

Biological Assessment of

City of Winter Haven WWTP #3

Polk County

NPDES #FL0036048

Sampled October 13, 2003

April 2004

Biology Section

Bureau of Laboratories

Division of Resource Assessment and Management

Quality Manual No. 870346G

NELAC Certification No. E31780

Florida Department of Environmental Protection

Fifth Year Inspection Summary

Discharger: City of Winter Haven WWTP #3

County: Polk

NPDES Number: FL0036048

Permit Expiration: 8/5/04

Toxics Sampling Inspection **(XSI)**

Date Sampled: 10/13/03

Results: Chloroform was detected in the effluent (0.22 µg/L) at a level that complied with the Class III Surface Water Quality Criterion. Bromodichloromethane was also detected in the effluent but only at a level above the method detection limit and below the practical quantitation limit. Aluminum, iron, lead, and zinc were all detected in effluent grab and composite samples at levels that complied with Class III Surface Water Quality Criteria. Cadmium and copper were also detected in both the grab and composite effluent samples, while nickel was only detected in the composite sample. The levels of cadmium, copper and nickel detected were above the method detection limits and below the practical quantitation limits.

Compliance Biomonitoring Inspection **(CBI)**

Date Sampled: 10/13/03

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

Water Quality Inspection **(WQI)**

Date Sampled: 10/13/03

Results: Fecal and total coliforms were detected in the effluent and the receiving water at levels that did not exceed Class III Water Quality Criteria. Dissolved oxygen measured at the Control Site (3.2 mg/L) and Test Site 1 (2.8 mg/L) did not meet the Class III Water Quality Criterion (≥5.0 mg/L, 62-302.530(31) F. A. C.). The effluent dissolved oxygen was 11.2 mg/L. Nutrient levels at the Control Site and Test Site 1 were similar. Nutrient concentrations at Test Site 2 were more similar to the effluent. At Test Site 2, levels of orthophosphate and total phosphorus were higher and levels of nitrate+nitrite, ammonia, and total Kjeldahl nitrogen were lower compared to the Control Site or Test Site 1. AGP results for the Control Site (24.2 mg dry wt/L) and Test Site 1 (20.6 mg dry wt/L) were similar and were both approximately 4 times the "problem" threshold of 5.0 mg dry wt/L. While the AGP results for Test Site 2 (10.3 mg dry wt/L) and the effluent (10.2 mg dry wt/L) were both 2 times the "problem" threshold.

Impact Bioassessment Inspection **(IBI)**

Date Sampled: 10/13/03

Results: The periphyton community at Test Site 1 was more diverse and had more taxa than the periphyton community at the Control Site. Periphyton chlorophyll-a values were 19 mg/m2 at the Control Site and 42 mg/m2 at Test Site 1. The effluent did not appear to have a negative effect on the macroinvertebrate communities. Diversity was similar between the Control and Test Site 1 in the quantitative Hester-Dendy samples. Qualitative dip-net samples for the Control Site SCI scored 17, placing it in the "Poor" category and the Test Site 1 SCI scored 21, placing it in the "Good" category.

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

Introduction

The City of Winter Haven Wastewater Treatment Plant is located in Polk County, Florida (Appendix 1). This facility is an activated-sludge domestic wastewater treatment system. Treatment activities at this plant include grit removal, aeration, clarification, and chlorination. The disinfected effluent flows into a 30-acre polishing pond prior to land application to a sprayfield and/or through an overland flow system (ridged furrow) for nutrient removal and then surface water discharge. The effluent is collected in an open ditch and is discharged into an unnamed tributary of the Peace Creek Drainage Canal, a Class III freshwater system, which ultimately flows into the Peace River. The design flow of the wastewater system is 5.0 million gallons per day (MGD) annual average daily flow. The average mean flow during the 12 months prior to this sampling event was 3.2 MGD (see Facility Summary in Appendix 2).

Surface Water Quality Criteria and facility permit limits are listed in Table 1. There is no current enforcement action with the facility. According to the facility's monthly discharge monitoring reports, the facility has not reported any violations from January 2002 through March 2003. However, the facility did have two violations of its Carbonaceous Biochemical Oxygen Demand (CBOD) permit limit in April 2003 and one violation of its Dissolved Oxygen (DO) permit limit in July 2003 (Appendix 2).

Methods

The purpose of this investigation was to determine the potential effects of the facility's effluent on the biota of the receiving waters. Chemical and biological comparisons were made between a Control Site (located in the Peace Creek Drainage Canal) and Test Site 1 (located in an unnamed tributary of the Peace Creek Drainage Canal approximately 3 miles downstream of the outfall weir) (Appendix 1). Additional water samples were collected from another test site (Test Site 2) and analyzed for chemical constituents. Test Site 2 was located approximately 1 mile downstream of the outfall weir in the same branch as Test Site 1. The tributary the Test Sites were located in flows through agricultural land and pastures and is accessible by livestock. Water samples were collected from this site because it was closer to the outfall. Biological samples were not collected, because it was characteristically too different from the Control Site (e.g. more shading, narrower stream). Biological community differences that may have resulted between Test Site 2 and the Control Site would have been difficult to attribute to the facility's discharge. Detailed methods and their relationship to Florida Administrative Code are given in Appendix 3.

Both grab and 24-hour flow-proportioned composite samples were collected from the effluent. The composite samples were analyzed for metal constituents and nutrient concentrations. All results are reported in Table 1. Results for the grab samples are discussed in this report.

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 were involved in this investigation: Melissa Gunter, Nahir Cornwell, Lori Pillsbury, Todd Falkner and Peggy Morgan (FDEP Southwest District), and FDEP 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

- Specific chemical results are reported in Table 1 and a complete list of chemical analytes can be reviewed in Appendix 4. Aluminum (184 µg/L), iron (111 µg/L), lead (0.45 µg/L), and zinc (44 µg/L) were all detected in effluent grab and composite samples at levels that complied with Class III Surface Water Quality Criteria. Cadmium and copper were also detected in both the grab and composite effluent samples, while nickel was only detected in the composite sample. The levels of cadmium, copper and nickel detected were above the method detection limits and below the practical quantitation limits. The field blank associated with the composite samples was contaminated with cadmium, copper and zinc. The field blank associated with the grab effluent samples was contaminated with nitrate+nitrite and total organic carbon. Levels detected in these field blanks were above the method detection limits, but below the practical quantitation limits (Appendix 4). Results from effluent samples that are more than ten times the level detected in the field blanks and are used without qualification. Chloroform was detected in the effluent (0.22 µg/L) at a level that complied with the Class III Surface Water Quality Criterion. Bromodichloromethane was also detected in the effluent, but at a level above the method detection limit and below the practical quantitation limit. Effluent conductivity (µmhos/cm), pH (Standard Units), and dissolved oxygen (mg/L) complied with Class III Water Quality Criteria (62-302 F.A.C.) and facility permit limits.

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

City of Winter Haven WWTP	Class III Stds	Effluent Limits	Effluent	Effluent 24-hr composite	Control Site	Test Site 1	Test Site 2
Organic Constituents (µg/L)							
Bromodichloromethane	≤22 a	-	0.22 I	-	-	-	-
Chloroform	≤470.8 a	-	2.1	-	-	-	-
Metals (µg/L unless otherwise noted)							
Aluminum	≤1500	-	184 A	122	-	-	-
Arsenic	≤50	-	6 U	6 U	-	-	-
Cadmium	≤1.3 b	-	0.058 I	0.06 I e	-	-	-
Calcium (mg/L)	-	-	35.5 A	36.1	-	-	-
Chromium-III	≤97.2 b	-	3 U	3 U	-	-	-
Copper	≤10.6 b	-	2.2 I	2.8 I e	-	-	-
Iron	≤1000	-	111 A	141	-	-	-
Lead	≤3.8 b	-	0.45 A	0.43	-	-	-
Magnesium (mg/L)	-	-	6.6 A	6.7	-	-	-
Nickel	≤59.1 b	-	3 U	4 I	-	-	-
Selenium	≤5	-	1 U	1 U	-	-	-
Silver	≤0.07	-	0.02 U	0.02 U	-	-	-
Zinc	≤135.7 b	-	44 A	40 e	-	-	-
Nutrients (mg/L)							
Organic Carbon	-	-	9.8 e	-	-	-	-
Ortho-phosphate	-	-	1.4	-	0.098	0.097	1.0
Total Phosphorus	-	-	1.3	1.6 A	0.18	0.18	1.1
Ammonia	-	3.6 w	0.023	0.035	0.059	0.055	0.022
Unionized Ammonia	≤0.02	-	≤0.02 c	-	≤0.02 c	≤0.02 c	≤0.02 c
Nitrate+Nitrite	-	-	0.13 e	0.34 A e	0.35	0.35	0.14
Total Kjeldahl Nitrogen	-	-	0.81	0.82 A	1.9	1.9	0.9
Organic Nitrogen	-	-	0.79 c	0.79 c	1.84 c	1.85 c	0.88 c
Total Nitrogen	-	-	0.94 c	1.2 c	2.25 c	2.25 c	1.04 c
General Physical and Chemical Parameters							
Habitat Assessment	-	-	-	-	59	74	-
Dissolved Oxygen (mg/L)	≥5.0 s	≥5.0 s	11.2	-	3.2	2.8	5.8
pH (S.U.)	6.0-8.5 s	6.0-8.5 s	7.7	-	7.6	7.2	7.4
Conductivity (umhos/cm)	1275 s	-	576	-	159	160	491
Temperature (C)	-	report	30.2	-	27.3	28.6	26.4
BOD, 5 day (mg/L)	-	-	2 U	-	2 U	2 U	2 U
CBOD, 5 day (mg/L)	-	3.6 w	2 U	-	2 U	2 U	2 U
Color (Pt-Co)	-	-	60	-	280	240	100
Turbidity (NTU)	<40	-	1.9	-	11.0	14.0	2.9
Total Suspended Solids (mg/L)		60 s	2.0	-	12.0	15.0	3.0
Alkalinity (mg/L)	<20	-	165.3	-	21	20.3	130.3
Oil and Grease (mg/l)	≤5	-	4 IV	-	-	-	-
Flow (MGD)	-	5.0	2.9	-	-	-	-
Chlorophyll a (µg/L)	-	-	-	-	1.2 U	1.2 U	0.85 U
Phaeophytin (µg/L)	-	-	-	-	1.2 U	1.2 U	0.85 U
Hardness (mg/L)	-	-	115.8 c	117.7 c	-	-	-
Microbiology (# counts/100ml)							
Fecal Coliforms-(1/12/04)	800 s	-	70 B	-	130 B	185	335
Total Coliforms (1/12/04)	2400 s	-	660	-	60 B	360	890 BL
Toxicology Bioassays (48-hour acute screening bioassay, percent mortality)							
Fish	-	-	0%	-	-	-	-
Water flea	-	-	0%	-	-	-	-

