Iron	36	ug/L	A	7	28
10/15/2002 12:50	RIVER OAKS	Metals-Water	Lead	0.27	ug/L	I	0.1	0.4
10/15/2002 12:50	RIVER OAKS	Metals-Water	Magnesium	5.9	mg/L	A	0.01	0.04
10/15/2002 12:50	RIVER OAKS	Metals-Water	Nickel	4.2	ug/L	I	2	8
10/15/2002 12:50	RIVER OAKS	Metals-Water	Selenium	1	ug/L	U	1	4
10/15/2002 12:50	RIVER OAKS	Metals-Water	Silver	0.02	ug/L	U	0.02	0.08
10/15/2002 12:50	RIVER OAKS	Metals-Water	Zinc	32.7	ug/L	A	2	8
10/15/2002 12:50	RIVER OAKS	Nutrients-Liquid	Ammonia-N	0.049	mg N/L	A	0.01	0.02
10/15/2002 12:50	RIVER OAKS	Nutrients-Liquid	NO2NO3-N	0.19	mg N/L		0.004	0.01
10/15/2002 12:50	RIVER OAKS	Nutrients-Liquid	N_KJEL_TOT	0.95	mg N/L	A	0.12	0.4
10/15/2002 12:50	RIVER OAKS	Nutrients-Liquid	Total-P	0.24	mg P/L	A	0.015	0.04
10/14/2002	TEST SITE	Bio-Chl-a	Chlorophyll-A, Monochromatic, Periphyton	8.4	mg/m2		0.19	0.57
10/14/2002	TEST SITE	Bio-Chl-a	Phaeophytin-A, Monochromatic, Periphyton	0	mg/m2		0.19	0.57
10/14/2002	TEST SITE	Bio-Invertebrates	Macroinvert-FW-Qual-Dipnetx20-# Taxa	15	# Taxa			
10/14/2002	TEST SITE	Bio-Peri/Phyto	Periphyton-Quantitative-# Diatom Taxa	17	#Taxa			
10/14/2002	TEST SITE	Bio-Peri/Phyto	Periphyton-Quantitative-# Wet Taxa	13	#Taxa			
10/14/2002 11:40	TEST SITE	Bio-AGP/LimNut	Algal Growth Potential	43.6	mg DryWt/L		0.1	0.3
10/14/2002 11:40	TEST SITE	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
10/14/2002 11:40	TEST SITE	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
10/14/2002 11:40	TEST SITE	Nutrients-Liquid	Ammonia-N	0.16	mg N/L		0.01	0.02
10/14/2002 11:40	TEST SITE	Nutrients-Liquid	NO2NO3-N	1.1	mg N/L		0.02	0.05
10/14/2002 11:40	TEST SITE	Nutrients-Liquid	N_KJEL_TOT	1.2	mg N/L		0.12	0.4
10/14/2002 11:40	TEST SITE	Nutrients-Liquid	O-Phosphate-P	0.18	mg P/L		0.008	0.02
10/14/2002 11:40	TEST SITE	Nutrients-Liquid	Total-P	0.22	mg P/L		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, *Pseudokirchneriella subcapitata* (formerly *Selenastrum capricornutum,* USEPA 2002*),* 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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C. and/or 62-302.530(48)(b) F.A.C.

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 62-302.530(62) F.A.C.

(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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C. and/or 62-302.530(48)(b) F.A.C.

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C.

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C.

(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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C.

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C. and/or 62-302.530(48)(b) F.A.C.

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 62-302.530(11) F.A.C.

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C.

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C.

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C.

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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C.

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 the Control to the 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 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C.

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	-
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	-
Hester-Dendy Taxa Richness	6	6.5	9	11.5	13	15	17	21.5	26	29	32	-
Dipnet Taxa Richness	9	12	17	20	22	**24.5**	26	28	31	37	53	**24**
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	**1.6**
Ammonia	0.02	0.02	0.04	0.05	0.06	0.08	0.11	**0.14**	0.20	0.34	0.60	**0.15**
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	**0.84**
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	**0.18**
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	-
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	-
Hester-Dendy Taxa Richness	6	6.5	9	11.5	13	15	17	21.5	26	29	32	-
Dipnet Taxa Richness	9	**12**	17	20	22	24.5	26	28	31	37	53	**16**
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	**1.2**
Ammonia	0.02	0.02	0.04	0.05	0.06	0.08	0.11	**0.14**	0.20	0.34	0.60	**0.16**
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**	**1.1**
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	**0.18**	0.25	0.39	0.74	1.51	**0.22**
Orthophosphate	0.01	0.01	0.03	0.04	0.05	0.08	0.11	**0.17**	0.27	0.59	1.37	**0.18**
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). ND = No data.

