

Biological Assessment of

Spencer Wastewater Treatment Plant

Clay County

NPDES #FL0173371

Sampled February 2002

February 2003

Biology Section
Bureau of Laboratories
Division of Resource Assessment & Management

Quality Manual No. 870346G

Florida Department of Environmental Protection
Fifth Year Inspection Summary

Discharger:	Spencer Wastewater Treatment Plant
County:	Clay
NPDES Number:	FL0173371
Permit Expiration:	10/16/02

Toxics Sampling Inspection **(XSI)**

Date Sampled: 11 February 2002

Results: Copper, iron, and zinc were found in the effluent at levels that complied with Class III Water Quality Criteria. Atrazine (0.45 µg/L) was detected at a low level in the effluent. Fonofos (0.28 µg/L) was also detected, but at a level below the minimum quantitation limit.

Compliance Biomonitoring Inspection **(CBI)**

Date Sampled: 11 February 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 bioassay.

Water Quality Inspection **(WQI)**

Date Sampled: 11 February 2002

Results: Fecal and total coliforms were detected in the effluent and the receiving water at levels that complied with Class III Water Quality Criteria and the facility's permit limits. Effluent concentrations of ortho-phosphate (0.081 mg/L), total phosphorus (0.19 mg/L), ammonia (0.81 mg/L), nitrate-nitrite (1.7 mg/L), and TKN (1.5 mg/L) contributed to nutrient enrichment at the Test Site compared to the Control Site. The Algal Growth Potential (AGP) for the water sample collected at the Control Site (5.1 mg dry wt/L) was slightly above the "problem threshold" of 5.0 mg dry wt/L, while the AGP values for the wastewater collected before the treatment wetlands (121.0 mg dry wt/L) and the water collected at the Test Site (23.7 mg dry wt/L) were much higher. The higher Test Site AGP value, as compared to the Control Site, is related to the nutrient input from the discharge.

Impact Bioassessment Inspection **(IBI)**

Date Sampled: 11 February 2002

Results: Periphyton community data were ambiguous, and a clear interpretation could not be made for this study. The macroinvertebrate results indicated nutrient enrichment. The Control Site SCI score of 31 was in the "excellent" category and the Test Site SCI score of 23 was in the "good" category. The Hester-Dendy and dipnet samples both indicated a significant shift towards a degraded macroinvertebrate community. In both types of macroinvertebrate data, the Test Site showed degradation in four measures (1) fewer EPT taxa, (2) lower percent suspension feeders and filterers, (3) higher percent contribution of the dominant taxon, and (4) higher percent Diptera.

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 Spencer Wastewater Treatment Plant (WWTP) is located in Clay County, Florida (Appendix 1). The facility consists of one surge tank, an anoxic tank, an aeration tank with recycle to the anoxic tank, one secondary clarifier, a chlorine contact chamber, and one aerobic digestor (see Facility Summary in Appendix 2). The effluent is discharged into two one-half acre constructed wetland cells which lead to Spencer Wetland and eventually Little Black Creek. Although the constructed wetland cells are part of the discharge treatment, it currently is not possible to collect water samples from a single discharge point out of these cells. Therefore effluent samples are collected from a point before the wetland cells and after all other treatment. The facility is presently under reconstruction to allow for effluent samples to be collected after treatment from a series of wetland cells. The design flow of the wastewater system is 0.250 million gallons per day (MGD) (Appendix 2). According to DMR data, the actual flow during this survey was 0.114 MGD.

State permit limits for the Spencer WWTP and Class III Water Quality Criteria are listed in Table 1. According to the facility's monthly operating reports, the plant exceeded the total nitrogen monthly average during November 2000, and silver, iron, and lead values were elevated during July 2001 (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 the North Prong of Double Branch Creek above Turtle Dove Road) and a test site (located approximately 15 meters downstream of the discharge). Spencer Wetland, a natural wetland system, encompasses the downstream test site. Samples were collected from a defined flow channel within the wetland, which connects to the South Prong of Double Branch Creek. The control site is influenced by runoff from a golf course and a growing residential area. 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: Pat O'Connor and Tom Kallemeyn (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

- Chemical results are reported in Table 1 (specific analytes) and Appendix 4 (entire analyte list). Effluent metals complied with Class III Water Quality Criteria (FAC 62-302) and facility permit limits. Atrazine and fonofos were detected in the effluent at low levels.
- Habitat assessment scores were 103 at the Control Site and 119 at the Test Site. The Control Site scored lower in the secondary habitat components: artificial channelization, bank stability, riparian buffer zone width and quality (Table 1, Appendix 8).
- Dissolved oxygen (DO as mg/L), pH (Standard Units), and conductivity (umhos) 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.
- The effluent sample was not toxic to the fish, *Cyprinella leedsi,* or to the water flea, *Ceriodaphnia dubia,* during 48-hour acute screening bioassays (Table 1, Appendix 7).
- 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 (Table 1, Appendix 7).
- The effluent total nitrogen concentration (3.2 mg/L) complied with the permit limit (Table 1). Effluent total phosphorus (0.19 mg/L), ortho-phosphate (0.081 mg/L), nitrate+nitrite (1.7 mg/L) and ammonia concentrations (0.81 mg/L, Table 1) contributed to elevated nutrient concentrations at the Test Site. Nutrient levels at the Test Site were elevated by a factor of 1.5-5 compared to Control Site levels (see also Appendix 6).
- 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 represent a "problem" threshold for fresh receiving waters, implying nutrient enrichment. The AGP value at the upstream Control Site was 5.1 mg dry weight/L (Table 2). The AGP values of the downstream Test Site (23.7 mg dry weight/L) and the effluent prior to treatment by the wetland cells (121.0 mg dry weight/L) were more than 4 and 24 times above this threshold, respectively. This indicates the potential for nutrient enrichment related to the Spencer discharge in this portion of Double Branch Creek. There was no evidence of growth inhibition in the AGP data (Table 2).

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

Spencer WWTP	Class III Criteria	Effluent Limits	Effluent Samples	Control Site	Test Site
Organic Constituents (ug/L)					
Atrazine	-	-	0.45	-	-
Fonofos	-	-	0.28 I	-	-
Metals (ug/L, Class III Criteria are less than or equal to the value given)					
Aluminum	1500	-	75 U	-	-
Arsenic	50	-	3 U	-	-
Cadmium	1.19 b	-	0.025 U	-	-
Calcium (mg/L)	-	-	24.4 A	-	-
Chromium	218 b	-	2 U	-	-
Copper	12.5 b	-	0.94 I	-	-
Iron	1000	-	250 A	-	-
Lead	3.45 b	-	0.3 U	-	-
Magnesium (mg/L)	-	-	11.1 A	-	-
Nickel	166 b	-	2 U	-	-
Selenium	5.0	-	0.5 U	-	-
Silver	0.07	-	0.02 U	-	-
Zinc	112 b	-	49.2 A	-	-
Nutrients (mg/L)					
Ortho-phosphate	-	-	0.081	0.016	0.063
Total Phosphorus	-	≤ 10.0	0.19 A	0.035 I	0.086
Ammonia	-	-	0.81	0.023 J	0.053 JA
Un-ionized Ammonia	≤ 0.02 s	≤ 0.02	<0.02	<0.02	<0.02
Nitrate+Nitrite	-	-	1.7	0.072	0.35
Total Kjeldahl Nitrogen	-	-	1.5 A	0.47	0.68
Organic Nitrogen	-	-	0.69	0.45	0.63
Total Nitrogen	-	≤ 6.0	3.2	0.54	1.03
General Physical and Chemical Parameters					
Habitat Assessment	-	-	-	103	119
Dissolved Oxygen (mg/L)	5.0 s	-	6.7	8.4	5.6
pH (SU)	6.0-8.5 s	≥ 6.0	6.7	6.8	6.8
Conductivity (mmhos/cm)	1275 s	-	598	108	440
Temperature (°C)	-	-	21.6	16.2	15.8
Total Suspended Solids (mg/L)	-	≤ 60.0 s	2	2	1
CBOD, 5 day (mg/L)	-	≤ 20.0 s	2 K	2 K	2 K
Total Residual Chlorine (mg/L)	<0.01	-	-	-	-
Flow (MGD)	-	0.250 a	0.114	-	-
Hardness (mg $CaCO_3$)	-	-	107	-	-
Toxicity (48-hour static, screening bioassay, percent mortality in 100% effluent)					
Bioassay - Water flea	-	-	0%	-	-
Bioassay - Fish	-	-	0%	-	-
Microbiology (Number of counts/100ml)					
Fecal Coliforms	800 s	800	4 K	72 B	92
Total Coliforms	2400 s	-	10 B	633 B	430

a - Annual average

b - Value is calculated based on hardness

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

Q - Sample held beyond normal holding time

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

s - Single sample

- There were differences between the Test and Control Site's algal community composition. Periphyton chlorophyll *a* concentration and algal density were lower at the Test Site, while the percent blue-green and green algae were higher. The lower chlorophyll *a* value is likely due to the difference in canopy cover at the test site. The control site was lightly shaded (11-45%), while the test site was moderately shaded (46-80%) (Phys/chem. form in Appendix 8). Given the elevated AGP value at the Test Site, we believe the periphyton chlorophyll *a* data to be suspect. The shift in algal community structure may be related to nutrient enrichment from Spencer WWTP discharge, but no conclusion can be made from this data (Table 3, Appendix 9).
- Quantitative measures of benthic macroinvertebrate assemblages from Hester-Dendy samplers showed evidence of impairment at the Test Site compared to the Control Site. Although Shannon-Weaver diversity was higher at the Test Site, there was only one EPT taxon at the Test Site while there were 5 EPT taxa at the Control Site. Other differences between the Control and Test Sites were: Florida Index points dropped from 22 to 11, percent Diptera raised from 54.2 to 83.8, and percent suspension feeders/filterers lowered from 34.2 to 11.0 (Table 4, Appendix 10). There was also a significant drop in the percent abundance of pollution-sensitive Ephemeropterans and Trichopterans (21.5% to 0.3% and 17.3% to 0% at the Control Site and Test Site, respectively, tests of significance explained in Appendix 3). These changes indicate a significant shift in community structure (Figure 1) and may be related to nutrient loading from the effluent.
- Qualitative measures of benthic macroinvertebrate assemblages from dip-

Table 2. Measured and predicted algal growth potential (AGP)

Location	AGP (measured)	Predicted AGP (TSIN) ± 20%	N:P ratio
Control	5.1	3.6 ± 0.7	5.9
Test	23.7	15.3 ± 3.1	6.4
Effluent	121.0	95.4 ± 12.9	31.0

Table 3. Periphyton composition at control and test sites.

Spencer WWTP	Control Site	Test Site
Number of Taxa	20	38
Shannon-Weaver Diversity	1.31	2.46
Chlorophyll *a* (mg/m^2)	8.7	4.4 A
Phaeophytin (mg/m^2)	0	0.32 A
Algal Density ($number/cm^2$)	118,313	38,139
Number of Algal Units Identified	534	584
Percentage Composition:		
Blue-green algae	2.8	8.4
Green algae	1.3	4.1
Diatoms	95.9	86.6
Other	0.0	0.86

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

Table 4. Macroinvertebrate Hester-Dendy Samples

Spencer WWTP	Control Site	Test Site
Summary Statistics		
Shannon-Weaver Diversity	3.35	3.80
Number of Taxa	26	30
Florida Index	22	11
Number of EPT Taxa	5	1
Total Number of Individuals	410	340
Community Composition: Percent of total		
Diptera	54.2	83.8
Ephemeroptera	21.5	0.3
Gastropoda	3.4	5.0
Oligochaeta	0.2	8.5
Plecoptera	0.0	0.0
Trichoptera	17.3	0.0
Other	3.4	2.4
Functional Feeding Groups: Percent of total		
Burrowing Deposit Feeders	0.2	7.7
Predators	8.6	15.8
Surface Deposit Feeders	27.4	53.5
Suspension Feeders and Filterers	34.2	11.0
Scrapers	14.2	6.2
Shredders	12.1	4.9
Unknown	3.4	0.9

net samples are summarized in Tables 5 and 6, Figure 2 and in Appendix 11. The Control Site SCI score of 31 placed it in the "excellent" category, and the Test Site SCI score of 23 placed it in the "good" category. The measures influencing the change in SCI scores between the Control and Test Sites are: number of EPT taxa, percent Diptera, and percent suspension feeders and filterers. Other differences between the Control and Test Sites were: the number of pollution-sensitive EPT taxa lowered from 4 to 1, percent Diptera raised from 52.5 to 77.5, and the percent suspension feeders/filterers lowered from 40.2 to 11.3. The shifts in the percentages of Diptera, Ephemerop-tera, and suspension feeders and filterers demonstrate a significant change at the Test Site compared to the Control Site (Figure 2, tests of significance explained in Appendix 3).