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
K - Actual value is known to be less than value given
L - Actual value is known to be greater than value given
O - Sampled, but analysis lost or not performed
U - Material analyzed for but not detected; value reported is the minimum detection limit
V - Analyte was detected in both sample and method blank

a - Annual average
b - Value based on hardness
c - Calculated value
e - Analyte was detected in the Field Blank at a level above the MDL, but below the PQL
s - Single sample
w - Weekly average

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

Location	AGP (measured)	Predicted AGP (TSIN) ± 20%	Predicted AGP (OP) ± 20%	Inorganic N:P ratio
Effluent	10.2	5.81 ± 1.162	602 ± 120.4	0.11
Control Site	24.2	15.54 ± 3.108	42.14 ± 8.428	4.17
Test Site 1	20.6	15.39 ± 3.078	41.71 ± 8.342	4.18
Test Site 2	10.3	6.20 ± 1.20	430 ± 86.0	0.16

- Habitat assessment scores were 59 at the Control Site and 74 at Test Site 1 (Table 1, data sheets in Appendix 7). The Control Site received lower points for substrate diversity, artificial channelization, and riparian buffer zone quality and width.
- Conductivity (µmhos/cm) and pH (Standard Units) at Test Site 1 and the Control Site complied with Class III Water Quality Criteria, however the conductivity at Test Site 2 was elevated compared to the Control Site (Table 1, 62-302.530 F.A.C.). Dissolved oxygen measured at the Control Site (3.2 mg/L) and Test Site 1 (2.8 mg/L) did not meet the Class III Water Quality Criterion (=5.0 mg/L, 62-302.530(31) F. A. C.), however the low dissolved oxygen levels are not attributed to the effluent, as the effluent dissolved oxygen was 11.2 mg/L.
- The effluent sample was not acutely toxic to the fish, *Cyprinella leedsi,* or to the water flea, *Ceriodaphnia dubia,* during 48-hour acute screening bioassays (See Table 1 for percent mortality and Appendix 6 for bioassay bench sheets).
- Fecal and total coliform samples collected in October 2003 were discarded due to laboratory problems with culture media; additional water samples of the effluent and from the Test and Control Sites were collected on January 12, 2004. Fecal and total coliforms were detected in the effluent and receiving waters at levels that did not exceed Class III Water Quality Criteria (See Table 1 for results and Appendix 6 for laboratory worksheets).
- Nutrient levels at Test Site 1 were similar to those at the Control Site, and nutrient levels at Test Site 2 were similar to those of the effluent. The effluent total nitrogen concentration was 0.94 mg/L (Table 1). Concentrations of orthophosphate and total phosphorus in Test Site 2 samples ranked in the 90th percentile of typical values for Florida streams, while levels of these same nutrients in Test Site 1 and Control Site samples ranked in the 50th percentile (Appendix 5). Levels of nitrate+ nitrite and TKN at the Control Site and Test Site 1 ranked in the 80th and 90th percentiles of typical values in Florida streams, while Test Site 2 values ranked in the 60th and 40th percentiles, respectively. These results suggest the facility is contributing to the enrichment of phosphorus in the Peace Creek Drainage Canal, and that there are other potential sources of nitrogen unrelated to the effluent in this portion of the Peace Drainage Creek Canal.
- 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 wt/L represent a "problem" threshold for fresh receiving waters, implying nutrient enrichment. The AGP value at the upstream Control Site was 24.2 mg dry wt/L, exceeding the "problem" threshold (Table 2). The AGP values of Test Site 1 (20.6 mg dry wt/L), Test Site 2 (10.3 mg dry wt/L), and the effluent (10.2 mg dry wt/L) were also above this threshold. AGP levels at the Control Site and Test Site 1 indicate some non-point source nutrient enrichment unrelated to the facility's discharge in this portion of the Peace Creek Drainage Canal. There was no evidence of growth inhibition in the AGP data (Table 2).
- Chlorophyll-*a* was not detected in water samples collected from the Control and Test Sites (Table 1).

Table 3. Periphyton composition

City of Winter Haven WWTP	Control Site	Test Site 1
Number of Taxa	11	45
Shannon-Weaver Diversity	1.7	3.2
Chlorophyll a (mg/m²)	19	42
Phaeophytin (mg/m²)	0	0
Algal Density (number/cm²)	159,293	420,318
Percent Dominant Taxon	71.9	53.8
Dominant Taxon (name)	*Stigeoclonium* sp.	*Stigeoclonium* sp.
Number of Algal Units Identified	306	314
Percentage Composition		
Blue-green algae	2.9	10.8
Diatoms	3.3	19.8
Green algae	93.5	68.5
Other	0.3	1.0

Table 4. Macroinvertebrate Hester-Dendy Samples - Quantitative

City of Winter Haven WWTP	Control Site	Test Site 1
Summary Statisics		
Shannon-Weaver Diversity	3.5	3.3
Number of Taxa	20	30
Florida Index	1	6
Number of EPT Taxa	3	3
Percent Dominant Taxon	22.5	31.0
Dominant Taxon (name)	*Caenis* sp.	*Hyalella azteca*
Dominant Taxon (group)	Ephemeroptera	Amphipoda
Total Number of Individuals	173	297
Community Composition: Percent of total		
Amphipoda	0	31.0
Decapoda	0	2.4
Diptera	13.9	11.5
Ephemeroptera	30.1	23.9
Gastropoda	32.4	25.3
Hirudinea	18.5	1.3
Odonata	2.9	2.4
Pelecypoda	0.6	1.4
Plecoptera	0	0
Trichoptera	1.7	0.7
Functional Feeding Groups: Percent of total		
Parasite	18.5	0.7
Predators	3.5	7.7
Scavenger	0	1.2
Surface Deposit Feeders	26.5	34.0
Suspension Feeders	2.3	2.4
Scrapers	31.9	31.8
Shredders	1.8	16.4
Unknown	15.5	5.6

We note that nutrients in the water column may or may not fuel algal production immediately, depending upon the sum of environmental conditions that limit algal growth at the site (e.g. pH, shading, turbidity). Thus, it is not necessarily contradictory for ambient nutrient levels to be high and for no chlorophyll to be detected in water samples.

- There were some differences between the Control and Test Site 1 algal community compositions (Table 3, Appendix 8) that appear to be unrelated to the facility's discharge. The periphyton algal community at Test Site 1 was comprised of more diatoms and blue-green algae, which is evident in the higher diversity score and higher number of taxa. The periphyton chlorophyll-*a* concentration measured from periphytometer samplers was two times greater at Test Site 1 (42 mg/m2) compared to the Control Site (19 mg/m2) and correlates to the more than doubling of the algal density at Test Site 1 relative to the Control Site.

- Measures of benthic macroinvertebrate assemblages from Hester-Dendy and dipnet samples showed little differences in the overall community compositions between Test Site 1 and the Control Site (Tables 4-6, Appendices 9-10). The same two taxa, *Hyalella azteca* and *Caenis* dominated benthic macroinvertebrate communities at both sites. Test Site 1 was slightly improved compared to the Control Site. The Control Site SCI score of 17 placed it in the "Poor" category, and the Test Site 1 SCI score of 21 placed it in the "Good" category.

Summary

Chloroform, aluminum, iron, lead, and zinc were all detected in the effluent at levels that complied with Class III Surface Water Quality Criteria. Dissolved oxygen measured at the Control Site (3.2 mg/L) and Test Site 1 (2.8 mg/L) did not meet the Class III Surface Water Quality Criterion (>5.0 mg/L, 62-302.530(31) F.A.C.), however the low dissolved oxygen levels are not attributed to the effluent, as the effluent dissolved oxygen was 11.2 mg/L. The effluent sample was not acutely toxic to the fish, *Cyprinella leedsi,* or to the water flea, *Ceriodaphnia dubia,* during 48-hour acute screening bioassays. The effluent appears to be contributing to the elevated levels of phosphorus in this portion of the Peace Creek Drainage Canal, but the concentrations of nitrate+nitrite and TKN appear to be caused by a non-point source of nutrients between Test Site 1 and Test Site 2 rather than the facility. The Control Site (24.2 mg dry wt/L) and Test Site 1 (20.6 mg dry wt/L) AGP results were similar at 4 times the "problem" threshold, while the Test Site 2 (10.3 mg dry wt/L) and effluent (10.2 mg dry wt/L) AGP results were both 2 times the "problem" threshold. The algal and benthic macroinvertebrate communities do not appear to be degraded at Test Site 1; however, due to the large distance between Test Site 1 and the facility's outfall, it is unknown if the effluent is having some effect on the biological communities in the portion of the Peace Creek Drainage Canal closer to the point of discharge or Test Site 2.