Appendix 7

Additional physical, chemical, toxicological and microbiological results

FL DEP SW District Chemistry Laboratory
3804 Coconut Palm Drive
Tampa, FL 33619
ph # 813-744-6100 DEP CompQAP # 880078

Project: RIVER OAKS WWTP Type: OTH Requested By: GUNTER

Site	Date	Time	Depth	Log	Samplers
OUTFALL	10/14/02	1020		27877	GUNTER,HODGMAN
NOTE: RQ#2002-10-14-03					
FIELD BLANK	10/14/02	1010		27878	GUNTER,HODGMAN
CONTROL SITE	10/14/02	1340		27879	GUNTER,HODGMAN
TEST SITE	10/14/02	1140		27880	GUNTER,HODGMAN

Code	Parameter	Units	Site ID OUTFALL	Site ID FIELD BLANK	Site ID CONTROL SITE	Site ID TEST SITE
00029	Log Number	LOG	27877	27878	27879	27880
310	BOD5	mg/l	2U	2U	3	2U
314	CBOD5	mg/l	2U	2U		
530	RESIDUE, NONFILT.	mg/l	1	1U	28	2
31501	TOTAL COLIFORM	#/100ml	1K	1K	440	170K
31616	FECAL COLIFORM	#/100ml	1K	1K	15K	50K
82079	TURBIDITY	NTU	0.3	0.1U	13.6	1.8

A denotes mean, B counts unacceptable, J estimate, K less than
L greater than, OO data lost, P too numerous to count, Q out of
holding time, T value below detection limit, U not detected

Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the River Oaks WWTP, 8425 Sheldon Road, Tampa, Hillsborough County, Florida, NPDES# FL0027821, performed from 15 to 17 October 2002.

Facility:	**River Oaks WWTP**		**NPDES #:**	**FL0027821**	Facility Type:	**Domestic Waste**	**Analysts:**	Jacquelyn Brynda	
Location:	8425 Sheldon Rd, Tampa		Contact/District:	Gucciardo/SW				Joshua Ayres	
County:	Hillsborough		Test type:	static acute screen				James Daniels	
Sample Collection Date:	10/14/2002	Time: 1020	# tests:	2	Receiving Water:	Rocky Creek/Cabbagehead Bayou		Marshall Faircloth	
Test Beginning Date:	10/15/2002	Time: 1415	Chlorination Type:	dechlorinated		Class III Fresh Waters		Christa Pierini	
Test Ending Date:	10/17/2002	Time: 1400	FDEP SOP#:	TA07_01/TA07_02		**Page 1 of 1**	**Reviewer:**	David Whiting	

Organism: ***Ceriodaphnia dubia*** Life stage: <24 hours [B]Feeding: YCT/Algae Chamber size: 30mL

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[A]			Dissolved Oxygen			Conductivity Uncorrected	
Concentrations	Volume(mL)	0 hr	24 hr	48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control A	0/20	5	5	5	8.3	-	8.3	23.6	-	24.4	7.9	-	7.3	155	220
Control B	0/20	5	5	5	-	-	8.3	-	-	24.5	-	-	7.3	-	200
Control C	0/20	5	5	5	-	-	8.3	-	-	24.4	-	-	7.4	-	190
Control D	0/20	5	5	5	-	-	8.3	-	-	24.4	-	-	7.4	-	210
100% A	20/0	5	5	5	7.5	-	8.4	23.7	-	24.3	8.0	-	7.5	860	980
100% B	20/0	5	5	5	-	-	8.5	-	-	24.5	-	-	7.4	-	1020
100% C	20/0	5	5	5	-	-	8.5	-	-	24.5	-	-	7.5	-	1050
100% D	20/0	5	5	5	-	-	8.5	-	-	24.4	-	-	7.5	-	1140

[A] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 24.0-27.0C
Incubator #3 temperature range for the test period was 25.0-25.5C

[B] Organisms fed prior to testing.