Table 5. Macroinvertebrate Dipnet Samples

Spencer WWTP	Control Site	Test Site
Stream Condition Index (value)	31	23
Stream Condition Index (word)	Excellent	Good
Stream Condition Index Metrics		
Florida Index	8	13
Number of EPT Taxa	4	1
Number of Taxa	22	20
Number of Chironomid Taxa	7	12
Percent Dominant Taxon	25.4	35.3
Percent Dipterans	52.5	77.5
Percent Suspension Feeders and Filterers	40.2	11.3
Total Number of Individuals	122	102
Community Composition: Percent of total		
Coletoptera	28.7	10.8
Diptera	52.5	77.5
Ephemeroptera	5.7	0.0
Oligochaeta	2.5	5.9
Plecoptera	0.0	0.0
Trichoptera	4.9	2.0
Other	5.7	3.9
Functional Feeding Groups: Percent of total		
Burrowing Deposit Feeders	2.5	5.9
Predators	6.6	7.8
Surface Deposit Feeders	23.0	25.5
Suspension Feeders and Filterers	40.2	11.3
Scrapers	18.0	6.4
Shredders	3.7	6.9
Unknown	5.7	35.3

Summary

Because effluent samples were collected prior to the treatment of the constructed wetland cells, the true effect of the wetland treatment cannot be determined by this study. Effluent data do indicate some treatment is occurring however, the effluent does not appear to have sufficient residence time in the two wetland cells, because nutrient levels and AGP values were higher at the Test Site than at the Control Site. Therefore the need for additional wetland cells is supported. Both types of macroinvertebrate samples indicated a shift to a degraded community. The differences may have been more striking if the upstream Control Site was not already affected by anthropogenic inputs. While these results suggest the treatment process needs improvement, the effluent did not exceed Class III Water Quality Criteria or facility permit limits at the point of collection for this study. The current constructed wetlands are having some treatment effect, but nutrient levels at the Test Site are still 1.5-3.0 times higher compared to the Control Site. The elevated AGP value in the receiving water (more than four times the problem threshold) raises concern for long term impacts related to nutrient loading.

Literature Cited

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Table 6. Stream Condition Index Metrics: Northeast, Winter index

Spencer WWTP - Control Site					
Metric:	Value	5	3	1	Score
Total Number of Taxa	22	≥ 18	17-9	<9	5
Number of EPT Taxa	4	-	≥ 3	<3	3
Number of Chironomid Taxa	7	≥ 4	3-2	<2	5
Percent Contribution of Dominant Taxon	25.4	≤ 37	38-69	>69	5
Percent Diptera	52.5	-	≤ 67	>67	3
Florida Index	8	≥ 6	5-3	<3	5
Percent Suspension Feeders and Filterers	40.2	≥ 25	25-13	<13	5
Total Score					31
Interpretation of Scores		**Excellent**			**26-31**
		Good			20-25
		Poor			14-19
		Very Poor			7-13

Spencer WWTP - Test Site					
Metric:	Value	5	3	1	Score
Total Number of Taxa	20	≥ 18	17-9	<9	5
Number of EPT Taxa	1	-	≥ 3	<3	1
Number of Chironomid Taxa	12	≥ 4	3-2	<2	5
Percent Contribution of Dominant Taxon	35.3	≤ 37	38-69	>69	5
Percent Diptera	77.5	-	≤ 67	>67	1
Florida Index	13	≥ 6	5-3	<3	5
Percent Suspension Feeders and Filterers	11.3	≥ 25	25-13	<13	1
Total Score					23
Interpretation of Scores		Excellent			26-31
		Good			**20-25**
		Poor			14-19
		Very Poor			7-13

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Figure 1.

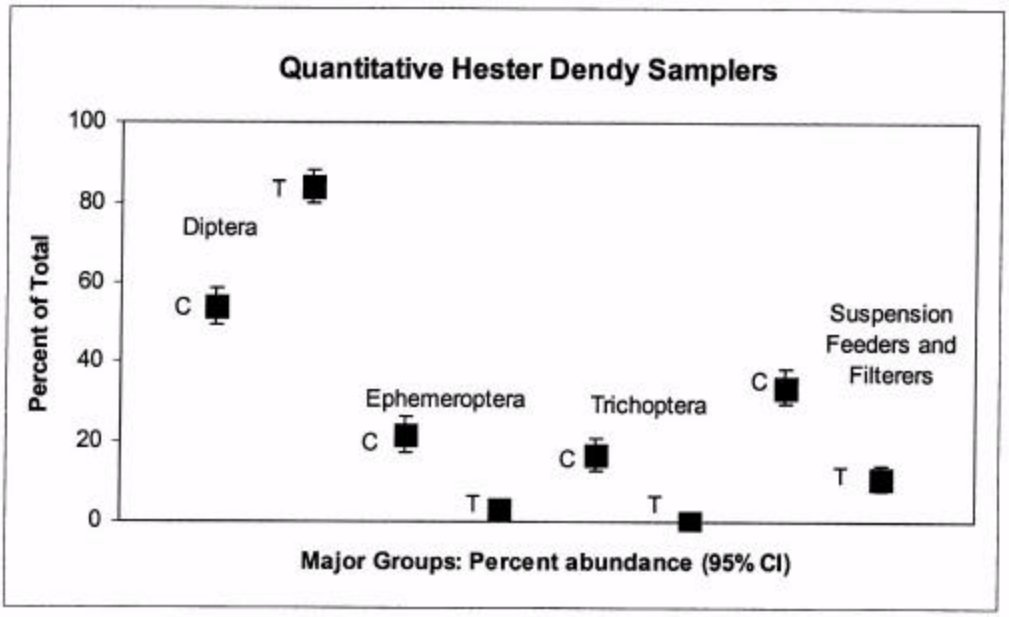
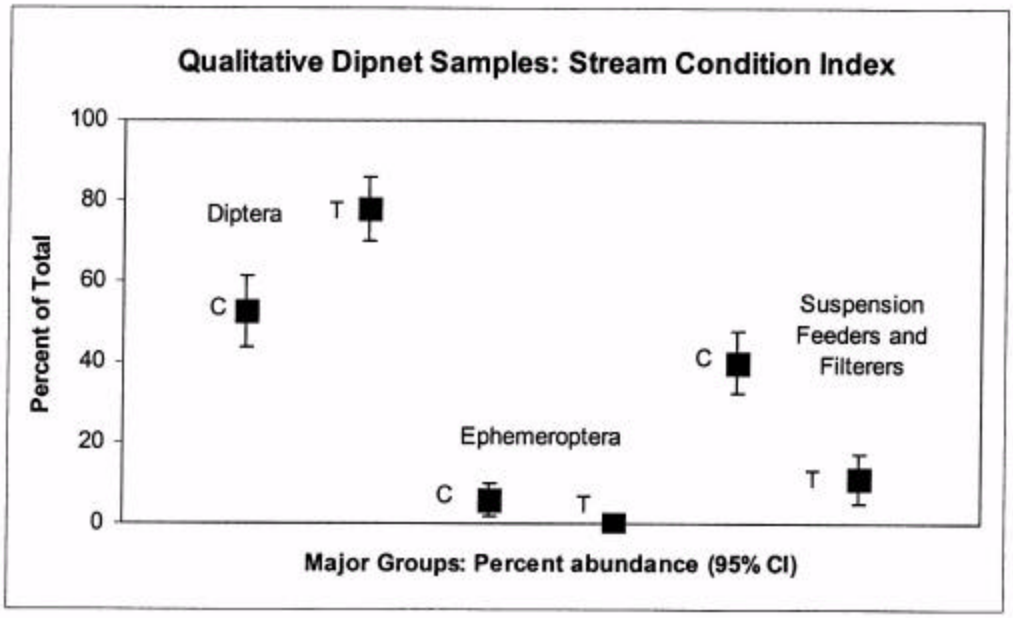


Figure 2.



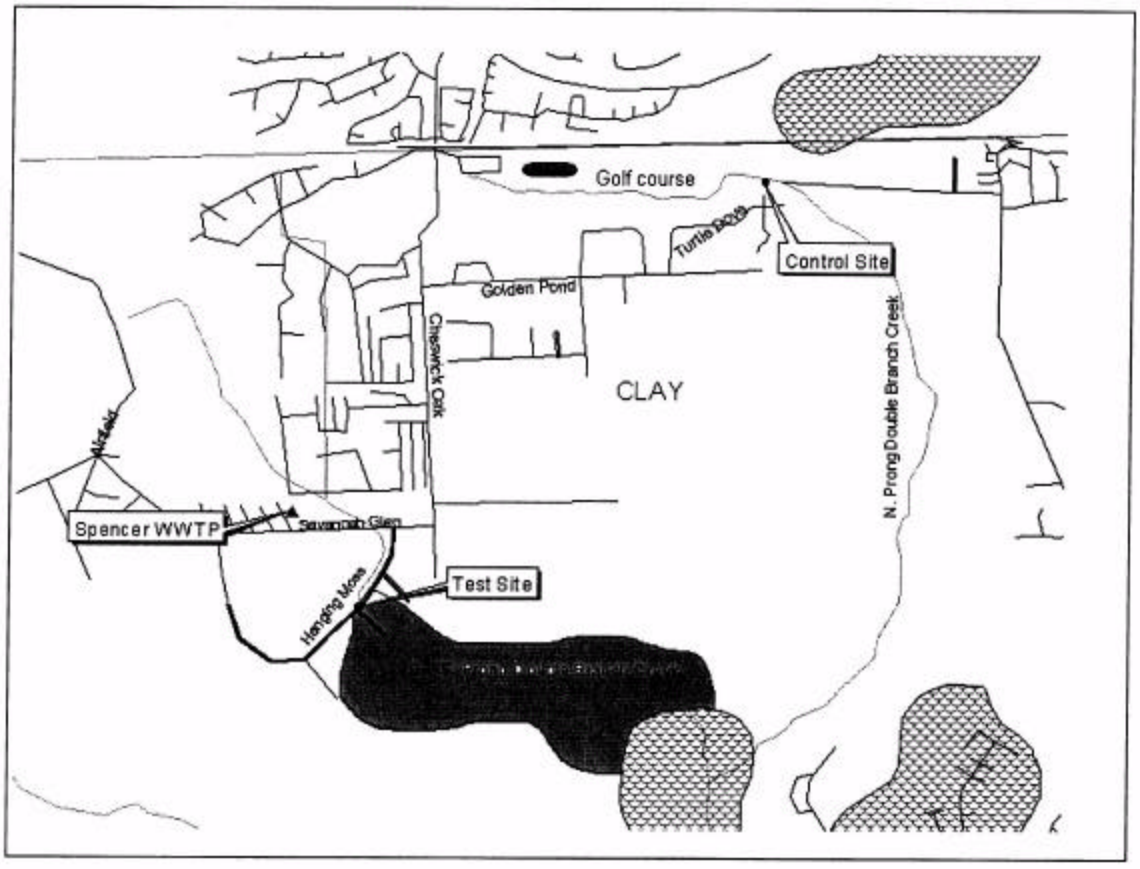
Appendices

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- 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 and 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