Literature Cited

Barbour, M. T. and J. B. Stribling. 1994. A technique for assessing stream

Table 5. Macroinvertebrate Dipnet Samples - Qualitative

City of Winter Haven WWTP	Control Site	Test Site 1
Stream Condition Index (value)	17	21
Stream Condition Index (word)	Poor	Good
Stream Condition Index Metrics		
Number of Taxa	14	14
Florida Index	5	4
Number of EPT Taxa	1	4
Number of Chironomid Taxa	5	3
Percent Dominant Taxon	57.0	44.0
Percent Diptera	7.0	6.4
Percent Suspension Feeders and Filterers	0	12.8
Total Number of Individuals	100	109
Community Composition: Percent of total		
Dominant Taxon (name)	*Hyalella azteca*	*Caenis* sp.
Dominant Taxon (group)	Amphipoda	Ephemeroptera
Amphipoda	57.0	24.8
Chironomidae	7.0	6.4
Coleoptera	3.0	11.0
Ephemeroptera	26.0	45.9
Odonata	4.0	0
Plecoptera	0	0
Trichoptera	0	10.1
Other	3.0	1.0
Functional Feeding Groups: Percent of total		
Burrowing Deposit Feeders	1.0	0
Browser/Grazer	1.0	0
Predators	7.0	1.4
Surface Deposit Feeders	45.0	42.7
Suspension Feeders and Filterers	0	12.8
Scrapers	13.0	28.0
Shredders	33.0	14.7
Unknown	0	0

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Stevenson, R. J. and J. P. Smol. 2003. Use of algae in environmental assessments, pp. 775-803, in: Freshwater algae of North America, edited by J. D. Wehr and R. G. Sheath, Academic Press, San Diego. 918 pp.

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

Metric: Control Site	**Value**	**5**	**3**	**1**	**Score**
Total Number of Taxa	14	≥26	25-14	<14	3
Number of EPT Taxa	1	≥4	3-2	<2	1
Number of Chironomid Taxa	5	≥7	6-4	<4	3
Percent Contribution of Dominant Taxon	57	≤29	30-64	>64	3
Percent Diptera	7	-	≤37	>37	3
Florida Index	5	≥7	6-4	<4	3
Percent Suspension Feeders and Filterers	0	-	≥7	<7	1
Total Score		**Poor**			**17**
Interpretation of Scores		Excellent			26-31
		Good			20-25
		Poor			13-19
		Very Poor			7-12

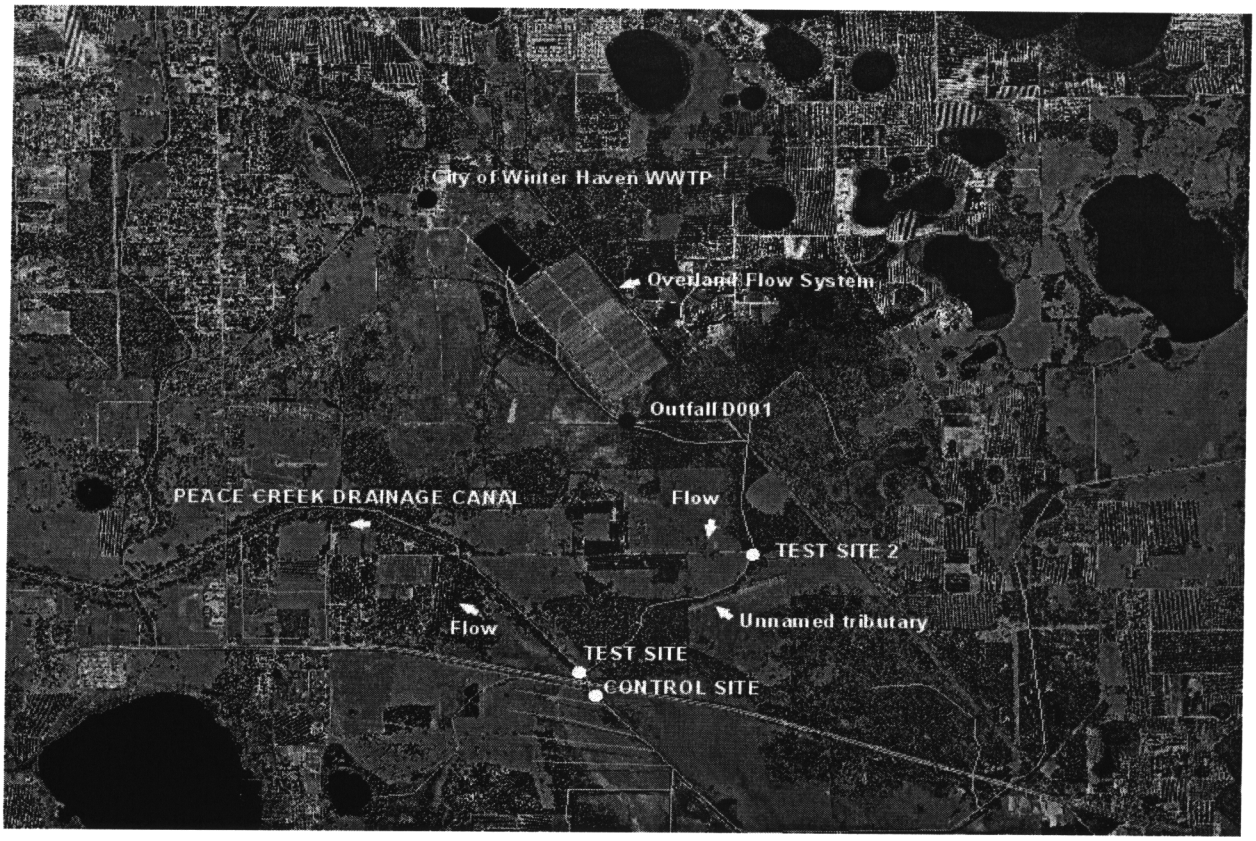
Metric: Test Site 1	**Value**	**5**	**3**	**1**	**Score**
Total Number of Taxa	14	≥26	25-14	<14	3
Number of EPT Taxa	4	≥4	3-2	<2	5
Number of Chironomid Taxa	3	≥7	6-4	<4	1
Percent Contribution of Dominant Taxon	44.0	≤29	30-64	>64	3
Percent Diptera	6.4	-	≤37	>37	3
Florida Index	4	≥7	6-4	<4	3
Percent Suspension Feeders and Filterers	12.8	-	≥7	<7	3
Total Score		**Good**			**21**
Interpretation of Scores		Excellent			26-31
		Good			20-25
		Poor			13-19
		Very Poor			7-12

Appendices

- Appendix 1. Map of facility
- Appendix 2. Facility summary
- Appendix 3. Explanation of measurements
- Appendix 4. Chemical analyses of effluent and receiving water.
- Appendix 5. Typical values for selected parameters in Florida waters
- Appendix 6. Additional physical, chemical, toxicological and microbiological results
- Appendix 7. Habitat Assessment field sheets
- Appendix 8a. Periphyton: Taxa list and density (number of individuals per cm^2)
- Appendix 8b. Periphyton: Taxa list and number of individuals counted
- Appendix 9a. Hester-Dendy multi-plate samplers: Taxa list and macroinvertebrate density (average number of individuals per m^2)
- Appendix 9b. Hester-Dendy multi-plate samplers: Taxa list and total number of macroinvertebrates counted
- Appendix 10a. Dipnet samples: Taxa list and number of macroinvertebrates counted (collapsed)
- Appendix 10b. Dipnet samples: Taxa list and number of macroinvertebrates counted

Appendix 1

Map of Facility







Fifth Year Inspection Program
FDEP- Bureau of Laboratories
Created on: March 5, 2004
Created by: Julie Espy

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENT PROECTION
FACILITY

Facility name: City of Winter Haven

Date of Summary: September 15, 2003

Location (detailed ARC view map attached):
4400 Pollard Drive
Winter Haven, FL 33880
Latitude 27° 57′ 03″ N Longitude 81° 42′ 35″ W

County: Polk County

District: SWD

NPDES Permit: FL0036048

State GMS # and
State expiration date: 08/05/04

Facility Type: Domestic Waste

Function of facility: The facility is a 5.0 MGD type I Annual Average Daily Flow 150-acre overland flow system. The facility's effluent is collected in an open ditch and discharges through D001 into an unnamed tributary of the Peace creek drainage canal, a Class III freshwater body, and ultimately into the Peace river.

Description of treatment process: The facility is an activated sludge domestic wastewater system consisting of one aerated grit chamber of 60, 318 gallons, three aeration basins with a volume of 4.746 million gallons, two clarifier basins with a volume of .8 gallons and two chlorine contact chambers with a volume of 167,800 gallons.
The disinfected effluent flows into a 30-acre polishing pond prior to land application and discharge.
-One additional clarifier will be constructed with the schedule in Consent Order 99-0248 for a total of three clarifiers.
-Residuals are processed in two aerobic digester tanks of 1.582 million of gallons and a sludge thickener of 79,309 gallons. Residuals are further treated by Micronair providing destruction of organics.

Receiving waters: Unnamed tributary of the Peace Creek drainage canal

Classification of water: III Freshwater

Design Flow: 5.0 MGD Annual Average Daily Flow

Mean Flow (12 month average): 3.2MGD

Flow during survey: 0.45 fps average

Discharge is: Intermittent
Therefore, the best time to sample the outfall is: Sample during business hours, plant unattended in the evening.

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

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

Parameter	Units	AnnAvg	MoAvg	WklyAvg	Single sample	Monitoring frequency
*CBOD5	mg/L	--	Variable	Variable	--	5 days/week
TSS	mg/L	20.0	30.0	45.0	60.0	5 days/week
Temperature	mg/L	--	report	report	--	5 days/week
*Ammonia, (NH_3) as N	mg/L	--	Variable	Variable	--	5 days/week
Chlorine, Total Residual (For Dechlorination)	mg/L	--	--	--	0.01	5 days/week
Dissolved Oxygen	mg/L	--	--	--	5.0	5 days/week (when effluent applied to overland flow system)
Coliform, Fecal	#/100 mL		--	--	--	5 days/week
Alkalinity	ug/L	--	--	--		5 days/week
pH	ug/L	--	--	--		Continuous
Total Residual Chlorine (For Disinfection)	ug/L	--	--	--	.5	Continuous

* Per permit condition I.A.10, the effluent limits for CBOD5 and NH3 on a monthly and weekly basis are seasonal.