Organism: ***Cyprinella leedsi*** Life stage: 13 days [D]Feeding: artemia Chamber size: 1L

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[C]			Dissolved Oxygen			Conductivity Uncorrected	
Concentrations	Volume(mL)	0 hr	24 hr	48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control A	0/500	5	5	5	8.0	8.2	8.5	24.0	24.6	23.9	7.8	7.5	7.8	255	280
Control B	0/500	5	5	5	8.0	8.2	8.5	23.8	24.4	23.9	8.0	7.5	7.8	260	280
Control C	0/500	5	5	5	8.0	8.2	8.5	23.6	24.4	23.9	8.1	7.5	7.8	260	270
Control D	0/500	5	5	5	8.0	8.2	8.5	23.6	24.8	24.1	8.1	7.5	7.8	260	280
100% A	500/0	5	5	5	7.6	8.2	8.4	24.3	24.7	24.0	7.9	7.4	7.8	880	890
100% B	500/0	5	5	5	7.6	8.2	8.4	24.2	24.9	24.0	7.8	7.4	7.8	905	925
100 % C	500/0	5	5	5	7.6	8.2	8.4	24.0	25.2	24.0	7.9	7.2	7.8	910	925
100% D	500/0	5	5	5	7.6	8.2	8.4	23.9	25.2	24.7	7.9	7.2	7.8	905	945

[C] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 24.0-27.0C
Incubator #3 temperature range for the test period was 25.0-25.5C

[D] Organisms fed prior to testing.

LIMS	
Job number:	TLH-2002-10-15-10
sample number:	628593

Data Transcription Verification	
date:	2/14/2003
by:	Christa Pierini
	James Daniels

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

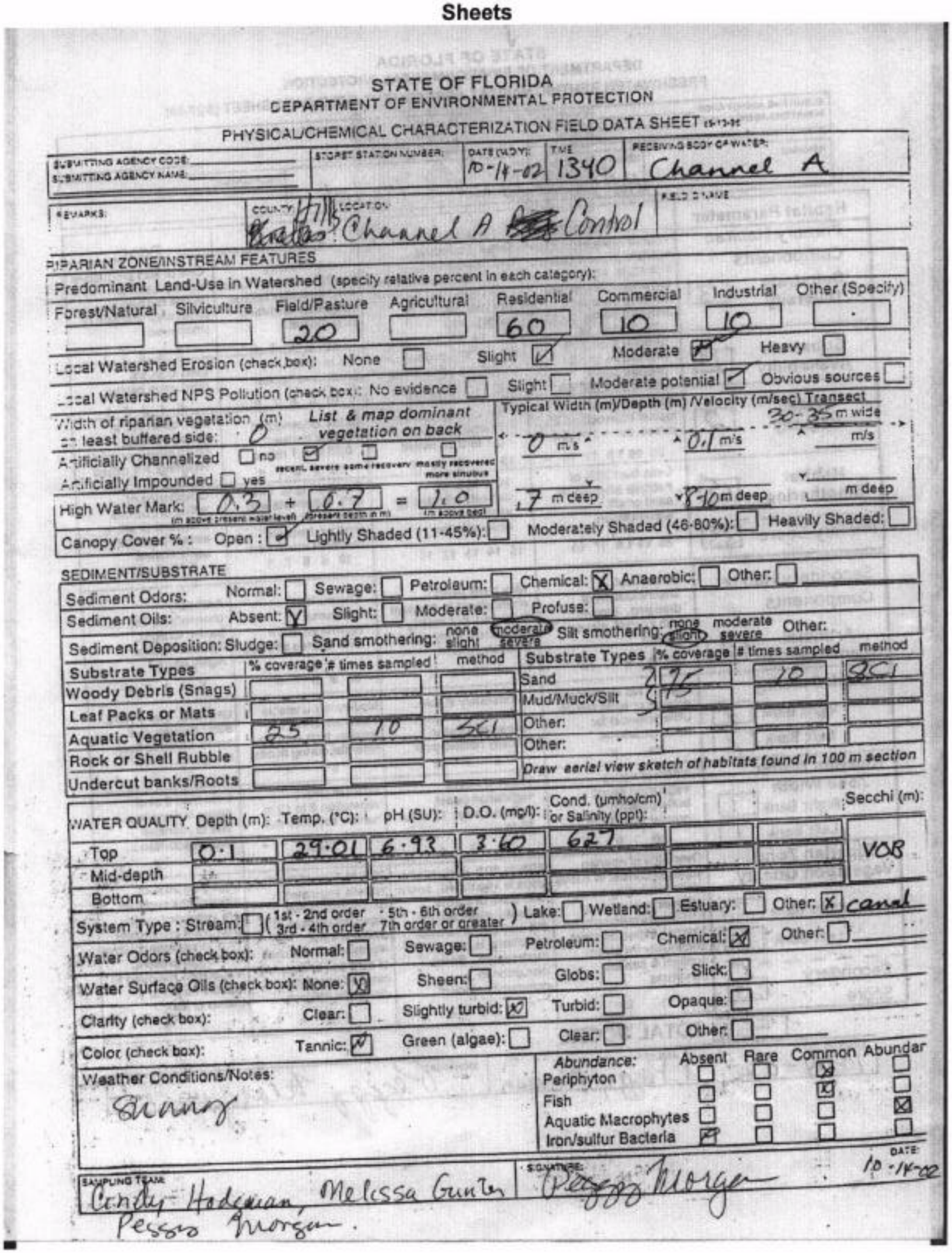
Ammonia	Total (mg/L)	Unionized (mg/L)
Control water (fish):	<0.017	<0.017
Control water (water flea):	<0.017	<0.017
100% Sample:	<0.017	<0.017