Spencer WWTP





1000 0 1000 Meters

FDEP- Bureau of Laboratories
Fifth Year Inspections
Created by: Julie Riley
Created on: November 12, 2002

Appendix 2

Facility Summary

State of Florida
Department of Environmental Protection
Facility Summary

Facility Name: Spencer WWTF		**Prepared By:** Brian Kelsay **Date:** 01/14/02
Location: (See Attached Map)	**County:** Clay	**District:** Northeast
Federal Permit No.: FL0173371 **Expiration Date:** 10/16/02	**State GMS #:** **State Expiration Date:** N/A	**Facility Type:** Domestic
Function of Facility: Domestic Wastewater		
Description of treatment process: The wastewater treatment facility consists of one surge tank, an anoxic tank, an aeration tank with recycle to the anoxic tank, one secondary clarifier, a chlorine contact chamber, and one aerobic digestor.		
Receiving Waters: into two ½ acre constructed wetland cells(EFF-1) which lead to Little Black Creek (WIM-1)	**Classification:** Class III – Fresh,	
Design Flow: 0.250 MGD	**Mean Flow:** 0.085 MGD (09/00-09/01)	**Flow during survey:**
Discharge is: Continuous Intermittent Seasonal Rainfall Dependent Other		
Facility Mixing Zone Details: N/A		
List effluent limits:		

Parameter	Limit	Describe special permit conditions and permit modifications:
<u>Into Constructed wetlands (EFF-1)</u> Flow (MGD)	Annual Average 0.250	
Total Suspended Solids (mg/l)	Annual Average 20.0	Sample Every Two Weeks
	Monthly Average 30.0	
	Weekly Average 45.0	
	Single Maximum 60.0	
CBOD5 (mg/l)	Annual Average 10.0	Sample Every Two Weeks
	Monthly Average 25.0	
	Weekly Average 15.0	
	Single Maximum 20.0	
pH	Daily Minimum 6.0	Sampled 5 Days/Week

Conductivity (umhos/cm)	Report	
Color (color unit)	Report	
CBOD (mg/L)	Annual Average 5.0 Monthly Average 6.25 Weekly Average 7.5 Maximum 10.0	
Total Suspended Solids (mg/L)	Annual Average 5.0 Monthly Average 6.25 Weekly Average 7.5 Maximum 10.0	
Fecal Coliform Bacteria (#/100mL)	Report Only	
Nitrogen, Total as N (mg/L as N)	Annual Average 3.0 Monthly Average 3.75 Weekly Average 4.5 Maximum 6.0	
Phophorous, total as P (mg/L as P)	Annual Average 5.0 Monthly Average 6.25 Weekly Average 7.5 Maximum 10.0	

	Daily Maximum 8.5	
Fecal Coliform (#/100mL)	Annual Average 200	
	Mo. Geo. Mean 200	Sampled Every Two Weeks
	Maximum 800	
TRC(for disinfection) (mg/L)	Daily Minimum 0.5	Sampled 5 Days/Week
Nitrogen, total as N (mg/l)	Annual Average 4.5	Sampled Every Two Weeks
	Monthly Average 5.6	
	Weekly Average 6.8	
	Maximum 9.0	
Phosphorus, Total as P (mg/l)	Annual Average 5.0	Sampled Every Two Weeks
	Monthly Average 6.25	
	Weekly Average 7.5	
	Single Maximum 10.0	
Outfall D001 **From constructed wetland(WTM-1)**		
Temperature (Centigrade)	Report only	
Dissolved Oxygen (mg/L)	Report only	
Total Residual Chlorine (mg/L)	Maximum 0.01	
pH	Report	

Ortho-Phosphorus as P (mg/L as P)	Report Only	
Nitrogen , Total Kjeldahl as N (mg/L as N)	Report Only	
Ammonia, Total as N (mg/L as N)	Report Only	
NO2+No3, Total as N (mg/L as N)	Report Only	
Ammonia, Unionized as N (mg/l as N)	Maximum 0.02	
Sulfate (mg/L as S)	Report Only	
Chlorophyll A (ug/L)	Monthly Average 85%	
Stage		Monitored Continuously an d used to determine flow as the point of discharge
Non-Metallic Priority Pollutants		Sampled Annually
Metals		Sampled Annually for: Hg, Pb, Cd, Cu, Zn, Fe, Ni, Ag
Upstream from Spencer wetland in unnamed tributary of Little Black Creek (SWU-1)		
Total Nitrogen, as N (mg/L as N)	Report Only	Sampled Quarterly
Phosphorous, Total as P (mg/L as P)	Report Only	
Downstream from Spencer wetland in unnamed tributary of Little Black Creek (SWD-1)		
Total Nitrogen, as N (mg/L as N)	Report Only	Sampled Quarterly
Phosphorous, Total as P (mg/L as P)	Report Only	

Description of permitted outfall: From constructed wetland into unnamed tributary of Little Black Creek.		
List permit violations (DMR data) and plant upsets that occurred at the plant within the past year: In November 2000, the total Nitrogen monthly average was in exceedance. The permit allows for 6 mg/L. The reported monthly average was 8.42 mg/L. In July 2001 levels of iron, silver and lead were found to be 58.7, 1.7, and 6.2 respectively.		
Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions: The last Wqbel was completed on August 13, 1999. The study recommends lowering the phosphorous permit limits from 5mg/l to 2 based on the assimilative capacity of the Spencer wetland.		
Discuss MOR 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 the North Prong of Double Branch Creek approximately above Turtle Dove Road) and a downstream test site (located in the South Prong of Double Branch Creek approximately 15 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 February 11, 2002.

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 (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 3. 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, Rhapidocelis 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.

Statistical comparisons of the proportions of taxa, major groups, or feeding groups were made using 95% confidence intervals on proportions. A 95% confidence interval is the range of values above and below a given proportion that has a 95% chance of containing the true proportion (Sokal and Rohlf 1995). If the 95% confidence intervals for two proportions do not overlap, then the proportion of X in sample 1 is significantly different from the proportion of X in sample 2 at $p<0.05$. A "$p<0.05$" level of significance means that there is less than a 5% chance that the true proportions in the two samples are the same. All comparisons that are labeled as significant in the text have a probability <0.05 that the proportions are the same.

Appendix 4

Chemical analyses of effluent and receiving water

Spencer Wastewater Treatment Plant: Analytes tested for in effluent and receiving waters

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
2/11/2002 9:00	CONTROL SITE	Bio-AGP/LimNut	Algal Growth Potential	5.09	mg DryWt/L		0.1	0.3
2/11/2002 9:00	CONTROL SITE	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
2/11/2002 9:00	CONTROL SITE	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
2/11/2002 9:00	CONTROL SITE	Bio-Peri/Phyto	Phytoplankton-Quantitative-# Wet Taxa		#Taxa			
2/11/2002 9:00	CONTROL SITE	Bio-Peri/Phyto	Phytoplankton-Quantitative-#Diatom Taxa		#Taxa			
2/11/2002 9:00	CONTROL SITE	Nutrients-Liquid	Ammonia-N	0.023	mg N/L	J	0.01	0.02
2/11/2002 9:00	CONTROL SITE	Nutrients-Liquid	NO2NO3-N	0.072	mg N/L		0.004	0.01
2/11/2002 9:00	CONTROL SITE	Nutrients-Liquid	N_KJEL_TOT	0.47	mg N/L		0.06	0.2
2/11/2002 9:00	CONTROL SITE	Nutrients-Liquid	O-Phosphate-P	0.016	mg P/L		0.004	0.01
2/11/2002 9:00	CONTROL SITE	Nutrients-Liquid	Total-P	0.035	mg P/L	I	0.015	0.04
2/11/2002 9:00	CONTROL SITE REP.2	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	21	# Taxa			
2/11/2002 9:00	CONTROL SITE REP.3	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	15	# Taxa			
2/11/2002 9:00	CONTROL SITE REP1	Bio-Chl-a	Chlorophyll-A, Monochromatic, Periphyton	8.7	mg/m2		0.17	0.51
2/11/2002 9:00	CONTROL SITE REP1	Bio-Chl-a	Phaeophytin-A, Monochromatic, Periphyton	0	mg/m2		0.17	0.51
2/11/2002 9:00	CONTROL SITE REP1	Bio-Invertebrates	Macroinvert-FW-Qual-Dipnetx20-# Taxa	21	# Taxa			
2/11/2002 9:00	CONTROL SITE REP1	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	18	# Taxa			
2/11/2002 9:00	CONTROL SITE REP1	Bio-Peri/Phyto	Periphyton-Quantitative-# Diatom Taxa	8	#Taxa			
2/11/2002 9:00	CONTROL SITE REP1	Bio-Peri/Phyto	Periphyton-Quantitative-# Wet Taxa	11	#Taxa			
2/11/2002 7:15	EQUIP BLK	BNA-Water	1,2,4,5-Tetrachlorobenzene	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	1,2,4-Trichlorobenzene	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	1,2-Dichlorobenzene	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	1,3,5-Trinitrobenzene	3.9	ug/L	U	3.9	16
2/11/2002 7:15	EQUIP BLK	BNA-Water	1,3-Dichlorobenzene	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	1,3-Dinitrobenzene	1.9	ug/L	U	1.9	7.8
2/11/2002 7:15	EQUIP BLK	BNA-Water	1,4-Dichlorobenzene	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	1,4-Naphthoquinone	19	ug/L	U	19	78
2/11/2002 7:15	EQUIP BLK	BNA-Water	1-Naphthylamine	9.7	ug/L	U	9.7	39
2/11/2002 7:15	EQUIP BLK	BNA-Water	2,3,4,6-Tetrachlorophenol	1.9	ug/L	U	1.9	7.8
2/11/2002 7:15	EQUIP BLK	BNA-Water	2,4,5-Trichlorophenol	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	2,4,6-Trichlorophenol	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	2,4-Dichlorophenol	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	2,4-Dimethylphenol	49	ug/L	U	49	190
2/11/2002 7:15	EQUIP BLK	BNA-Water	2,4-Dinitrophenol	15	ug/L	U	15	58
2/11/2002 7:15	EQUIP BLK	BNA-Water	2,4-Dinitrotoluene	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	2,6-Dichlorophenol	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	2,6-Dinitrotoluene	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	2-Acetylaminofluorene	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	2-Chloronaphthalene	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	2-Chlorophenol	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	2-Methyl-4,6-dinitrophenol	2.9	ug/L	U	2.9	12
2/11/2002 7:15	EQUIP BLK	BNA-Water	2-Methylnaphthalene	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	2-Naphthylamine	9.7	ug/L	U	9.7	39
2/11/2002 7:15	EQUIP BLK	BNA-Water	2-Nitroaniline	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	2-Nitrophenol	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	2-Picoline	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	3,3'-Dichlorobenzidine	39	ug/L	U	39	160
2/11/2002 7:15	EQUIP BLK	BNA-Water	3,3'-Dimethylbenzidine	19	ug/L	U	19	78
2/11/2002 7:15	EQUIP BLK	BNA-Water	3-Methylcholanthrene	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	3-Nitroaniline	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	4,4'-DDD	1.5	ug/L	U	1.5	5.8
2/11/2002 7:15	EQUIP BLK	BNA-Water	4,4'-DDE	1.5	ug/L	U	1.5	5.8
2/11/2002 7:15	EQUIP BLK	BNA-Water	4,4'-DDT	1.5	ug/L	U	1.5	5.8
2/11/2002 7:15	EQUIP BLK	BNA-Water	4-Aminobiphenyl	3.9	ug/L	U	3.9	16
2/11/2002 7:15	EQUIP BLK	BNA-Water	4-Bromophenyl phenyl ether	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	4-Chloro-3-methylphenol	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	4-Chloroaniline	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	4-Chlorophenyl phenyl ether	1.9	ug/L	U	1.9	7.8
2/11/2002 7:15	EQUIP BLK	BNA-Water	4-Nitroaniline	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	4-Nitrophenol	15	ug/L	U	15	58
2/11/2002 7:15	EQUIP BLK	BNA-Water	5-Nitro-o-toluidine	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15	EQUIP BLK	BNA-Water	7,12-Dimethylbenz(a)anthracene	0.97	ug/L	U	0.97	3.9