Describe special permit conditions and permit modifications:

Per Minor Revision notice dated September 12, 2001, chronic toxicity tests will be conducted once every six months (semiannual basis), instead of once every two months as stated in the current permit per permit condition I.A.14. In addition, Surface Ambient Monitoring shall be conducted once every six months (semiannual basis); instead of conducting the monitoring requirements on a quarterly basis as stated in the current permit per permit condition I.A. 16.

Description of permitted outfall(s):
The facility has a permitted discharge of 5.0 mgd annual average daily flow at D001 to an unnamed tributary of the Peace Creek Drainage Canal, a Class III freshwater body of the State, and ultimately the Peace River. The point of discharge is located at approximately at latitude 27° 56′ 04″ N, longitude 81° 41′ 38″ W.

List permit violations (form DMR data or other sources) and plant upsets that occurred within past year:
Mr. Joe Squitieri (Compliance/Enforcement Inspector) provided the following information:
There is no current enforcement action for this facility and no reported violations at D001 from January 2002 through March 2003.

Describe previous impact bioassessments, WQBELs, and previous or current enforcement actions:

The Department conducted an FYI-5 at the facility on September 1996. Water quality samples were obtained from the outfall weir location, reference and test sites in the Peace Canal.

The 48-acute bioassay indicated that the species *Ceriodaphnia dubia* or *Cyprinella leedsi* resulted in a 100% survival for both species at the times of sample collection.

Effluent samples indicated that metals (aluminum, iron and zinc) and organic compounds present complied with Class III Water Quality Standards. CBOD5, coliforms and suspended solids were also within water quality standards. The nutrient analyses from all sampling locations indicated that the effluent is not adversely affecting water quality of the water. Nutrient levels were lower at the unnamed tributary and the Peace Creek drainage canal sampling locations when compared to results at the outfall location.

In conclusion, the results of the FYI5 for the facility indicated that the effluent was not affecting the water quality of the receiving water.

Additional information

Staff contributing to this review:

Biologist: Melissa Gunter and Nahir Cornwell

Inspector: Joe Squitieri

Engineer:

Grey line denotes that biologist should know data

Black line denotes that inspector or engineer should know data

City of Winter Haven FYI-5 Test and Control Site Comparability Discussion

Location map for the City of Winter Haven FYI5 is located on a separate file.

Parameter	Control Site			Test Site 1[2]			Test Site 2		
	Top	Mid	Bottom	Top	Mid	Bottom	Top	Mid	Bottom
Depth (m)[1]				2.5					
Dissolved oxygen (mg/L)[1]	1.41			1.32			5.28		
Specific conductance (uS/cm)[1]	160			146			341		
Temperature (·C)[1]	28.10			28.74			25.16		
pH (SU)[1]	6.10			5.97			6.97		
Latitude/longitude	27° 54' 45.7" / 81° 41' 52.3"						27° 55' 23.7" / 81° 41' 02.4"		
Least wide riparian side	12 m			12m			1.5m		
Artificially channelized	Yes, severe			Yes			Yes		
Artificially impounded	No			No			No		
High water mark	3.0 m			2.2m			.10m		
Canopy cover %	none			none			Dense canopy		
Sediment odor	Earthy/organic			organic			None		
Sediment oils	none			none			None		
Sediment deposition	Muck			Muck			Sand is moderate to severe		
System type	3rd order			2nd order			1th order		
Water odors	none			none			none		
Water surface oils	none			none			none		
Clarity	turbid			turbid			Slightly turbid		
Color	tannic			tannic			tannic		
Periphyton									
Fish	yes			yes			none		
Aquatic macrophytes									
Iron/sulfur bacteria	none			none			none		

[2] A recon was not conducted at the control site; however, site 1 is approximately 30 feet upstream from the control site. A recon will be reviewed on September 15, 2003.

Test site 1 is a channelized water body with no shade where the unnamed tributary enters the Peace Creek drainage canal. Test site 1 is located approximately 20 meters upstream of the reference site. As you walk upstream, canopy becomes dense. The stream width was about 15.24 m wide and the velocity was approximately .71 feet per second. Aquatic vegetation (water hyacinth) was present in the stream. Due to the depth of the stream, TS was not able to cross to the other side and conduct a more accurate characterization of the right side of the stream bank.

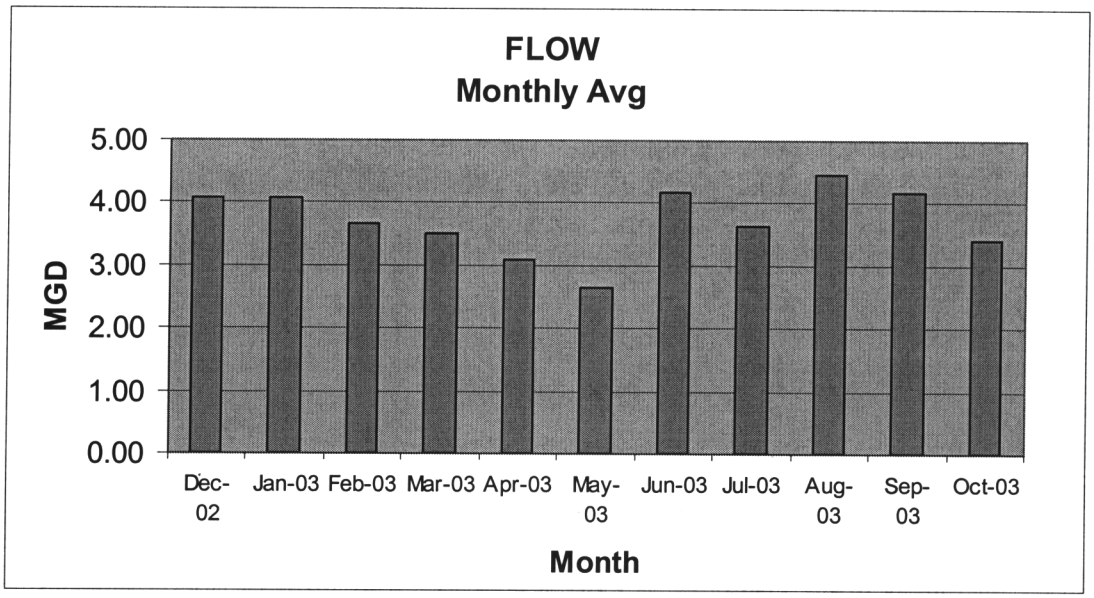
The control site had on its left and right banks aquatic vegetation (water hyacinth) that covered approximately .10m of the whole length of the creek. There is no canopy cover on either side of the creek. The total depth of the creek was not obtained since the creek is fairly deep. Test site 1 and the reference site are the most comparable sites for the fifth year inspection study.

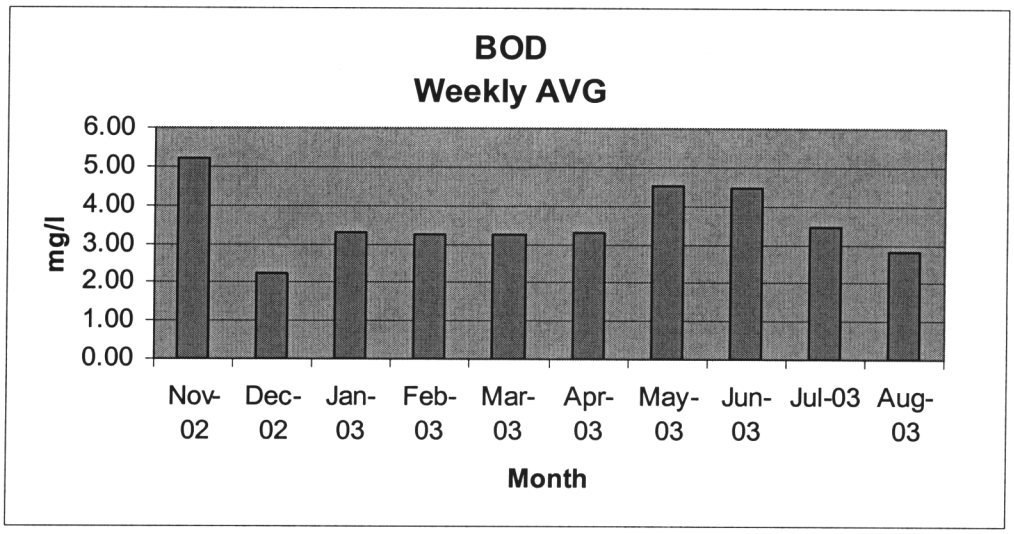
Test site 2 is located upstream Test Site 1, in the unnamed tributary. Water quality samples will be obtained from this location for informational and comparative purposes due to its proximity to the outfall location, even though TS does not consider it is comparable to the reference site.

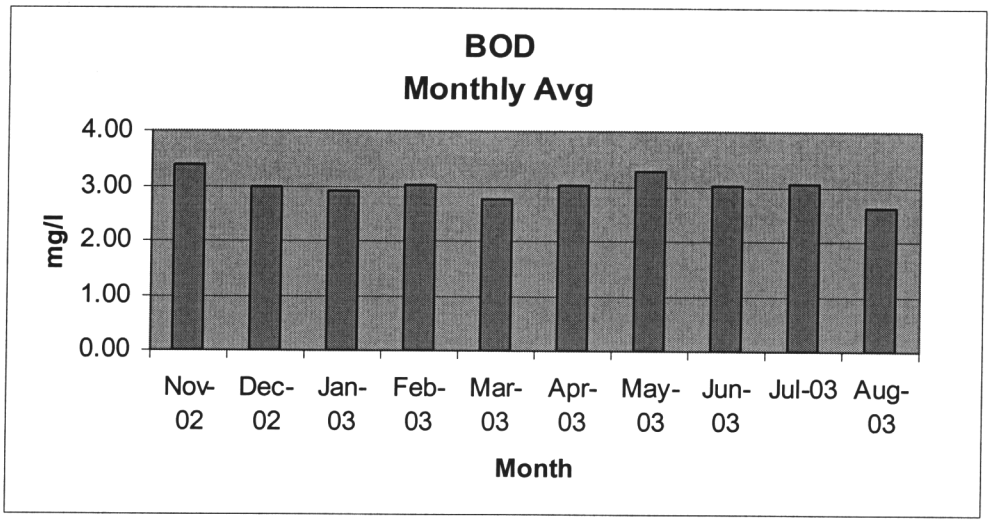
Floating Hester-Dendys and periphyton racks will be placed at the test site 1 and control site on September 15, 2003.