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control water (fish):	175	200
Control water (water flea):	80	77
100% Sample:	140	133

Photoperiod during the test was 16 hours of light : 8 hours of dark.

Appendix 8

Habitat Assessment and Phys/Chem Field Sheets



STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: _____ SUBMITTING AGENCY NAME: _____ STORET STATION NUMBER: _____ DATE (M/D/Y): 10-14-02 TIME: 1340 RECEIVING BODY OF WATER: Channel A

REMARKS: _____ COUNTY: Hillsborough LOCATION: Channel A ~~Basin~~ Control FIELD STAFF: _____

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
		20		60	10	10	

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

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

Width of riparian vegetation (m) on least buffered side: 0 — List & map dominant vegetation on back

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect: 30-35 m wide; 0 m/s; 0.1 m/s; m/s

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

Artificially Impounded ☐ yes

High Water Mark: 0.3 (m above present water level) + 0.7 (m deep at m) = 1.0 (m above bed)

.7 m deep; 8-10 m deep; m deep

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

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand	75	10	SCI
Leaf Packs or Mats				Mud/Muck/Silt	5		
Aquatic Vegetation	25	10	SCI	Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots				Draw aerial view sketch of habitats found in 100 m section			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (umho/cm) or Salinity (ppt):			Secchi (m):
Top	0.1	29.01	6.93	3.60	627			VOB
Mid-depth								
Bottom								

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

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: Sunny

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

SAMPLING TEAM: Cindy Hoderman, Melissa Gunter, Peggy Morgan. SIGNATURE: Peggy Morgan DATE: 10-14-02

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET (5-27-98)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y): 10-14-02	RECEIVING BODY OF WATER:
REMARKS:	COUNTY: Hills	LOCATION: Channel A Control	FIELD ID/NAME:

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components **Substrate Diversity** [3]	Four or more productive habitats present (snags, tree roots, aquatic vegetation, leaf packs (partially decayed), undercut banks, 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 [13]	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 [2]	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 occuring: > 1 m/sec 5 4 3 2 1
Habitat Smothering [15]	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent 5 4 3 2 1
Primary Score [33]				
Secondary Habitat Components **Artificial Channelization** [2]	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Bank Stability Right Bank [7] 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 [1] Left Bank [1]	Width of native vegetation (least buffered side) greater than 18 m 10 9	Width of native vegetation (least buffered side) 12 m 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 [2] Left Bank [2]	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions. 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 zone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 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
Secondary Score [22]				

[55] **TOTAL SCORE**

ANALYSIS DATE: 10-14-02	ANALYST: Peggy Morgan	SIGNATURE: Peggy Morgan

DEP-SOP-001/01: Form FD 9000-3 (December 11, 2001)