2/11/2002 7:15 EQUIP BLK	BNA-Water	Acenaphthene	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Acenaphthylene	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Acetophenone	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Aldrin	1.5 ug/L	U	1.5	5.8
2/11/2002 7:15 EQUIP BLK	BNA-Water	Aniline	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Anthracene	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Azobenzene/1,2-Diphenylhydrazine	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Benzidine	97 ug/L	U	97	390
2/11/2002 7:15 EQUIP BLK	BNA-Water	Benzo(a)anthracene	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Benzo(a)pyrene	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Benzo(b)fluoranthene	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Benzo(g,h,i)perylene	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Benzo(k)fluoranthene	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Benzyl alcohol	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Bis(2-chloroethoxy)methane	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Bis(2-chloroethyl)ether	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Bis(2-chloroisopropyl)ether	2.9 ug/L	U	2.9	12
2/11/2002 7:15 EQUIP BLK	BNA-Water	Bis(2-ethylhexyl)phthalate	15 ug/L	U	15	58
2/11/2002 7:15 EQUIP BLK	BNA-Water	Butyl benzyl phthalate	4.9 ug/L	U	4.9	19
2/11/2002 7:15 EQUIP BLK	BNA-Water	Chrysene	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Di-n-butyl phthalate	4.9 ug/L	U	4.9	19
2/11/2002 7:15 EQUIP BLK	BNA-Water	Di-n-octyl phthalate	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Dibenzo(a,h)anthracene	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Dibenzofuran	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Dieldrin	1.5 ug/L	U	1.5	5.8
2/11/2002 7:15 EQUIP BLK	BNA-Water	Diethyl phthalate	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Dimethyl phthalate	49 ug/L	U	49	190
2/11/2002 7:15 EQUIP BLK	BNA-Water	Dimethylaminoazobenzene	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Dinoseb	3.9 ug/L	U	3.9	16
2/11/2002 7:15 EQUIP BLK	BNA-Water	Diphenylamine	2.9 ug/L	U	2.9	12
2/11/2002 7:15 EQUIP BLK	BNA-Water	Endosulfan I	3.9 ug/L	U	3.9	16
2/11/2002 7:15 EQUIP BLK	BNA-Water	Endosulfan II	3.9 ug/L	U	3.9	16
2/11/2002 7:15 EQUIP BLK	BNA-Water	Endosulfan sulfate	1.5 ug/L	U	1.5	5.8
2/11/2002 7:15 EQUIP BLK	BNA-Water	Endrin	1.5 ug/L	U	1.5	5.8
2/11/2002 7:15 EQUIP BLK	BNA-Water	Endrin aldehyde	3.9 ug/L	U	3.9	16
2/11/2002 7:15 EQUIP BLK	BNA-Water	Ethyl methanesulfonate	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Fluoranthene	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Fluorene	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Heptachlor	1.5 ug/L	U	1.5	5.8
2/11/2002 7:15 EQUIP BLK	BNA-Water	Heptachlor epoxide	1.5 ug/L	U	1.5	5.8
2/11/2002 7:15 EQUIP BLK	BNA-Water	Hexachlorobenzene	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Hexachlorobutadiene	2.9 ug/L	U	2.9	12
2/11/2002 7:15 EQUIP BLK	BNA-Water	Hexachlorocyclopentadiene	2.9 ug/L	U	2.9	12
2/11/2002 7:15 EQUIP BLK	BNA-Water	Hexachloroethane	2.9 ug/L	U	2.9	12
2/11/2002 7:15 EQUIP BLK	BNA-Water	Hexachloropropene	1.9 ug/L	U	1.9	7.8
2/11/2002 7:15 EQUIP BLK	BNA-Water	Indeno(1,2,3-cd)pyrene	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Isophorone	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Isosafrole	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Methapyrilene	3.9 ug/L	U	3.9	16
2/11/2002 7:15 EQUIP BLK	BNA-Water	Methyl methanesulfonate	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	N-Nitrosodi-n-butylamine	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	N-Nitrosodi-n-propylamine	1.9 ug/L	U	1.9	7.8
2/11/2002 7:15 EQUIP BLK	BNA-Water	N-Nitrosodiethylamine	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	N-Nitrosodimethylamine	1.9 ug/L	U	1.9	7.8
2/11/2002 7:15 EQUIP BLK	BNA-Water	N-Nitrosodiphenylamine	2.9 ug/L	U	2.9	12
2/11/2002 7:15 EQUIP BLK	BNA-Water	N-Nitrosomethylethylamine	1.9 ug/L	U	1.9	7.8
2/11/2002 7:15 EQUIP BLK	BNA-Water	N-Nitrosomorpholine	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	N-Nitrosopiperidine	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	N-Nitrosopyrrolidine	1.9 ug/L	U	1.9	7.8
2/11/2002 7:15 EQUIP BLK	BNA-Water	Naphthalene	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Nitrobenzene	1.9 ug/L	U	1.9	7.8
2/11/2002 7:15 EQUIP BLK	BNA-Water	Nitroquinoline-1-oxide	19 ug/L	U	19	78
2/11/2002 7:15 EQUIP BLK	BNA-Water	Pentachlorobenzene	0.97 ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Pentachloroethane	49 ug/L	U	49	190

2/11/2002 7:15 EQUIP BLK	BNA-Water	Pentachloronitrobenzene	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Pentachlorophenol	2.9	ug/L	U	2.9	12
2/11/2002 7:15 EQUIP BLK	BNA-Water	Phenacetin	3.9	ug/L	U	3.9	12
2/11/2002 7:15 EQUIP BLK	BNA-Water	Phenanthrene	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Phenol	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Pyrene	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	Pyridine	3.9	ug/L	U	3.9	16
2/11/2002 7:15 EQUIP BLK	BNA-Water	Safrole	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	BNA-Water	alpha-BHC	1.5	ug/L	U	1.5	5.8
2/11/2002 7:15 EQUIP BLK	BNA-Water	beta-BHC	1.5	ug/L	U	1.5	5.8
2/11/2002 7:15 EQUIP BLK	BNA-Water	delta-BHC	1.5	ug/L	U	1.5	5.8
2/11/2002 7:15 EQUIP BLK	BNA-Water	gamma-BHC	1.5	ug/L	U	1.5	5.8
2/11/2002 7:15 EQUIP BLK	BNA-Water	m,p-Cresols	1.9	ug/L	U	1.9	7.8
2/11/2002 7:15 EQUIP BLK	BNA-Water	o-Cresol	1.9	ug/L	U	1.9	7.8
2/11/2002 7:15 EQUIP BLK	BNA-Water	o-Toluidine	0.97	ug/L	U	0.97	3.9
2/11/2002 7:15 EQUIP BLK	Bio-AGP/LimNut	Algal Growth Potential	0.1	mg DryWt/L	U	0.1	0.3
2/11/2002 7:15 EQUIP BLK	GC-Water	Alachlor	0.59	ug/L	U	0.59	2.36
2/11/2002 7:15 EQUIP BLK	GC-Water	Ametryn	0.049	ug/L	U	0.049	0.196
2/11/2002 7:15 EQUIP BLK	GC-Water	Atrazine	0.049	ug/L	U	0.049	0.196
2/11/2002 7:15 EQUIP BLK	GC-Water	Azinphos Methyl	0.049	ug/L	U	0.049	0.196
2/11/2002 7:15 EQUIP BLK	GC-Water	Bromacil	0.2	ug/L	U	0.2	0.8
2/11/2002 7:15 EQUIP BLK	GC-Water	Butylate	0.2	ug/L	U	0.2	0.8
2/11/2002 7:15 EQUIP BLK	GC-Water	Chlorpyrifos Ethyl	0.049	ug/L	U	0.049	0.196
2/11/2002 7:15 EQUIP BLK	GC-Water	Chlorpyrifos Methyl	0.098	ug/L	U	0.098	0.392
2/11/2002 7:15 EQUIP BLK	GC-Water	Diazinon	0.049	ug/L	U	0.049	0.196
2/11/2002 7:15 EQUIP BLK	GC-Water	Ethion	0.049	ug/L	U	0.049	0.196
2/11/2002 7:15 EQUIP BLK	GC-Water	Ethoprop	0.098	ug/L	U	0.098	0.392
2/11/2002 7:15 EQUIP BLK	GC-Water	Fenamiphos	0.2	ug/L	U	0.2	0.8
2/11/2002 7:15 EQUIP BLK	GC-Water	Fonofos	0.098	ug/L	U	0.098	0.392
2/11/2002 7:15 EQUIP BLK	GC-Water	Hexazinone	0.098	ug/L	U	0.098	0.392
2/11/2002 7:15 EQUIP BLK	GC-Water	Malathion	0.15	ug/L	U	0.15	0.6
2/11/2002 7:15 EQUIP BLK	GC-Water	Metalaxyl	0.25	ug/L	U	0.25	1
2/11/2002 7:15 EQUIP BLK	GC-Water	Metolachlor	0.49	ug/L	U	0.49	1.96
2/11/2002 7:15 EQUIP BLK	GC-Water	Metribuzin	0.098	ug/L	U	0.098	0.392
2/11/2002 7:15 EQUIP BLK	GC-Water	Mevinphos	0.2	ug/L	U	0.2	0.8
2/11/2002 7:15 EQUIP BLK	GC-Water	Naled	0.78	ug/L	U	0.78	3.12
2/11/2002 7:15 EQUIP BLK	GC-Water	Norflurazon	0.098	ug/L	U	0.098	0.392
2/11/2002 7:15 EQUIP BLK	GC-Water	Parathion Ethyl	0.15	ug/L	U	0.15	0.6
2/11/2002 7:15 EQUIP BLK	GC-Water	Parathion Methyl	0.098	ug/L	U	0.098	0.392
2/11/2002 7:15 EQUIP BLK	GC-Water	Phorate	0.049	ug/L	U	0.049	0.196
2/11/2002 7:15 EQUIP BLK	GC-Water	Prometryn	0.15	ug/L	U	0.15	0.6
2/11/2002 7:15 EQUIP BLK	GC-Water	Simazine	0.049	ug/L	U	0.049	0.196
2/11/2002 7:15 EQUIP BLK	Metals-Water	Aluminum_308	75	ug/L	U	75	300
2/11/2002 7:15 EQUIP BLK	Metals-Water	Arsenic	3	ug/L	U	3	12
2/11/2002 7:15 EQUIP BLK	Metals-Water	Cadmium	0.025	ug/L	U	0.025	0.1
2/11/2002 7:15 EQUIP BLK	Metals-Water	Calcium	0.1	mg/L	U	0.1	0.4
2/11/2002 7:15 EQUIP BLK	Metals-Water	Chromium	2	ug/L	U	2	8
2/11/2002 7:15 EQUIP BLK	Metals-Water	Copper	0.75	ug/L	U	0.75	3
2/11/2002 7:15 EQUIP BLK	Metals-Water	Iron_271	35	ug/L	U	35	140
2/11/2002 7:15 EQUIP BLK	Metals-Water	Lead	0.3	ug/L	U	0.3	1.2
2/11/2002 7:15 EQUIP BLK	Metals-Water	Magnesium	0.025	mg/L	U	0.025	0.1
2/11/2002 7:15 EQUIP BLK	Metals-Water	Nickel	2	ug/L	U	2	8
2/11/2002 7:15 EQUIP BLK	Metals-Water	Selenium	0.5	ug/L	U	0.5	2
2/11/2002 7:15 EQUIP BLK	Metals-Water	Silver	0.02	ug/L	U	0.02	0.08
2/11/2002 7:15 EQUIP BLK	Metals-Water	Zinc	2	ug/L	U	2	8
2/11/2002 7:15 EQUIP BLK	Nutrients-Liquid	Ammonia-N	0.01	mg N/L	U	0.01	0.02
2/11/2002 7:15 EQUIP BLK	Nutrients-Liquid	NO2NO3-N	0.004	mg N/L	U	0.004	0.01
2/11/2002 7:15 EQUIP BLK	Nutrients-Liquid	N_KJEL_TOT	0.06	mg N/L	U	0.06	0.2
2/11/2002 7:15 EQUIP BLK	Nutrients-Liquid	O-Phosphate-P	0.004	mg P/L	U	0.004	0.01
2/11/2002 7:15 EQUIP BLK	Nutrients-Liquid	Total-P	0.015	mg P/L	U	0.015	0.04