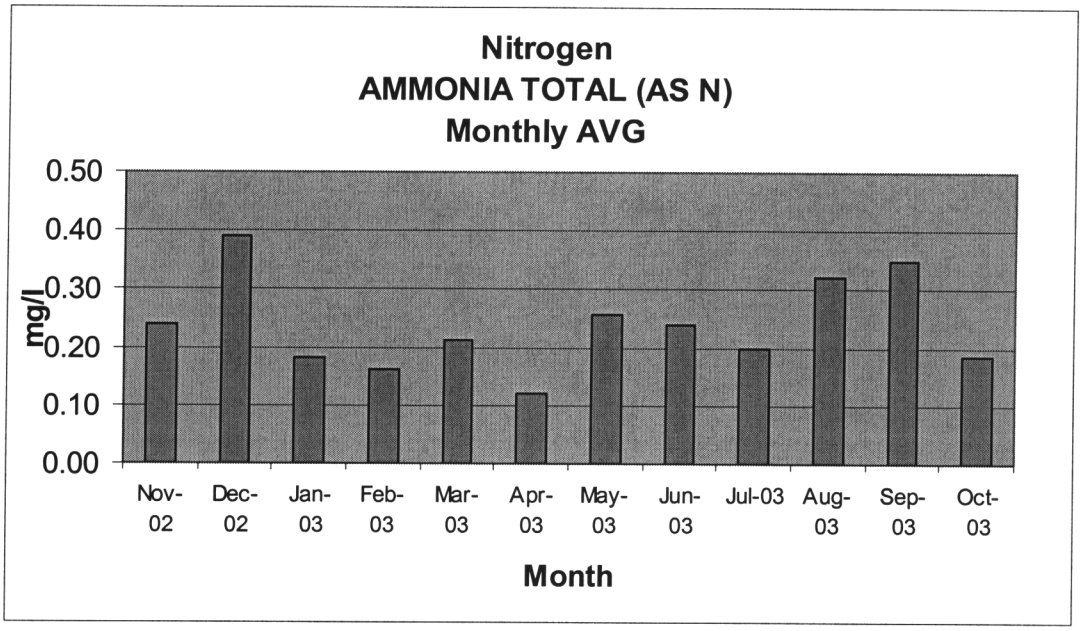
Discharge Monitoring Report Data

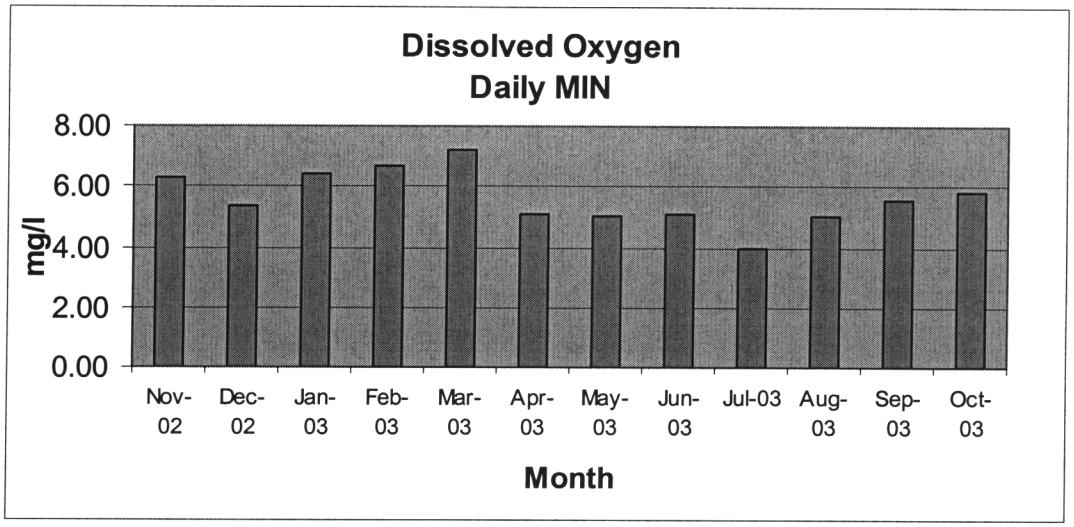
Facility ID	Facility Name	District	Facility Type	Major (M)	Outfall Type	Monitoring Date	Outfall Indicator	Parameter Code	Parameter Description	Monitoring Location Code	Concentration (1)	Concentration Limit (1)
FL0036048	WINTER HAVEN #3 WAHNETA	TA	M	M	EFFLUENT	4/30/2003	001-1	P 80082	BOD, CARBONACEOUS 05 DAY, 20C	1	3.01	3.0
FL0036048	WINTER HAVEN #3 WAHNETA	TA	M	M	EFFLUENT	4/30/2003	001-1	P 80082	BOD, CARBONACEOUS 05 DAY, 20C	1	3.30	3.0
FL0036048	WINTER HAVEN #3 WAHNETA	TA	M	M	EFFLUENT	7/31/2003	001-1	P 00300	OXYGEN, DISSOLVED (DO)	1	3.97	5.0






BOD
Monthly Avg
4.00
3.00
2.00
1.00
0.00
mg/l
Nov-02
Dec-02
Jan-03
Feb-03
Mar-03
Apr-03
May-03
Jun-03
Jul-03
Aug-03
Month


Nitrogen
AMMONIA TOTAL (AS N)
Monthly AVG
0.50
0.40
0.30
0.20
0.10
0.00
mg/l
Nov-02
Dec-02
Jan-03
Feb-03
Mar-03
Apr-03
May-03
Jun-03
Jul-03
Aug-03
Sep-03
Oct-03
Month


Dissolved Oxygen
Daily MIN
8.00
6.00
4.00
2.00
0.00
mg/l
Nov-02
Dec-02
Jan-03
Feb-03
Mar-03
Apr-03
May-03
Jun-03
Jul-03
Aug-03
Sep-03
Oct-03
Month

Appendix 3

Explanation of Measurements

(1) Quality Assurance and Quality Control

FDEP's quality assurance requirements for analytical laboratories and field activities are codified in Chapter 62-160, F.A.C., Quality Assurance (QA Rule) and in internal Standard Operating Procedures (FDEP SOPs). Methods for all analyses are on file at the FDEP Central Laboratory in Tallahassee and may be viewed on the web at http://www.floridadep.org/labs/sop/index.htm and/or http://www.floridadep.org/labs/qa/index.htm.

(2) Chemical Analyses of the Effluent

The effluent was analyzed for nutrients, metals, organic constituents (base, neutral, and acid extractables) and pesticides following FDEP SOPs. A list of the analytes tested for, results, data qualifiers, the minimum detection limit and the practical quantitation limit are given in Appendix 4. The results from these analyses were compared with Water Quality Criteria (62-302 F.A.C.) and facility permit limits (Table 1, Appendix 2). Exceedances of Water Quality Criteria may be violations of specific provisions of Chapter 62-302 (F.A.C.) and/ or facility permit limits.

(3) Toxicity Bioassays

Acute screening toxicity bioassays were performed on the effluent sample using the water flea, *Ceriodaphnia dubia,* and the fish, *Cyprinella leedsi* following FDEP SOPs TA07_01 and TA07_02. Failure of toxicity testing may constitute a violation of 62-302.520(21), 62-302.530(62) and/or facility permit limits.

(4) Bacteriological Testing

The effluent and water from control and test sites were analyzed for the presence and concentration of total and fecal coliform bacteria following FDEP SOPs MB1_0 and MB1_1. High levels of fecal or total coliform bacteria may constitute violation of 62-302.530(6), 62-302.530(7) and/or facility permit limits.

(5) Habitat Assessment

Habitat assessment is used to evaluate the physical structure and extent of disturbance in a waterbody. Eight aspects are ranked, with 20 possible points for each aspect (QA Rule SOP FT 3100). 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).

(6) Algal Growth Potential (AGP)

The effluent and water from control and test sites are autoclaved, filtered (0.45μm), inoculated with the unicellular green alga, *Pseudokirchneriella subcapitata* (formerly *Selenastrum capricornutum,* USEPA 2002*),* and incubated for 14 days (FDEP SOP TA08_05). The algal growth potential (AGP) value is the peak growth of the alga within that 14-day period, recorded as mg dry weight/L. Raschke and Shultz (1987) found that an AGP above 5.0 mg dry weight/L represents a "problem" threshold for fresh receiving waters, implying nutrient enrichment. High AGP values may constitute one line of evidence for violation of 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C. and/or 62-302.530(48)(b) F.A.C..

The concentration of nutrients in a water sample may be used to calculate the expected yield of AGP under the assumption that other required nutrients (e.g. silicon, micronutrients) are present in excess (Miller *et al.* 1978). The expected amount of production is calculated as 38 times the total soluble inorganic nitrogen (nitrate and nitrite plus ammonia) under nitrogen limitation or 430 times the ortho-phosphate (OP) concentration under phosphorus limitation with an error of ± 20%. When the ratio of nitrogen to phosphorus (N: P) is less than 10:1, nitrogen limitation of algal production is likely. When the N: P ratio is 20:1 or greater, phosphorus limitation is likely (USEPA 2000). For ratios in-between, co-limitation may occur. Production of lower biomass than expected may be evidence of growth inhibition related to toxic compounds present in the water sample tested and may be a violation of 62-302.530(62) F.A.C..