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y): 10/14/02	TIME 1140	RECEIVING BODY OF WATER: Channel A
REMARKS:	COUNTY: Hills	LOCATION: Channel A Test		FIELD ID/NAME:

RIPARIAN ZONE/STREAM FEATURES

PREDOMINANT LAND-USE IN WATERSHED (specify relative percent in each category):

FOREST/NATURAL	SILVICULTURE	FIELD/PASTURE	AGRICULTURAL	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	OTHER (SPECIFY)
		20		60	10	10	

LOCAL WATERSHED EROSION (check box): None ☐ Slight ☑ Moderate ☐ Heavy ☐

LOCAL WATERSHED NPS POLLUTION (check box): No evidence ☐ Slight ☐ Moderate potential ☑ Obvious sources ☐

WIDTH OF RIPARIAN VEGETATION (m) On least buffered side: 0

LIST & MAP DOMINANT VEGETATION ON BACK

TYPICAL WIDTH (M) DEPTH (M)/VELOCITY (M/SEC) TRANSECT 75 ~~30~~ m wide

0 m/s | 0.1 m/s | m/s

0.7 m deep | 8-10 m deep | m deep

ARTIFICIALLY CHANNELIZED ☐ no ☑ recent, severe ☐ some recovery ☐ mostly recovered

ARTIFICIALLY IMPOUNDED ☑ yes more sinuous

HIGH WATER MARK 0.3 + 0.7 = 1.0

(m above present water level) (present depth in m) (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)	~~25~~	~~10~~	~~SC1~~	SAND	75	10	SC1
LEAF PACKS OF MATS				MUD/MUCK (SILT)			
AQUATIC VEGETATION	25	10	SC1	OTHER:			
ROCK OR SHELL RUBBLE				OTHER:			
UNDERCUT BANKS/ROOTS				DRAW AERIAL VIEW SKETCH OF HABITATS FOUND IN 100 M SECTION			

WATER QUALITY	DEPTH (M):	TEMP. (°C):	PH (SU):	D.O. (MG/L):	COND. (UMHO/CM) OR SALINITY (PPT):			SECCHI (M):
TOP	0.1	28.62	6.82	3.35	611			VOB
MID-DEPTH								
BOTTOM								

SYSTEM TYPE: STREAM: 1ST-2ND ORDER ☐ 3RD-4TH ORDER ☐ 5TH-6TH ORDER ☐ 7TH ORDER OR GREATER ☐ LAKE: ☐ WETLAND: ☐ ESTUARY: ☐ OTHER: ☒ Canal

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: Snowing

ABUNDANCE:	ABSENT	RARE	COMMON	ABUNDANT
PERIPHYTON	☐	☐	☒	☐
FISH	☐	☐	☑	☐
AQUATIC MACROPHYTES	☐	☐	☒	☒
IRON/SULFUR BACTERIA	☒	☐	☐	☐

SAMPLING TEAM: Peggy Morgan Melissa Bunta Cindy Hodgman

SIGNATURE: Peggy Morg

DATE: 10-14-02

DEP-SOP-001/01: Form FD 9000-5 (December 11, 2001)

STATE OF FLORIDA, DEPARTMENT OF ENVIRONMENTAL PROTECTION
STREAM/RIVER HABITAT ASSESSMENT FIELD SHEET

SUBMITTING AGENCY CODE: SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (MM/DD/YY): 10-14-02	RECEIVING BODY OF WATER:
REMARKS:	COUNTY: Hillsborough LOCATION: Channel A Test		FIELD ID/NAME:

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components **Substrate Diversity** 3	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 13	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 2	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 15 Primary Score ___	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** 2	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 (2) 1
Bank Stability Right Bank 7 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 1 Left Bank 1	Width of native vegetation (least buffered side) greater than 18 m 10 9	Width of native vegetation (least buffered side) 12 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 2 Left Bank 2 Secondary Score ___	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions 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 zone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 5 4	Less than 25% of stream bank 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