2/11/2002 11:25 F.EFFLUENT	BNA-Water	1,2,4,5-Tetrachlorobenzene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	1,2,4-Trichlorobenzene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	1,2-Dichlorobenzene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	1,3,5-Trinitrobenzene	3.8 ug/L	U	3.8	15
2/11/2002 11:25 F.EFFLUENT	BNA-Water	1,3-Dichlorobenzene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	1,3-Dinitrobenzene	1.9 ug/L	U	1.9	7.5
2/11/2002 11:25 F.EFFLUENT	BNA-Water	1,4-Dichlorobenzene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	1,4-Naphthoquinone	19 ug/L	U	19	75
2/11/2002 11:25 F.EFFLUENT	BNA-Water	1-Naphthylamine	9.4 ug/L	U	9.4	38
2/11/2002 11:25 F.EFFLUENT	BNA-Water	2,3,4,6-Tetrachlorophenol	1.9 ug/L	U	1.9	7.5
2/11/2002 11:25 F.EFFLUENT	BNA-Water	2,4,5-Trichlorophenol	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	2,4,6-Trichlorophenol	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	2,4-Dichlorophenol	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	2,4-Dimethylphenol	47 ug/L	U	47	190
2/11/2002 11:25 F.EFFLUENT	BNA-Water	2,4-Dinitrophenol	14 ug/L	U	14	57
2/11/2002 11:25 F.EFFLUENT	BNA-Water	2,4-Dinitrotoluene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	2,6-Dichlorophenol	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	2,6-Dinitrotoluene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	2-Acetylaminofluorene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	2-Chloronaphthalene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	2-Chlorophenol	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	2-Methyl-4,6-dinitrophenol	2.8 ug/L	U	2.8	11
2/11/2002 11:25 F.EFFLUENT	BNA-Water	2-Methylnaphthalene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	2-Naphthylamine	9.4 ug/L	U	9.4	38
2/11/2002 11:25 F.EFFLUENT	BNA-Water	2-Nitroaniline	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	2-Nitrophenol	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	2-Picoline	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	3,3'-Dichlorobenzidine	38 ug/L	U	38	150
2/11/2002 11:25 F.EFFLUENT	BNA-Water	3,3'-Dimethylbenzidine	19 ug/L	U	19	75
2/11/2002 11:25 F.EFFLUENT	BNA-Water	3-Methylcholanthrene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	3-Nitroaniline	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	4,4'-DDD	1.4 ug/L	U	1.4	5.7
2/11/2002 11:25 F.EFFLUENT	BNA-Water	4,4'-DDE	1.4 ug/L	U	1.4	5.7
2/11/2002 11:25 F.EFFLUENT	BNA-Water	4,4'-DDT	1.4 ug/L	U	1.4	5.7
2/11/2002 11:25 F.EFFLUENT	BNA-Water	4-Aminobiphenyl	3.8 ug/L	U	3.8	15
2/11/2002 11:25 F.EFFLUENT	BNA-Water	4-Bromophenyl phenyl ether	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	4-Chloro-3-methylphenol	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	4-Chloroaniline	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	4-Chlorophenyl phenyl ether	1.9 ug/L	U	1.9	7.5
2/11/2002 11:25 F.EFFLUENT	BNA-Water	4-Nitroaniline	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	4-Nitrophenol	14 ug/L	U	14	57
2/11/2002 11:25 F.EFFLUENT	BNA-Water	5-Nitro-o-toluidine	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	7,12-Dimethylbenz(a)anthracene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Acenaphthene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Acenaphthylene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Acetophenone	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Aldrin	1.4 ug/L	U	1.4	5.7
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Aniline	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Anthracene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Azobenzene/1,2-Diphenylhydrazine	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Benzidine	94 ug/L	U	94	380
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Benzo(a)anthracene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Benzo(a)pyrene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Benzo(b)fluoranthene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Benzo(g,h,i)perylene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Benzo(k)fluoranthene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Benzyl alcohol	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Bis(2-chloroethoxy)methane	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Bis(2-chloroethyl)ether	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Bis(2-chloroisopropyl)ether	2.8 ug/L	U	2.8	11
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Bis(2-ethylhexyl)phthalate	14 ug/L	U	14	57
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Butyl benzyl phthalate	4.7 ug/L	U	4.7	19
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Chrysene	0.94 ug/L	U	0.94	3.8
2/11/2002 11:25 F.EFFLUENT	BNA-Water	Di-n-butyl phthalate	4.7 ug/L	U	4.7	19

2/11/2002 11:25	F.EFFLUENT	BNA-Water	Di-n-octyl phthalate	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Dibenzo(a,h)anthracene	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Dibenzofuran	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Dieldrin	1.4	ug/L	U	1.4	5.7
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Diethyl phthalate	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Dimethyl phthalate	47	ug/L	U	47	190
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Dimethylaminoazobenzene	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Dinoseb	3.8	ug/L	U	3.8	15
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Diphenylamine	2.8	ug/L	U	2.8	11
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Endosulfan I	3.8	ug/L	U	3.8	15
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Endosulfan II	3.8	ug/L	U	3.8	15
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Endosulfan sulfate	1.4	ug/L	U	1.4	5.7
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Endrin	1.4	ug/L	U	1.4	5.7
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Endrin aldehyde	3.8	ug/L	U	3.8	15
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Ethyl methanesulfonate	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Fluoranthene	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Fluorene	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Heptachlor	1.4	ug/L	U	1.4	5.7
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Heptachlor epoxide	1.4	ug/L	U	1.4	5.7
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Hexachlorobenzene	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Hexachlorobutadiene	2.8	ug/L	U	2.8	11
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Hexachlorocyclopentadiene	2.8	ug/L	U	2.8	11
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Hexachloroethane	2.8	ug/L	U	2.8	11
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Hexachloropropene	1.9	ug/L	U	1.9	7.5
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Indeno(1,2,3-cd)pyrene	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Isophorone	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Isosafrole	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Methapyrilene	3.8	ug/L	U	3.8	15
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Methyl methanesulfonate	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	N-Nitrosodi-n-butylamine	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	N-Nitrosodi-n-propylamine	1.9	ug/L	U	1.9	7.5
2/11/2002 11:25	F.EFFLUENT	BNA-Water	N-Nitrosodiethylamine	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	N-Nitrosodimethylamine	1.9	ug/L	U	1.9	7.5
2/11/2002 11:25	F.EFFLUENT	BNA-Water	N-Nitrosodiphenylamine	2.8	ug/L	U	2.8	11
2/11/2002 11:25	F.EFFLUENT	BNA-Water	N-Nitrosomethylethylamine	1.9	ug/L	U	1.9	7.5
2/11/2002 11:25	F.EFFLUENT	BNA-Water	N-Nitrosomorpholine	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	N-Nitrosopiperidine	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	N-Nitrosopyrrolidine	1.9	ug/L	U	1.9	7.5
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Naphthalene	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Nitrobenzene	1.9	ug/L	U	1.9	7.5
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Nitroquinoline-1-oxide	19	ug/L	U	19	75
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Pentachlorobenzene	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Pentachloroethane	47	ug/L	U	47	190
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Pentachloronitrobenzene	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Pentachlorophenol	2.8	ug/L	U	2.8	11
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Phenacetin	3.8	ug/L	U	3.8	11
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Phenanthrene	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Phenol	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Pyrene	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Pyridine	3.8	ug/L	U	3.8	15
2/11/2002 11:25	F.EFFLUENT	BNA-Water	Safrole	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	BNA-Water	alpha-BHC	1.4	ug/L	U	1.4	5.7
2/11/2002 11:25	F.EFFLUENT	BNA-Water	beta-BHC	1.4	ug/L	U	1.4	5.7
2/11/2002 11:25	F.EFFLUENT	BNA-Water	delta-BHC	1.4	ug/L	U	1.4	5.7
2/11/2002 11:25	F.EFFLUENT	BNA-Water	gamma-BHC	1.4	ug/L	U	1.4	5.7
2/11/2002 11:25	F.EFFLUENT	BNA-Water	m,p-Cresols	1.9	ug/L	U	1.9	7.5
2/11/2002 11:25	F.EFFLUENT	BNA-Water	o-Cresol	1.9	ug/L	U	1.9	7.5
2/11/2002 11:25	F.EFFLUENT	BNA-Water	o-Toluidine	0.94	ug/L	U	0.94	3.8
2/11/2002 11:25	F.EFFLUENT	Bio-AGP/LimNut	Algal Growth Potential	121	mg DryWt/L	A	0.1	0.3
2/11/2002 11:25	F.EFFLUENT	Bio-Toxicology	Bioassay-Acute-Screen-FW-C.dubia, LC50	100	LC50	L		
2/11/2002 11:25	F.EFFLUENT	Bio-Toxicology	Bioassay-Acute-Screen-FW-Fish, LC50	100	LC50	L		
2/11/2002 11:25	F.EFFLUENT	GC-Water	Alachlor	0.57	ug/L	U	0.57	2.28
2/11/2002 11:25	F.EFFLUENT	GC-Water	Ametryn	0.048	ug/L	U	0.048	0.192
2/11/2002 11:25	F.EFFLUENT	GC-Water	Atrazine	0.45	ug/L		0.048	0.192