(7) Algal Phytoplankton and Periphyton Assemblages

Methods: Periphyton were sampled at both control and test sites by incubating glass microscope slides in a standard periphytometer for 28 days (QA Rule SOP FS7210). Phytoplankton were sampled using a 1 L grab sample (QA Rule SOP FS7100). Periphyton and phytoplankton were subsampled and identified to the lowest practical level, usually species (FDEP SOPs AB03, AB03_1 and AB05).

Chlorophyll *a* Content: Chlorophyll *a* content is measured in both phytoplankton and periphyton samples to estimate algal biomass (FDEP SOP BB05). High algal biomass implies nutrient stress (Stevenson and Bahls 1999) and may be a violation of 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C. and/or 62-302.530(48)(b) F.A.C..

Algal Density: Algal density is estimated as number of natural units/ml for phytoplankton samples and number of natural units/cm^2 for periphyton samples. Although algal density of a single site is highly variable and depends on a number of factors, comparison of algal density at a control site to algal density at a related test site gives a partial comparison of algal biomass at the two sites (Stevenson and Smol 2003).

Taxa richness: Taxa richness is the number of distinct algal taxa present in a sample. Extreme nutrient enrichment tends to reduce the number of different types of algae present in a sample because a few tolerant taxa tend to reproduce rapidly and constitute the majority of the cells present. However, moderate nutrient enrichment of nutrient poor waters may sometimes be correlated with increased algal taxa richness (Stevenson and Bahls 1999) as the algal community begins to respond to the increased input of nutrients.

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

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

(8) Benthic Macroinvertebrate Assemblages

Methods: Benthic macroinvertebrates were collected using two methods. Quantitative samples were collected from Hester-Dendy multi-plate samplers incubated for 28 days (QA Rule SOP FS7430). Qualitative collections are made using 20 dipnet sweeps (QA Rule SOP FS7420). Benthic macroinvertebrates were sorted and identified to the lowest practical taxonomic level, usually species (FDEP SOP IZ06).

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

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

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

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

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

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

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

The Stream Condition Index (SCI): The SCI is a composite macroinvertebrate metric 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 (QA Rule SOP LT 7200). Points are summed to yield a final SCI score (range 7-33, depending on region and index period). Included in the calculation of SCI are taxa richness, number of EPT taxa, number of Chironomid taxa, percent contribution of the dominant taxon, the Florida Index, percent contribution of Diptera, and the percent contribution of suspension and filter feeders. Scores are broken into four ordinal groups: Excellent, Good, Poor and Very Poor. A decrease in ordinal SCI score from the Control to the Test site may be evidence of degradation related to a facility's effluent. An SCI score of "Poor" or "Very Poor" related to a facility's effluent may constitute violations of 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

(9) Statistical Comparisons

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 analysis of effluent and receiving water

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
10/13/2003 14:45	29234	Bio-AGP/LimNut	Algal Growth Potential	10.2	mg DryWt/L		0.1	0.3
10/13/2003 14:45	29234	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
10/13/2003 14:45	29234	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
10/13/2003 14:45	29234	Bio-Toxicology	Bioassay-Acute-Screen-FW-C.dubia, L	100	LC50	L		
10/13/2003 14:45	29234	Bio-Toxicology	Bioassay-Acute-Screen-FW-Fish, LC50	100	LC50	L		
10/13/2003 14:45	29234	BNA-Water	1,2,4,5-Tetrachlorobenzene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	1,2,4-Trichlorobenzene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	1,2-Dichlorobenzene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	1,3,5-Trinitrobenzene	4.3	ug/L	U	4.3	17
10/13/2003 14:45	29234	BNA-Water	1,3-Dichlorobenzene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	1,3-Dinitrobenzene	2.2	ug/L	U	2.2	8.7
10/13/2003 14:45	29234	BNA-Water	1,4-Dichlorobenzene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	1,4-Naphthoquinone	22	ug/L	U	22	87
10/13/2003 14:45	29234	BNA-Water	1-Naphthylamine	11	ug/L	UJ	11	43
10/13/2003 14:45	29234	BNA-Water	2,3,4,6-Tetrachlorophenol	2.2	ug/L	U	2.2	8.7
10/13/2003 14:45	29234	BNA-Water	2,4,5-Trichlorophenol	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	2,4,6-Trichlorophenol	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	2,4-Dichlorophenol	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	2,4-Dimethylphenol	54	ug/L	U	54	220
10/13/2003 14:45	29234	BNA-Water	2,4-Dinitrophenol	16	ug/L	U	16	65
10/13/2003 14:45	29234	BNA-Water	2,4-Dinitrotoluene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	2,6-Dichlorophenol	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	2,6-Dinitrotoluene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	2-Acetylaminofluorene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	2-Chloronaphthalene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	2-Chlorophenol	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	2-Methyl-4,6-dinitrophenol	3.3	ug/L	U	3.3	13
10/13/2003 14:45	29234	BNA-Water	2-Methylnaphthalene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	2-Naphthylamine	11	ug/L	U	11	43
10/13/2003 14:45	29234	BNA-Water	2-Nitroaniline	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	2-Nitrophenol	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	2-Picoline	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	3,3'-Dichlorobenzidine	43	ug/L	U	43	170
10/13/2003 14:45	29234	BNA-Water	3,3'-Dimethylbenzidine	22	ug/L	U	22	87
10/13/2003 14:45	29234	BNA-Water	3-Methylcholanthrene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	3-Nitroaniline	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	4,4'-DDD	1.6	ug/L	U	1.6	6.5
10/13/2003 14:45	29234	BNA-Water	4,4'-DDE	1.6	ug/L	U	1.6	6.5
10/13/2003 14:45	29234	BNA-Water	4,4'-DDT	1.6	ug/L	U	1.6	6.5
10/13/2003 14:45	29234	BNA-Water	4-Aminobiphenyl	4.3	ug/L	U	4.3	17
10/13/2003 14:45	29234	BNA-Water	4-Bromophenyl phenyl ether	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	4-Chloro-3-methylphenol	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	4-Chloroaniline	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	4-Chlorophenyl phenyl ether	2.2	ug/L	U	2.2	8.7
10/13/2003 14:45	29234	BNA-Water	4-Nitroaniline	1.1	ug/L	UJ	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	4-Nitrophenol	16	ug/L	U	16	65
10/13/2003 14:45	29234	BNA-Water	5-Nitro-o-toluidine	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	7,12-Dimethylbenz(a)anthracene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Acenaphthene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Acenaphthylene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Acetophenone	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Aldrin	1.6	ug/L	UJ	1.6	6.5
10/13/2003 14:45	29234	BNA-Water	Aniline	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Anthracene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Azobenzene/1,2-Diphenylhydrazine	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Benzidine	110	ug/L	U	110	430
10/13/2003 14:45	29234	BNA-Water	Benzo(a)anthracene	1.1	ug/L	U	1.1	4.3

10/13/2003 14:45	29234	BNA-Water	Benzo(a)pyrene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Benzo(b)fluoranthene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Benzo(g,h,i)perylene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Benzo(k)fluoranthene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Benzyl alcohol	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Bis(2-chloroethoxy)methane	1.1	ug/L	UJ	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Bis(2-chloroethyl)ether	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Bis(2-chloroisopropyl)ether	3.3	ug/L	U	3.3	13
10/13/2003 14:45	29234	BNA-Water	Bis(2-ethylhexyl)phthalate	16	ug/L	U	16	65
10/13/2003 14:45	29234	BNA-Water	Butyl benzyl phthalate	5.4	ug/L	U	5.4	22
10/13/2003 14:45	29234	BNA-Water	Chrysene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Di-n-butyl phthalate	5.4	ug/L	U	5.4	22
10/13/2003 14:45	29234	BNA-Water	Di-n-octyl phthalate	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Dibenzo(a,h)anthracene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Dibenzofuran	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Dieldrin	1.6	ug/L	U	1.6	6.5
10/13/2003 14:45	29234	BNA-Water	Diethyl phthalate	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Dimethyl phthalate	54	ug/L	U	54	220
10/13/2003 14:45	29234	BNA-Water	Dimethylaminoazobenzene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Dinoseb	4.3	ug/L	U	4.3	17
10/13/2003 14:45	29234	BNA-Water	Diphenylamine	3.3	ug/L	U	3.3	13
10/13/2003 14:45	29234	BNA-Water	Endosulfan I	4.3	ug/L	U	4.3	17
10/13/2003 14:45	29234	BNA-Water	Endosulfan II	4.3	ug/L	U	4.3	17
10/13/2003 14:45	29234	BNA-Water	Endosulfan sulfate	1.6	ug/L	U	1.6	6.5
10/13/2003 14:45	29234	BNA-Water	Endrin	1.6	ug/L	U	1.6	6.5
10/13/2003 14:45	29234	BNA-Water	Endrin aldehyde	4.3	ug/L	U	4.3	17
10/13/2003 14:45	29234	BNA-Water	Ethyl methanesulfonate	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Fluoranthene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Fluorene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Heptachlor	1.6	ug/L	UJ	1.6	6.5
10/13/2003 14:45	29234	BNA-Water	Heptachlor epoxide	1.6	ug/L	U	1.6	6.5
10/13/2003 14:45	29234	BNA-Water	Hexachlorobenzene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Hexachlorobutadiene	3.3	ug/L	U	3.3	13
10/13/2003 14:45	29234	BNA-Water	Hexachlorocyclopentadiene	3.3	ug/L	U	3.3	13
10/13/2003 14:45	29234	BNA-Water	Hexachloroethane	3.3	ug/L	U	3.3	13
10/13/2003 14:45	29234	BNA-Water	Hexachloropropene	2.2	ug/L	U	2.2	8.7
10/13/2003 14:45	29234	BNA-Water	Indeno(1,2,3-cd)pyrene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Isophorone	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Isosafrole	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Methapyrilene	4.3	ug/L	UJ	4.3	17
10/13/2003 14:45	29234	BNA-Water	Methyl methanesulfonate	1.1	ug/L	UJ	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	N-Nitrosodi-n-butylamine	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	N-Nitrosodi-n-propylamine	2.2	ug/L	U	2.2	8.7
10/13/2003 14:45	29234	BNA-Water	N-Nitrosodiethylamine	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	N-Nitrosodimethylamine	2.2	ug/L	U	2.2	8.7
10/13/2003 14:45	29234	BNA-Water	N-Nitrosodiphenylamine	3.3	ug/L	U	3.3	13
10/13/2003 14:45	29234	BNA-Water	N-Nitrosomethylethylamine	2.2	ug/L	U	2.2	8.7
10/13/2003 14:45	29234	BNA-Water	N-Nitrosomorpholine	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	N-Nitrosopiperidine	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	N-Nitrosopyrrolidine	2.2	ug/L	U	2.2	8.7
10/13/2003 14:45	29234	BNA-Water	Naphthalene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Nitrobenzene	2.2	ug/L	U	2.2	8.7
10/13/2003 14:45	29234	BNA-Water	Nitroquinoline-1-oxide	22	ug/L	UJ	22	87
10/13/2003 14:45	29234	BNA-Water	Pentachlorobenzene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Pentachloroethane	54	ug/L	U	54	220
10/13/2003 14:45	29234	BNA-Water	Pentachloronitrobenzene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Pentachlorophenol	3.3	ug/L	U	3.3	13
10/13/2003 14:45	29234	BNA-Water	Phenacetin	4.3	ug/L	U	4.3	13
10/13/2003 14:45	29234	BNA-Water	Phenanthrene	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Phenol	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	Pyrene	1.1	ug/L	U	1.1	4.3