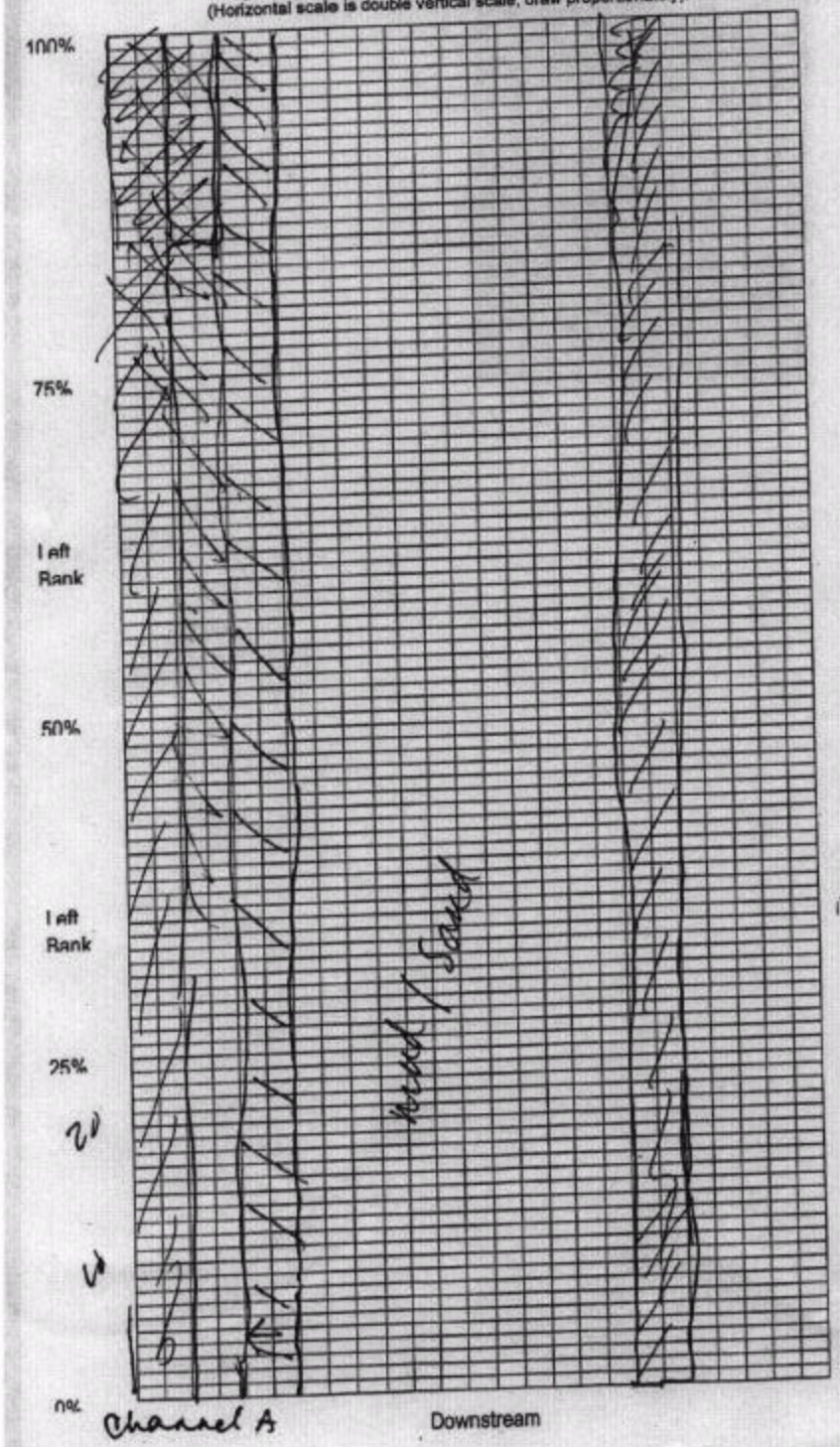
56 TOTAL SCORE

ANALYSIS DATE: 10-14-02	ANALYST: Peggy Morga	SIGNATURE: Peggy Morga

DEP-SOP-001/01: Form FD 9000-4 (December 11, 2001)

Stream/River Habitat Sketch Sheet

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



Substrates: Code key, draw proportionate habitat abundance.

- ☐ Snags
- ☐ Roots/undercut banks
- ☐ Leaf Packs (or mats)
- ▨ Macrophytes
- ☐ _____
- ☐ _____
- ☐ _____

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 vegetation is altered or eliminated.