2/11/2002 11:25 F.EFFLUENT	GC-Water	Azinphos Methyl	0.048	ug/L	U	0.048	0.192
2/11/2002 11:25 F.EFFLUENT	GC-Water	Bromacil	0.19	ug/L	U	0.19	0.76
2/11/2002 11:25 F.EFFLUENT	GC-Water	Butylate	0.19	ug/L	U	0.19	0.76
2/11/2002 11:25 F.EFFLUENT	GC-Water	Chlorpyrifos Ethyl	0.048	ug/L	U	0.048	0.192
2/11/2002 11:25 F.EFFLUENT	GC-Water	Chlorpyrifos Methyl	0.095	ug/L	U	0.095	0.38
2/11/2002 11:25 F.EFFLUENT	GC-Water	Diazinon	0.048	ug/L	U	0.048	0.192
2/11/2002 11:25 F.EFFLUENT	GC-Water	Ethion	0.048	ug/L	U	0.048	0.192
2/11/2002 11:25 F.EFFLUENT	GC-Water	Ethoprop	0.095	ug/L	U	0.095	0.38
2/11/2002 11:25 F.EFFLUENT	GC-Water	Fenamiphos	0.19	ug/L	U	0.19	0.76
2/11/2002 11:25 F.EFFLUENT	GC-Water	Fonofos	0.28	ug/L	I	0.095	0.38
2/11/2002 11:25 F.EFFLUENT	GC-Water	Hexazinone	0.095	ug/L	U	0.095	0.38
2/11/2002 11:25 F.EFFLUENT	GC-Water	Malathion	0.14	ug/L	U	0.14	0.56
2/11/2002 11:25 F.EFFLUENT	GC-Water	Metalaxyl	0.24	ug/L	U	0.24	0.96
2/11/2002 11:25 F.EFFLUENT	GC-Water	Metolachlor	0.48	ug/L	U	0.48	1.92
2/11/2002 11:25 F.EFFLUENT	GC-Water	Metribuzin	0.095	ug/L	U	0.095	0.38
2/11/2002 11:25 F.EFFLUENT	GC-Water	Mevinphos	0.35	ug/L	U	0.19	0.76
2/11/2002 11:25 F.EFFLUENT	GC-Water	Naled	0.76	ug/L	U	0.76	3.04
2/11/2002 11:25 F.EFFLUENT	GC-Water	Norflurazon	0.095	ug/L	U	0.095	0.38
2/11/2002 11:25 F.EFFLUENT	GC-Water	Parathion Ethyl	0.14	ug/L	U	0.14	0.56
2/11/2002 11:25 F.EFFLUENT	GC-Water	Parathion Methyl	0.095	ug/L	U	0.095	0.38
2/11/2002 11:25 F.EFFLUENT	GC-Water	Phorate	0.048	ug/L	U	0.048	0.192
2/11/2002 11:25 F.EFFLUENT	GC-Water	Prometryn	0.14	ug/L	U	0.14	0.56
2/11/2002 11:25 F.EFFLUENT	GC-Water	Simazine	0.048	ug/L	U	0.048	0.192
2/11/2002 11:25 F.EFFLUENT	Metals-Water	Aluminum_308	75	ug/L	U	75	300
2/11/2002 11:25 F.EFFLUENT	Metals-Water	Arsenic	3	ug/L	U	3	12
2/11/2002 11:25 F.EFFLUENT	Metals-Water	Cadmium	0.025	ug/L	U	0.025	0.1
2/11/2002 11:25 F.EFFLUENT	Metals-Water	Calcium	24.4	mg/L	A	0.1	0.4
2/11/2002 11:25 F.EFFLUENT	Metals-Water	Chromium	2	ug/L	U	2	8
2/11/2002 11:25 F.EFFLUENT	Metals-Water	Copper	0.94	ug/L	I	0.75	3
2/11/2002 11:25 F.EFFLUENT	Metals-Water	Iron_271	250	ug/L	A	35	140
2/11/2002 11:25 F.EFFLUENT	Metals-Water	Lead	0.3	ug/L	U	0.3	1.2
2/11/2002 11:25 F.EFFLUENT	Metals-Water	Magnesium	11.1	mg/L	A	0.025	0.1
2/11/2002 11:25 F.EFFLUENT	Metals-Water	Nickel	2	ug/L	U	2	8
2/11/2002 11:25 F.EFFLUENT	Metals-Water	Selenium	0.5	ug/L	U	0.5	2
2/11/2002 11:25 F.EFFLUENT	Metals-Water	Silver	0.02	ug/L	U	0.02	0.08
2/11/2002 11:25 F.EFFLUENT	Metals-Water	Zinc	49.2	ug/L	A	2	8
2/11/2002 11:25 F.EFFLUENT	Nutrients-Liquid	Ammonia-N	0.81	mg N/L	A	0.1	0.2
2/11/2002 11:25 F.EFFLUENT	Nutrients-Liquid	NO2NO3-N	1.7	mg N/L		0.04	0.1
2/11/2002 11:25 F.EFFLUENT	Nutrients-Liquid	N_KJEL_TOT	1.5	mg N/L	A	0.06	0.2
2/11/2002 11:25 F.EFFLUENT	Nutrients-Liquid	O-Phosphate-P	0.081	mg P/L		0.008	0.02
2/11/2002 11:25 F.EFFLUENT	Nutrients-Liquid	Total-P	0.19	mg P/L	A	0.015	0.04
2/11/2002 11:50 TEST SITE	Bio-AGP/LimNut	Algal Growth Potential	23.7	mg DryWt/L		0.1	0.3
2/11/2002 11:50 TEST SITE	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
2/11/2002 11:50 TEST SITE	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
2/11/2002 11:50 TEST SITE	Bio-Peri/Phyto	Phytoplankton-Quantitative-# Wet Taxa		#Taxa			
2/11/2002 11:50 TEST SITE	Bio-Peri/Phyto	Phytoplankton-Quantitative-#Diatom Taxa		#Taxa			
2/11/2002 11:50 TEST SITE	Nutrients-Liquid	Ammonia-N	0.053	mg N/L	JA	0.01	0.02
2/11/2002 11:50 TEST SITE	Nutrients-Liquid	NO2NO3-N	0.35	mg N/L		0.004	0.01
2/11/2002 11:50 TEST SITE	Nutrients-Liquid	N_KJEL_TOT	0.68	mg N/L		0.06	0.2
2/11/2002 11:50 TEST SITE	Nutrients-Liquid	O-Phosphate-P	0.063	mg P/L		0.004	0.01
2/11/2002 11:50 TEST SITE	Nutrients-Liquid	Total-P	0.086	mg P/L		0.015	0.04
2/11/2002 11:50 TEST SITE REP 1	Bio-Chl-a	Chlorophyll-A, Monochromatic, Periphyton	4.4	mg/m2	A	0.095	0.28
2/11/2002 11:50 TEST SITE REP 1	Bio-Chl-a	Phaeophytin-A, Monochromatic, Periphyton	0.32	mg/m2	A	0.095	0.28
2/11/2002 11:50 TEST SITE REP 1	Bio-Invertebrates	Macroinvert-FW-Qual-Dipnetx20-# Taxa	20	# Taxa			
2/11/2002 11:50 TEST SITE REP 1	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	21	# Taxa			
2/11/2002 11:50 TEST SITE REP 1	Bio-Peri/Phyto	Periphyton-Quantitative-# Diatom Taxa	15	#Taxa			
2/11/2002 11:50 TEST SITE REP 1	Bio-Peri/Phyto	Periphyton-Quantitative-# Wet Taxa	24	#Taxa			
2/11/2002 11:50 TEST SITE REP.2	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	22	# Taxa			
2/11/2002 11:50 TEST SITE REP.3	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	19	# Taxa			

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 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 FAC 62-302.530(47), 62-302.530(48)(a) 62-302.530(48)(b) and/or 62-302.530(62).

(5) Significance Testing

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	**8.7**
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	**3.35**
Hester-Dendy Taxa Richness	6	6.5	9	11.5	13	15	17	21.5	26	**29**	32	**26**
Dipnet Taxa Richness	9	12	17	**20**	22	24.5	26	28	31	37	53	**22**
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	**0.47**
Ammonia	0.02	**0.02**	0.04	0.05	0.06	0.08	0.11	0.14	0.20	0.34	0.60	**0.023**
Nitrate+nitrite	0.01	0.01	0.03	0.05	**0.07**	0.10	0.14	0.20	0.32	0.64	1.05	**0.072**
Total Phosphorus	0.02	**0.03**	0.05	0.06	0.10	0.13	0.18	0.25	0.39	0.74	1.51	**0.035**
Ortho-phosphate	0.01	**0.01**	0.03	0.04	0.05	0.08	0.11	0.17	0.27	0.59	1.37	**0.016**
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	**4.4**
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	**3.8**
Hester-Dendy Taxa Richness	6	6.5	9	11.5	13	15	17	21.5	26	**29**	32	**30**
Dipnet Taxa Richness	9	12	17	**20**	22	24.5	26	28	31	37	53	**20**
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	**0.68**
Ammonia	0.02	0.02	0.04	**0.05**	0.06	0.08	0.11	0.14	0.20	0.34	0.60	**0.053**
Nitrate+nitrite	0.01	0.01	0.03	0.05	0.07	0.10	0.14	0.20	**0.32**	0.64	1.05	**0.35**
Total Phosphorus	0.02	0.03	0.05	**0.06**	0.10	0.13	0.18	0.25	0.39	0.74	1.51	**0.086**
Ortho-phosphate	0.01	0.01	0.03	0.04	**0.05**	0.08	0.11	0.17	0.27	0.59	1.37	**0.063**
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

Chemical analyses of effluent and receiving water

STATE OF FLORIDA
DEPT. OF ENVIRONMENTAL PROTECTION
NORTHEAST DISTRICT

Division of Water Facilities
Surface Water Section

MICROBIOLOGICAL ANALYSIS REPORT

	Spencer WWTP		O'connor
DATE: COLLECTED	**RECEIVED**	**PROCESS START**	**COMPLETED**
2/11/02	14:45 2/11/02	15:00 2/11/02	15:00 2/12/02
SURVEY TYPE	**SAMPLE TYPE**	**COUNTY**	**ANALYTICAL METHOD**
Domestic Waste Compliance	5th year Final Effluent	Duval	Membrane Filter
ANALYST	**COMMENTS**		
Kallemeyn			

		Spencer WWTP						
020074		Control	13:50	15:30	633	B	72	B
020076		Test	12:00	15:30	430		92	
020075		Final Effluent	11:00	15:30	10	B	4	K

Tom Kallemeyn	2-13-02

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STATE OF FLORIDA

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

SAMPLE ID : 020074 STATION : DATE: 02/1102 TIME: 09:00
SAMPLE SOURCE Spencer WWTP SAMPLER: O'Connor/Kallemeyn
STATION LOCATION: Control site
PROGRAM MOD.: DW COMPLIANCE: ☒ ENFORCEMENT: ☐
FIELD MEASUREMENTS

Tot. Depth:	1.2	Sample Depth:	0.6	W.Temp. °C:	16.16
Conductivity: µmoh/cm (EPA 120.1) :	108.1	Diss. Oxygen (EPA 360.1)	8.37	EPA 170.1	
Stream Velocity:	0.18	Salinity:	0	T.R.C.: mg/L	
pH:(EPA 150.1)	6.83	Secchi:	0.3 L	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	2	Vol. S.S: EPA 160.4	1	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: 02/11/2002

Preservation: Ice Time: 14:45

Reported by: Bipin Adhyaru Date:: 02/18/2002

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 : 020076 STATION : DATE: 02/11/02 TIME: 11:50
SAMPLE SOURCE Spencer WWTP SAMPLER: O'Connor/Kallemeyn
STATION LOCATION: Test Site
PROGRAM MOD.: DW COMPLIANCE: ☒ ENFORCEMENT: ☐
FIELD MEASUREMENTS

Tot. Depth:	1.2	Sample Depth:	0.6	W.Temp. °C:	15.76
Conductivity; µmoh/cm (EPA 120.1) :	440	Diss. Oxygen (EPA 360.1)	5.58	EPA 170.1	
Stream Velocity:	0.18	Salinity:	0.2	T.R.C.: mg/L	
pH:(EPA 150.1)	6.76	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
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: 02/11/2002

Preservation: Ice Time: 14:45

Reported by: Bipin Adhyaru Date:: 02/18/2002

K – Actual value is known to be less than the value given.
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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, SUITE B-200 **Comp.QAP # 880236**
JACKSONVILLE, FL 32256-7577

SAMPLE ID : 020075 STATION : DATE: 02/11/02 TIME: 11:25
SAMPLE SOURCE Spencer WWTP SAMPLER: O'Connor/Kallemeyn
STATION LOCATION: Final Effluent
PROGRAM MOD.: DW COMPLIANCE: ☒ ENFORCEMENT: ☐
FIELD MEASUREMENTS

Tot. Depth:	2.0	Sample Depth:	1.0	W.Temp. °C:	21.55
Conductivity µmoh/cm (EPA 120.1) :	598	Diss. Oxygen (EPA 360.1)	6.74	EPA 170.1	
Stream Velocity:		Salinity:	0.3	T.R.C.: mg/L	
pH:(EPA 150.1)	6.73	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	2	Vol. S.S: EPA 160.4	2	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: 02/11/2002
Preservation: Ice Time: 14:45
Reported by: Bipin Adhyaru Date:: 02/18/2002

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.

Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the Spencer Wastewater Treatment Facility, Service Road behind Spencer Crossing S/D, Orange Park, Clay County, Florida, NPDES# FL0173371, performed from 12 to 14 February 2002.