10/13/2003 14:45	29234	BNA-Water	Pyridine	4.3	ug/L	U	4.3	17
10/13/2003 14:45	29234	BNA-Water	Safrole	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	BNA-Water	alpha-BHC	1.6	ug/L	U	1.6	6.5
10/13/2003 14:45	29234	BNA-Water	beta-BHC	1.6	ug/L	U	1.6	6.5
10/13/2003 14:45	29234	BNA-Water	delta-BHC	1.6	ug/L	U	1.6	6.5
10/13/2003 14:45	29234	BNA-Water	gamma-BHC	1.6	ug/L	U	1.6	6.5
10/13/2003 14:45	29234	BNA-Water	m,p-Cresols	2.2	ug/L	U	2.2	8.7
10/13/2003 14:45	29234	BNA-Water	o-Cresol	2.2	ug/L	U	2.2	8.7
10/13/2003 14:45	29234	BNA-Water	o-Toluidine	1.1	ug/L	U	1.1	4.3
10/13/2003 14:45	29234	GC-Water	Alachlor	0.59	ug/L	U	0.59	2.36
10/13/2003 14:45	29234	GC-Water	Ametryn	0.05	ug/L	U	0.05	0.2
10/13/2003 14:45	29234	GC-Water	Atrazine	0.05	ug/L	U	0.05	0.2
10/13/2003 14:45	29234	GC-Water	Azinphos Methyl	0.05	ug/L	U	0.05	0.2
10/13/2003 14:45	29234	GC-Water	Bromacil	0.2	ug/L	U	0.2	0.8
10/13/2003 14:45	29234	GC-Water	Butylate	0.2	ug/L	U	0.2	0.8
10/13/2003 14:45	29234	GC-Water	Chlorpyrifos Ethyl	0.05	ug/L	U	0.05	0.2
10/13/2003 14:45	29234	GC-Water	Chlorpyrifos Methyl	0.099	ug/L	U	0.099	0.396
10/13/2003 14:45	29234	GC-Water	Diazinon	0.05	ug/L	U	0.05	0.2
10/13/2003 14:45	29234	GC-Water	Ethion	0.05	ug/L	U	0.05	0.2
10/13/2003 14:45	29234	GC-Water	Ethoprop	0.099	ug/L	U	0.099	0.396
10/13/2003 14:45	29234	GC-Water	Fenamiphos	0.2	ug/L	U	0.2	0.8
10/13/2003 14:45	29234	GC-Water	Fonofos	0.099	ug/L	U	0.099	0.396
10/13/2003 14:45	29234	GC-Water	Hexazinone	0.099	ug/L	U	0.099	0.396
10/13/2003 14:45	29234	GC-Water	Malathion	0.15	ug/L	U	0.15	0.6
10/13/2003 14:45	29234	GC-Water	Metalaxyl	0.25	ug/L	UJ	0.25	1
10/13/2003 14:45	29234	GC-Water	Metolachlor	0.5	ug/L	U	0.5	2
10/13/2003 14:45	29234	GC-Water	Metribuzin	0.099	ug/L	U	0.099	0.396
10/13/2003 14:45	29234	GC-Water	Mevinphos	0.2	ug/L	U	0.2	0.8
10/13/2003 14:45	29234	GC-Water	Naled	0.79	ug/L	U	0.79	3.16
10/13/2003 14:45	29234	GC-Water	Norflurazon	0.099	ug/L	U	0.099	0.396
10/13/2003 14:45	29234	GC-Water	Parathion Ethyl	0.15	ug/L	U	0.15	0.6
10/13/2003 14:45	29234	GC-Water	Parathion Methyl	0.099	ug/L	U	0.099	0.396
10/13/2003 14:45	29234	GC-Water	Phorate	0.05	ug/L	U	0.05	0.2
10/13/2003 14:45	29234	GC-Water	Prometryn	0.15	ug/L	U	0.15	0.6
10/13/2003 14:45	29234	GC-Water	Simazine	0.05	ug/L	U	0.05	0.2
10/13/2003 14:45	29234	Metals-Water	Aluminum	184	ug/L	A	7	28
10/13/2003 14:45	29234	Metals-Water	Arsenic	6	ug/L	U	6	24
10/13/2003 14:45	29234	Metals-Water	Cadmium	0.058	ug/L	I	0.025	0.1
10/13/2003 14:45	29234	Metals-Water	Calcium	35.5	mg/L	A	0.05	0.2
10/13/2003 14:45	29234	Metals-Water	Chromium	3	ug/L	U	3	12
10/13/2003 14:45	29234	Metals-Water	Copper	2.2	ug/L	I	1	4
10/13/2003 14:45	29234	Metals-Water	Iron	111	ug/L	A	15	60
10/13/2003 14:45	29234	Metals-Water	Lead	0.45	ug/L	A	0.05	0.2
10/13/2003 14:45	29234	Metals-Water	Magnesium	6.6	mg/L	A	0.02	0.08
10/13/2003 14:45	29234	Metals-Water	Nickel	3	ug/L	U	3	12
10/13/2003 14:45	29234	Metals-Water	Selenium	1	ug/L	U	1	4
10/13/2003 14:45	29234	Metals-Water	Silver	0.02	ug/L	U	0.02	0.08
10/13/2003 14:45	29234	Metals-Water	Zinc	44	ug/L	A	4	16
10/13/2003 14:45	29234	Nutrients-Liquid	Ammonia-N	0.023	mg N/L		0.01	0.02
10/13/2003 14:45	29234	Nutrients-Liquid	Color		PCU			
10/13/2003 14:45	29234	Nutrients-Liquid	NO2NO3-N	0.13	mg N/L		0.004	0.01
10/13/2003 14:45	29234	Nutrients-Liquid	N_KJEL_TOT	0.81	mg N/L		0.12	0.4
10/13/2003 14:45	29234	Nutrients-Liquid	O-Phosphate-P	1.4	mg P/L		0.04	0.1
10/13/2003 14:45	29234	Nutrients-Liquid	Organic Carbon	9.8	mg C/L		1	5
10/13/2003 14:45	29234	Nutrients-Liquid	TSS		mg/L			
10/13/2003 14:45	29234	Nutrients-Liquid	Total-P	1.3	mg P/L		0.04	0.12
10/13/2003 14:45	29234	Nutrients-Liquid	Turbidity		NTU			
10/13/2003 14:45	29234	Overflow	Oil and Grease	4	mg/l	IV		
10/13/2003 14:45	29234	VOC-Water	Bromodichloromethane	0.22	ug/L	I	0.2	1
10/13/2003 14:45	29234	VOC-Water	Bromoform	0.2	ug/L	U	0.2	1
10/13/2003 14:45	29234	VOC-Water	Chloroform	2.1	ug/L		0.2	1