Plants observed/other notes:

Nuphar ? Chara
L. peruv
Bacopa
Duckweed
Salvinia

Density (number/cm^2) and taxa list for periphyton collected from glass microscope slides incubated for 28 days downstream of River Oaks facility discharge, October 14, 2002.

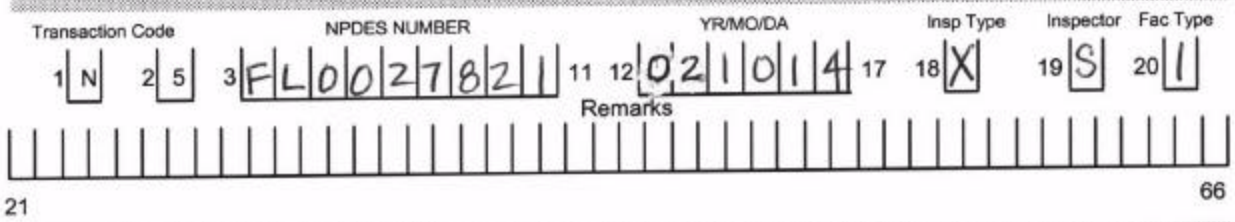
	Control Site	Test Site
Bacillariophyceae:		
Achnanthes exigua	-	34991
Achnanthes hungarica	-	9331
Achnanthes lanceolata	-	19828
Amphora sp.	-	11664
Cocconeis placentula	-	27993
Cyclotella sp.	-	2333
Encyonema sp.	-	1166
Encyonema silesiacum	-	1166
Eunotia sp.	-	162123
Gomphonema augur	-	4665
Gomphonema parvulum	-	16329
Navicula sp.	-	26826
Navicula clementis	-	2333
Nitzschia sp.	-	16329
Nitzschia amphibia	-	4665
Nitzschia frustulum	-	2333
Pinnularia sp.	-	1166
Chlorophyceae:		
Characium sp.	-	2333
Chlorella sp.	-	2333
Cosmarium phaseolus	-	1166
Oedogonium sp.	-	1166
Oocystis gigas	-	1166
Stigeoclonium sp.	-	1166
Cyanophyceae:		
Anabaena sp.	-	3499
Chamaecalyx clavata	-	1166
Cyanobium parvum	-	4665
Cyanobium plancticum	-	1166
Lyngbya sp.	-	10497
Oscillatoria sp.	-	3499
Euglenophyceae:		
Euglena sp.	-	1166

Appendix 11

Qualitative benthic macroinvertebrate collections (n = 20 discrete dipnet sweeps) upstream and downstream of the River Oaks facility (October 14, 2002). Taxa lists and number of individuals counted.

	Control Site	Test Site
Acarina:		
Arrenurus sp.	2	1
Amphipoda:		
Hyalella azteca	5	30
Undetermined Amphipoda	-	1
Decapoda:		
Palaemonetes sp.	18	11
Diptera:		
Atrichopogon sp.	1	-
Chironomidae	3	-
Dasyhelea sp.	1	-
Dicrotendipes modestus	2	-
Labrundinia neopilosella	2	-
Labrundinia sp.	1	-
Larsia decolorata	1	-
Polypedilum halterale grp.	-	12
Polypedilum illinoense grp.	4	-
Polypedilum sp. A Epler	-	1
Tanytarsus sp. C Epler	1	-
Ephemeroptera:		
Baetidae	1	-
Caenis sp.	1	1
Gastropoda:		
Ancylidae	3	1
Hydrobiidae	6	19
Physella sp.	-	2
Planorbella sp.	2	-
Pyrogophorus platyrachis	3	6
Undetermined Gastropoda	6	-
Odonata:		
Argia sp.	1	-
Coenagrionidae	2	-
Undetermined Odonata	4	-
Zygoptera	5	1
Oligochaeta:		
Aulodrilus pigueti	2	5
Bratislavia unidentata	1	1
Dero lodeni	2	-
Dero sp.	4	-
Dero vaga	-	1
Limnodrilus hoffmeisteri	4	-
Limnodrilus sp.	-	5
Pristina leidyi	2	-
Pristina synclites	3	1
Pelecypoda:		
Undetermined Pelecypoda	-	1
Trichoptera:		
Oecetis georgia	1	-

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)