Facility:	**Spencer Wastewater Treatment Facility**	**NPDES # FL0173371**	Facility Type:	**Wastewater**	**Analysts:**	Della Parker-Hanson	
Location:	**Service Rd. Spencer Crossing S/D**	Contact/District:	Brian Kelsay/Northeast	**Treatment Facility**		Joshua Ayres	
County:	**Clay**	Test type:	static acute screen			Gary Hardie	
Sample Collection Date:	2/11/2002 Time: 1125	# tests:	2	Receiving Water: **Little Bear Creek**		Marshall Faircloth	
Test Beginning Date:	2/12/2002 Time: 1415	Chlorination Type:	Chlorinated	Classification: **Class III freshwater**			
Test Ending Date:	2/14/2002 Time: 1355		sample collected after dechlorination	**Page 1 of 1**	**Reviewer:**	David Whiting	

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

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[A]			Dissolved Oxygen			Conductivity Uncorrected µm	
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	8.2	-	8.1	24.2	-	23.4	8.0	-	8.0	160	230
Control B	0/20	5	5	5	-	-	8.2	-	-	23.4	-	-	8.0	-	190
Control C	0/20	5	5	5	-	-	8.2	-	-	23.4	-	-	8.0	-	200
Control D	0/20	5	5	5	-	-	8.3	-	-	23.0	-	-	8.0	-	200
100% A	20/0	5	5	5	7.3	-	8.4	24.4	-	23.0	7.5	-	8.1	530	610
100% B	20/0	5	5	5	-	-	8.4	-	-	23.2	-	-	8.1	-	600
100% C	20/0	5	5	5	-	-	8.4	-	-	23.2	-	-	8.1	-	600
100% D	20/0	5	5	5	-	-	8.4	-	-	23.0	-	-	8.0	-	630

[A] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.0-24.5 C
Incubator #3 temperature range for the test period was 25.0-25.5C

LIMS	
Job number:	TLH-2002-02-12-22
sample number:	576340

Data Transcription Verification	
date:	11/22/2002
by:	Joshua Ayres
	Jacquelyn M. Brynda

Total Residual CL2	mg/L	Method
Field:	0.01	-
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:	0.386	0.005

Organism: ***Cyprinella leedsi*** Life stage: 9 days

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[B]			Dissolved Oxygen			Conductivity Uncorrected µm	
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	8.4	8.4	24.3	23.5	24.0	7.8	7.7	8.1	255	255
Control B	0/500	5	5	5	8.0	8.4	8.4	24.3	23.5	24.2	7.7	7.7	8.1	260	270
Control C	0/500	5	5	5	8.0	8.3	8.4	24.3	24.1	24.1	7.8	7.6	8.0	260	270
Cotnrol D	0/500	5	5	5	8.0	8.4	8.4	24.3	23.9	24.4	7.8	7.5	8.1	260	275
100% A	500/0	5	5	5	7.2	8.0	8.2	24.7	23.6	24.4	7.2	7.7	7.9	545	550
100% B	500/0	5	5	5	7.2	8.0	8.3	24.7	23.6	24.0	7.0	7.6	7.8	555	570
100 % C	500/0	5	5	5	7.2	8.0	8.3	24.7	23.6	24.0	6.9	7.5	7.8	560	600
100% D	500/0	5	5	5	7.2	7.9	8.2	24.7	23.7	24.0	6.8	7.5	7.8	560	580

[B] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.0-24.5 C
Incubator #3 temperature range for the test period was 25.0-25.5C

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control water (fish):	131	126
Control water (water flea):	76	76
100% Sample:	105	110

Appendix 8

Habitat Assessment and Field Sheets.

Control
P. 173

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 (MM/DD/YY): 2/12/02	TIME: 0945	RECEIVING BODY OF WATER: Little Black Creek
REMARKS:	COUNTY: Clay	LOCATION: NE Prong of Double Branch @ Turtle Dove Rd	FIELD ID NAME: Control Site	

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)
25	20	10		45			

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: 8

List & map dominant Vegetation on back

Typical Width (m) Depth (m)/Velocity (m/sec) Transect: 1-2 m wide; m/s; 0.1-.5 m/s; m/s; m deep; 0.3 m deep; m deep

Artificially Channelized ☒ no ☐ ☐ ☐ (recent, severe some recovery mostly recovered moderate/slight)

Artificially Impounded ☐ yes

High Water Mark: 1.0 + 0.3 = 1.3 (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)	10	5	Direct	Sand	85	5	Direct
Leaf Packs or Mats	1	5	Direct	Mud/Muck/Silt			
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots	5	5	Direct	Draw aerial view sketch of habitats found in 100 m section			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (S.U.):	D.O. (mg/l):	Cond. (umhos/cm) Or Salinity (ppt):			Secchi (m):
Top								
Mid-depth	0.15	16.16	6.83	8.37	108			0.3L
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: ☐

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: 60°S Clear Sky

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

SAMPLING TEAM: KAllemeyn, O'Connor

SIGNATURE: Patrick O'Connor

DATE: 2/11/02

Control
8-273

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 (MDY): 2/14/02	RECEIVING BODY OF WATER: Little Black Creek

REMARKS:	COUNTY: Clay	LOCATION: North Prong of Doctor Branch @ Turtle Dove RD	FIELD PHASE: Control Site

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components Substrate Diversity 11	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 50% productive habitat present at site. 20 19 18 17 16	16% to 50% productive habitat, by areal 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 13	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
Primary Score 45				
Secondary Habitat Components Artificial Channelization 16	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 10 Left Bank 4	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 9 Left Bank 6	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 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
Secondary Score 58				

TOTAL SCORE 103

ANALYSIS DATE: 2/14/02	ANALYST: O'Connor	SIGNATURE:

Continued p. 3 of 3

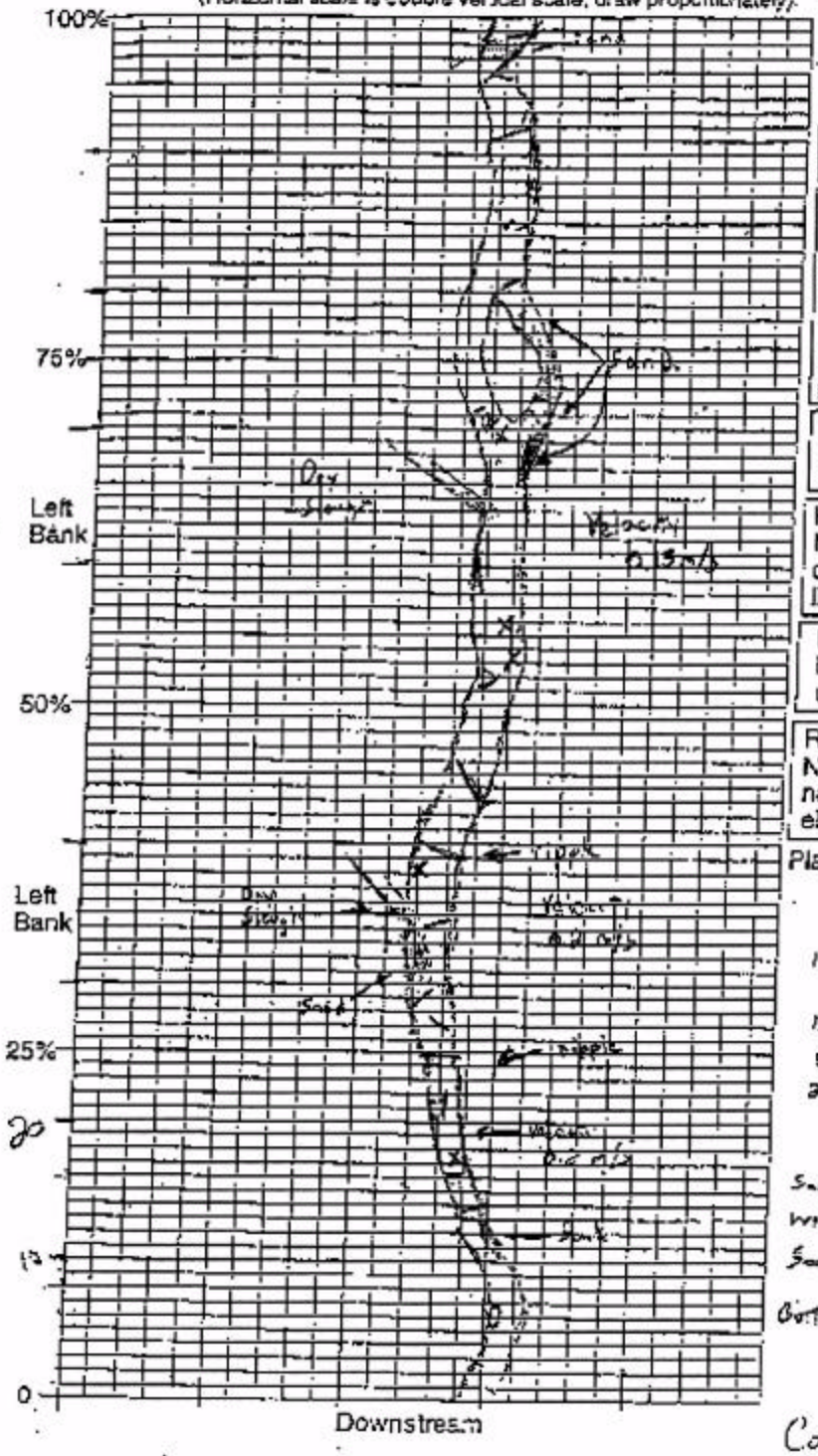
12-27-01

N. Prong Double Branch

Field ID: @ Turtle Dove Rd

Site Map / Habitat Sketch

Length of grid represents 100m 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
- Sand

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:

15 meters wide

15 Snags 10%
5 roots 3%
2 leaf 1%
14%

Some unstable Banks
were sloughing after
Some Sand Smothering

Bottom - mud muck + Sand

Continued

Test
P. 17.3

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): 2/11/02	TIME: 1240	RECEIVING BODY OF WATER: Little Black Creek
REMARKS:	COUNTY: Clay	LOCATION: Spring Double Branch 15m Below Culvert @ Spencer WWTP RD	FIELD ID/NAME: TEST Site	

RIPARIAN ZONE/STREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
20	40	25					15

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

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

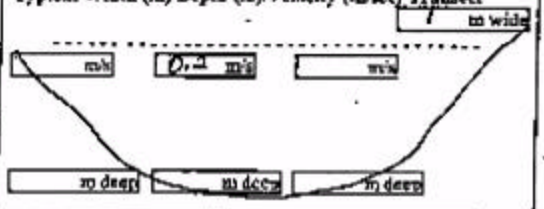
Width of riparian vegetation (m) On least buffered side: >18

List & map dominant Vegetation on back

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

Artificially Impounded ☐ yes

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



High Water Mark: 0.3 (m above present water level) + 0.3 (present depth in m) = 0.6 (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 moderate Silt Smothering: none moderate Other: ____
slight severe slight severe

Substrate Type	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	6	2	Diplex	Sand	81	5	Diplex
Leaf Packs of Mats	10	3	Diplex	Mud/Muck/Silt			
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots	3	5	Diplex	*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (umhos/cm) Or Salinity (ppt):			Secchi (m):
Top								
Mid-depth	0.15	15.76	6.76	5.58	440			0.32
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: ☐

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

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

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

Weather Conditions/Notes: 60°S Clear Sky

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

SAMPLING TEAM: Kallenath, O'Connor

SIGNATURE: [signature] DATE: 2/11/02

Test
p. 273

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:
		2/11/02	Little Black Creek

REMARKS:	COUNTY:	LOCATION:	FIELD ID NAME:
	Clay	S. Prong Double Branch 15 m below Cuivrel & Spencer Mill Rd	Test Site

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components Substrate Diversity 12	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 areal 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 eddy occurring: > 1 m/sec 5 4 3 2 1
Habitat Smothering 8	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
Primary Score 41				
Secondary Habitat Components Artificial Channelization 20	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 9 Left Bank 9	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 10 Left Bank 10	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 10 Left Bank 10	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 78				

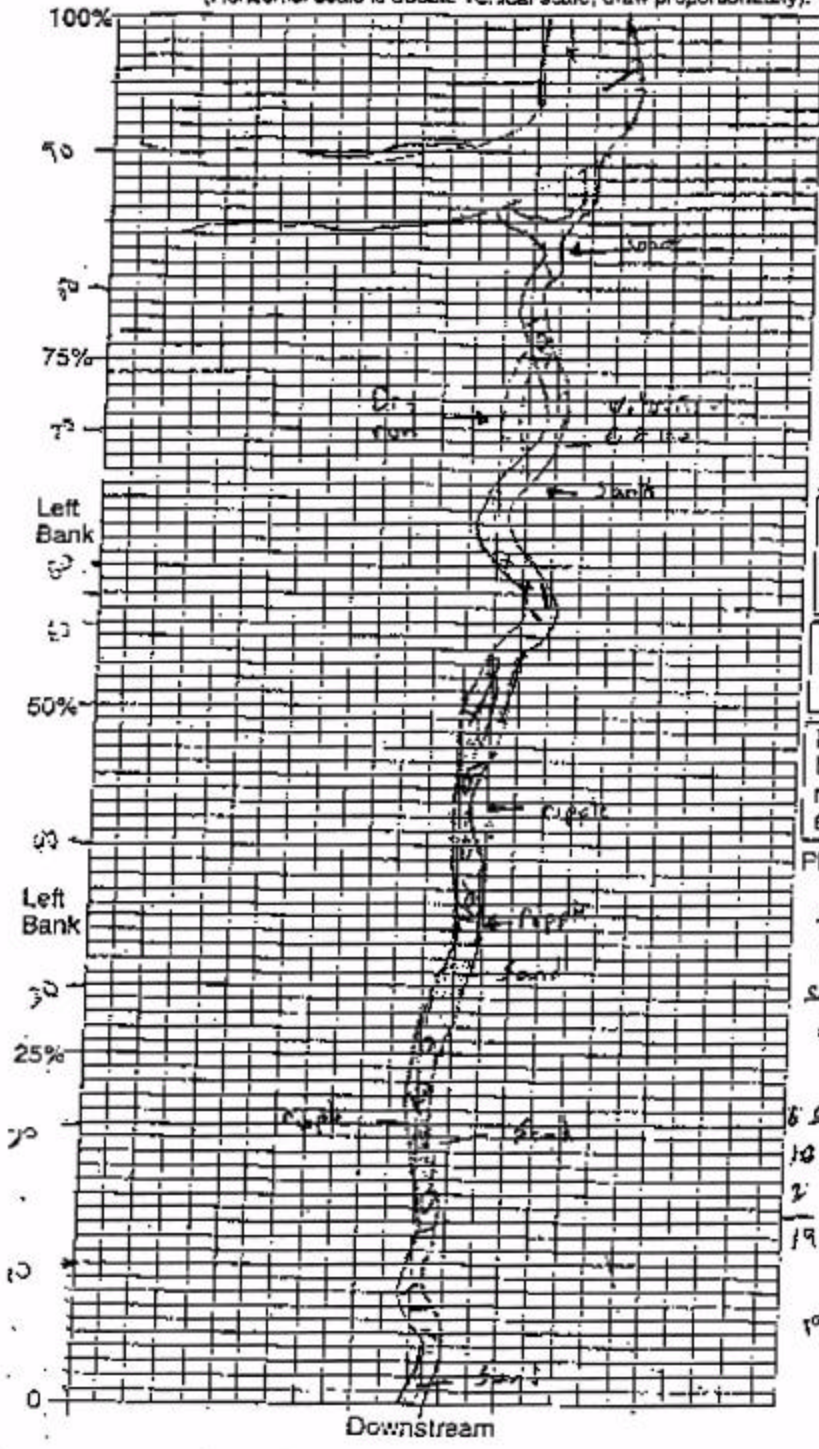
TOTAL SCORE 119

ANALYSIS DATE:	ANALYST:	SIGNATURE:
2/11/02	O'Connor	

Test p-393
S. Prong Ossibk R.
15mi Below culvert
@ WWTP Road

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.

- 11 Snags
- XX Roots/undercut banks
- 00 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 vegetaton is altered or eliminated.

Plants observed/other notes:

Silt Smothering near Top 100m.
Sand Smothering near bottom 100m

6 Snags
10 leaves
2 roots
19%

Appendix 9

Density (number/cm^2) and taxa list for periphyton collected from glass microscope slides incubated for 28 days upstream and downstream of Spencer Wastewater Treatment Plant discharge, February 11,2002. Taxa collected and density (number/cm^2) rounded to nearest individual.

	Control Site	Test Site
Bacillariophyceae:		
Achnanthes hungarica	-	522
Achnanthes lanceolata	443	131
Cocconeis placentula	8641	-
Cyclotella sp.	443	914
Cymbellaceae	-	522
Eunotia sp.	94606	25339
Eunotia formica	-	131
Eunotia tautoniensis	-	131
Fragilariaceae	1329	261
Gomphonema sp.	-	1306
Gomphonema augur	-	392
Gomphonema parvulum	-	261
Navicula sp.	443	261
Nitzschia sp.	-	1959
Pinnularia sp.	443	653
Synedra sp.	6647	261
Synedra ulna	443	-
Chlorophyceae:		
Ankistrodesmus falcatus	443	65
Chlorella sp.	443	327
Chlorococcaceae	-	131
Chlorophyceae	-	131
Mougeotia sp.	222	131
Oedogonium sp.	222	196
Scenedesmus acutiformis	-	131
Scenedesmus dimorphus	-	196
Schroederia setigera	222	-
Ulothrix sp.	-	261
Cyanophyceae:		
Anabaena sp.	222	327
Aphanocapsa sp.	-	65
Chroococcaceae	-	131
Chroococcus turgidus	-	65
Cyanobium parvum	443	261
Cyanobium plancticum	1551	784
Lyngbya sp.	-	457
Microcystis sp.	-	261
Oscillatoria sp.	222	718
Rhabdogloea sp.	665	-
Schizothrix sp.	-	131
Solentia sp.	222	-
Euglenophyceae:		
Euglena sp.	-	65
Lepocinclis sp.	-	131
Phacus sp.	-	65
Trachelomonas hispida	-	65

Appendix 10.

Benthic macroinvertebrates collected from Hester-Dendy artificial substrates incubated upstream and downstream of the Spencer Wastewater Treatment Plant for 28 days (February 11, 2002). Taxa collected and density (individuals/m^2) rounded to the nearest individual (n = 3 samples).

	Control Site	Test Site
Annelida:		
Oligochaeta		
Dero sp.	-	5
Dero digitata complex	-	3
Slavina appendiculata	-	69
Stylaria lacustris	3	-
Arachnida:		
Acariformes		
Atractides sp.	3	-
Sperchonopsis sp.	11	-
Insecta:		
Coleoptera		
Ancyronyx variegatus	-	5
Dubiraphia sp.	3	11
Microcylloepus pusillus	16	-
Peltodytes sp.	-	3
Diptera		
Ablabesmyia mallochi	3	185
Chironomidae	29	3
Chironomus sp.	-	24
Corynoneura sp.	11	21
Dicrotendipes sp.	-	3
Dicrotendipes modestus	-	11
Dicrotendipes neomodestus	-	26
Hemerodromia sp.	26	-
Kiefferulus sp.	-	5
Labrundinia becki	-	42
Labrundinia pilosella	-	5
Nanocladius sp.	-	26
Nilotanypus fimbriatus	5	-
Paratanytarsus sp.	-	16
Paratanytarsus sp. c epler	-	5
Pentaneura inconspicua	26	-
Phaenopsectra obediens grp.	3	-
Phaenopsectra punctipes grp.	-	3
Polypedilum fallax	8	11
Polypedilum flavum	249	-
Polypedilum illinoense grp.	-	3
Polypedilum scalaenum grp.	3	-
Polypedilum tritum	-	71
Rheocricotopus robacki	3	-
Rheotanytarsus exiguus grp.	164	3
Rheotanytarsus pellucidus	37	-
Simulium sp.	19	-
Stempellinella sp.	-	24
Tanytarsus sp.	-	5

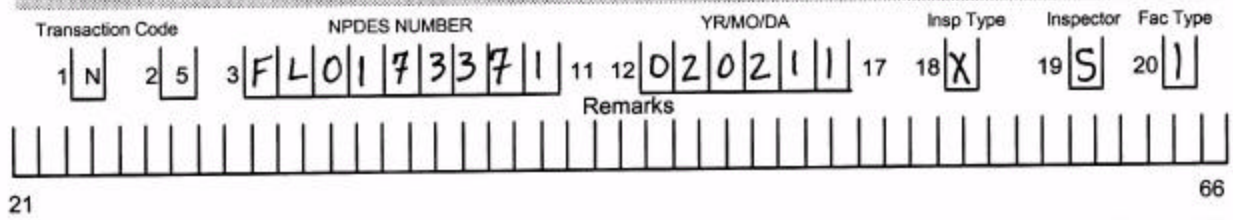
Diptera continued		
Tanytarsus sp. l epler	-	61
Tanytarsus sp. s epler	-	8
Tanytarsus sp. t epler	-	3
Tanytarsus sp. u epler	-	5
Tribelos jucundus	3	185
Ephemeroptera		
Acerpenna pygmaea	16	-
Baetidae	5	-
Caenis sp.	-	3
Stenacron interpunctatum	3	-
Stenonema sp.	42	-
Stenonema exiguum	21	-
Stenonema smithae	146	-
Megaloptera		
Corydalus cornutus	5	-
Trichoptera		
Cheumatopsyche sp.	185	-
Hydropsychidae	3	-
Mollusca:		
Pelecypoda		
Sphaeriidae	-	3
Gastropoda		
Ancylidae	21	3
Ferrissia sp.	16	11
Micromenetus dilatatus	-	32

Appendix 11

Qualitative benthic macroinvertebrate collections (n = 20 discrete dipnet sweeps) upstream and downstream of Spencer Wastewater Treatment Plant (February 11, 2002). Taxa lists and number of individuals counted.

	Control Site	Test Site
Annelida:		
Oligochaeta		
Slavina appendiculata	3	6
Arachnida:		
Acariformes		
Atractides sp.	1	-
Sperchon sp.	1	-
Crustacea:		
Amphipoda		
Crangonyx sp.	-	1
Gammarus sp.	-	1
Decapoda		
Procambarus sp.	1	-
Insecta:		
Coleoptera		
Dubiraphia sp.	-	8
Microcylloepus pusillus	31	3
Stenelmis sp.	4	-
Diptera		
Ablabesmyia mallochi	-	3
Chironomidae	2	-
Corynoneura sp.	-	4
Dicrotendipes sp.	2	-
Hemerodromia sp.	1	-
Labrundinia sp.	1	-
Labrundinia becki	-	1
Labrundinia pilosella	-	3
Nanocladius sp.	-	3
Pentaneura inconspicua	1	1
Polypedilum flavum	8	8
Polypedilum scalaenum grp.	1	6
Rheotanytarsus exiguus grp.	14	5
Rheotanytarsus pellucidus	7	36
Simulium sp.	27	-
Stempellinella sp.	-	7
Tanytarsus sp. I epler	-	2
Ephemeroptera		
Acerpenna pygmaea	1	-
Stenonema sp.	5	-
Tricorythodes albilineatus	1	-
Odonata		
Aeshnidae	-	1
Coenagrionidae	1	-
Trichoptera		
Cheumatopsyche sp.	6	2
Mollusca:		
Gastropoda		
Ancylidae	2	-
Physella sp.	-	1
Pelecypoda	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)