10/13/2003 14:45	29234	VOC-Water	Dibromochloromethane	0.2	ug/L	U	0.2	1
10/13/2003 10:30	29235	Bio-AGP/LimNut	Algal Growth Potential	20.6	mg DryWt/L		0.1	0.3
10/13/2003 10:30	29235	Bio-Chl-a	Chlorophyll-A, Monochromatic, Peri	42	mg/m2		1.4	4.1
10/13/2003 10:30	29235	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	1.2	ug/L	U	1.2	3.7
10/13/2003 10:30	29235	Bio-Chl-a	Phaeophytin-A, Monochromatic, Peri	0	mg/m2		1.4	4.1
10/13/2003 10:30	29235	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	1.2	ug/L	U	1.2	3.7
10/13/2003 10:30	29235	Bio-Invertebrates	Macroinvert-FW-Qual-Dipnetx20-# Taxa	15	# Taxa			
10/13/2003 10:30	29235	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-		# Taxa			
10/13/2003 10:30	29235	Bio-Peri/Phyto	Periphyton-Quantitative-# Diatom Taxa	27	#Taxa			
10/13/2003 10:30	29235	Bio-Peri/Phyto	Periphyton-Quantitative-# Wet Taxa	18	#Taxa			
10/13/2003 10:30	29235	Nutrients-Liquid	Ammonia-N	0.055	mg N/L		0.01	0.02
10/13/2003 10:30	29235	Nutrients-Liquid	NO2NO3-N	0.35	mg N/L		0.004	0.01
10/13/2003 10:30	29235	Nutrients-Liquid	N_KJEL_TOT	1.9	mg N/L		0.12	0.4
10/13/2003 10:30	29235	Nutrients-Liquid	O-Phosphate-P	0.097	mg P/L		0.004	0.01
10/13/2003 10:30	29235	Nutrients-Liquid	Total-P	0.18	mg P/L		0.04	0.12
10/13/2003 14:10	29236	Bio-AGP/LimNut	Algal Growth Potential	10.3	mg DryWt/L		0.1	0.3
10/13/2003 14:10	29236	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
10/13/2003 14:10	29236	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
10/13/2003 14:10	29236	Nutrients-Liquid	Ammonia-N	0.022	mg N/L		0.01	0.02
10/13/2003 14:10	29236	Nutrients-Liquid	NO2NO3-N	0.14	mg N/L		0.004	0.01
10/13/2003 14:10	29236	Nutrients-Liquid	N_KJEL_TOT	0.9	mg N/L		0.12	0.4
10/13/2003 14:10	29236	Nutrients-Liquid	O-Phosphate-P	1	mg P/L		0.12	0.3
10/13/2003 14:10	29236	Nutrients-Liquid	Total-P	1.1	mg P/L		0.04	0.12
10/13/2003 10:50	29237	BNA-Water	1,2,4,5-Tetrachlorobenzene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	1,2,4-Trichlorobenzene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	1,2-Dichlorobenzene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	1,3,5-Trinitrobenzene	3.8	ug/L	U	3.8	15
10/13/2003 10:50	29237	BNA-Water	1,3-Dichlorobenzene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	1,3-Dinitrobenzene	1.9	ug/L	U	1.9	7.7
10/13/2003 10:50	29237	BNA-Water	1,4-Dichlorobenzene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	1,4-Naphthoquinone	19	ug/L	U	19	77
10/13/2003 10:50	29237	BNA-Water	1-Naphthylamine	9.6	ug/L	UJ	9.6	38
10/13/2003 10:50	29237	BNA-Water	2,3,4,6-Tetrachlorophenol	1.9	ug/L	U	1.9	7.7
10/13/2003 10:50	29237	BNA-Water	2,4,5-Trichlorophenol	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	2,4,6-Trichlorophenol	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	2,4-Dichlorophenol	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	2,4-Dimethylphenol	48	ug/L	U	48	190
10/13/2003 10:50	29237	BNA-Water	2,4-Dinitrophenol	14	ug/L	U	14	58
10/13/2003 10:50	29237	BNA-Water	2,4-Dinitrotoluene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	2,6-Dichlorophenol	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	2,6-Dinitrotoluene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	2-Acetylaminofluorene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	2-Chloronaphthalene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	2-Chlorophenol	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	2-Methyl-4,6-dinitrophenol	2.9	ug/L	U	2.9	12
10/13/2003 10:50	29237	BNA-Water	2-Methylnaphthalene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	2-Naphthylamine	9.6	ug/L	U	9.6	38
10/13/2003 10:50	29237	BNA-Water	2-Nitroaniline	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	2-Nitrophenol	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	2-Picoline	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	3,3'-Dichlorobenzidine	38	ug/L	U	38	150
10/13/2003 10:50	29237	BNA-Water	3,3'-Dimethylbenzidine	19	ug/L	U	19	77
10/13/2003 10:50	29237	BNA-Water	3-Methylcholanthrene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	3-Nitroaniline	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	4,4'-DDD	1.4	ug/L	U	1.4	5.8
10/13/2003 10:50	29237	BNA-Water	4,4'-DDE	1.4	ug/L	U	1.4	5.8
10/13/2003 10:50	29237	BNA-Water	4,4'-DDT	1.4	ug/L	U	1.4	5.8
10/13/2003 10:50	29237	BNA-Water	4-Aminobiphenyl	3.8	ug/L	U	3.8	15
10/13/2003 10:50	29237	BNA-Water	4-Bromophenyl phenyl ether	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	4-Chloro-3-methylphenol	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	4-Chloroaniline	0.96	ug/L	U	0.96	3.8

10/13/2003 10:50	29237	BNA-Water	4-Chlorophenyl phenyl ether	1.9	ug/L	U	1.9	7.7
10/13/2003 10:50	29237	BNA-Water	4-Nitroaniline	0.96	ug/L	UJ	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	4-Nitrophenol	14	ug/L	U	14	58
10/13/2003 10:50	29237	BNA-Water	5-Nitro-o-toluidine	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	7,12-Dimethylbenz(a)anthracene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Acenaphthene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Acenaphthylene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Acetophenone	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Aldrin	1.4	ug/L	UJ	1.4	5.8
10/13/2003 10:50	29237	BNA-Water	Aniline	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Anthracene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Azobenzene/1,2-Diphenylhydrazine	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Benzidine	96	ug/L	U	96	380
10/13/2003 10:50	29237	BNA-Water	Benzo(a)anthracene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Benzo(a)pyrene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Benzo(b)fluoranthene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Benzo(g,h,i)perylene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Benzo(k)fluoranthene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Benzyl alcohol	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Bis(2-chloroethoxy)methane	0.96	ug/L	UJ	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Bis(2-chloroethyl)ether	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Bis(2-chloroisopropyl)ether	2.9	ug/L	U	2.9	12
10/13/2003 10:50	29237	BNA-Water	Bis(2-ethylhexyl)phthalate	14	ug/L	U	14	58
10/13/2003 10:50	29237	BNA-Water	Butyl benzyl phthalate	4.8	ug/L	U	4.8	19
10/13/2003 10:50	29237	BNA-Water	Chrysene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Di-n-butyl phthalate	4.8	ug/L	U	4.8	19
10/13/2003 10:50	29237	BNA-Water	Di-n-octyl phthalate	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Dibenzo(a,h)anthracene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Dibenzofuran	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Dieldrin	1.4	ug/L	U	1.4	5.8
10/13/2003 10:50	29237	BNA-Water	Diethyl phthalate	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Dimethyl phthalate	48	ug/L	U	48	190
10/13/2003 10:50	29237	BNA-Water	Dimethylaminoazobenzene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Dinoseb	3.8	ug/L	U	3.8	15
10/13/2003 10:50	29237	BNA-Water	Diphenylamine	2.9	ug/L	U	2.9	12
10/13/2003 10:50	29237	BNA-Water	Endosulfan I	3.8	ug/L	U	3.8	15
10/13/2003 10:50	29237	BNA-Water	Endosulfan II	3.8	ug/L	U	3.8	15
10/13/2003 10:50	29237	BNA-Water	Endosulfan sulfate	1.4	ug/L	U	1.4	5.8
10/13/2003 10:50	29237	BNA-Water	Endrin	1.4	ug/L	U	1.4	5.8
10/13/2003 10:50	29237	BNA-Water	Endrin aldehyde	3.8	ug/L	U	3.8	15
10/13/2003 10:50	29237	BNA-Water	Ethyl methanesulfonate	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Fluoranthene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Fluorene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Heptachlor	1.4	ug/L	UJ	1.4	5.8
10/13/2003 10:50	29237	BNA-Water	Heptachlor epoxide	1.4	ug/L	U	1.4	5.8
10/13/2003 10:50	29237	BNA-Water	Hexachlorobenzene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Hexachlorobutadiene	2.9	ug/L	U	2.9	12
10/13/2003 10:50	29237	BNA-Water	Hexachlorocyclopentadiene	2.9	ug/L	U	2.9	12
10/13/2003 10:50	29237	BNA-Water	Hexachloroethane	2.9	ug/L	U	2.9	12
10/13/2003 10:50	29237	BNA-Water	Hexachloropropene	1.9	ug/L	U	1.9	7.7
10/13/2003 10:50	29237	BNA-Water	Indeno(1,2,3-cd)pyrene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Isophorone	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Isosafrole	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Methapyrilene	3.8	ug/L	UJ	3.8	15
10/13/2003 10:50	29237	BNA-Water	Methyl methanesulfonate	0.96	ug/L	UJ	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	N-Nitrosodi-n-butylamine	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	N-Nitrosodi-n-propylamine	1.9	ug/L	U	1.9	7.7
10/13/2003 10:50	29237	BNA-Water	N-Nitrosodiethylamine	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	N-Nitrosodimethylamine	1.9	ug/L	U	1.9	7.7
10/13/2003 10:50	29237	BNA-Water	N-Nitrosodiphenylamine	2.9	ug/L	U	2.9	12
10/13/2003 10:50	29237	BNA-Water	N-Nitrosomethylethylamine	1.9	ug/L	U	1.9	7.7

10/13/2003 10:50	29237	BNA-Water	N-Nitrosomorpholine	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	N-Nitrosopiperidine	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	N-Nitrosopyrrolidine	1.9	ug/L	U	1.9	7.7
10/13/2003 10:50	29237	BNA-Water	Naphthalene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Nitrobenzene	1.9	ug/L	U	1.9	7.7
10/13/2003 10:50	29237	BNA-Water	Nitroquinoline-1-oxide	19	ug/L	UJ	19	77
10/13/2003 10:50	29237	BNA-Water	Pentachlorobenzene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Pentachloroethane	48	ug/L	U	48	190
10/13/2003 10:50	29237	BNA-Water	Pentachloronitrobenzene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Pentachlorophenol	2.9	ug/L	U	2.9	12
10/13/2003 10:50	29237	BNA-Water	Phenacetin	3.8	ug/L	U	3.8	12
10/13/2003 10:50	29237	BNA-Water	Phenanthrene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Phenol	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Pyrene	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	Pyridine	3.8	ug/L	U	3.8	15
10/13/2003 10:50	29237	BNA-Water	Safrole	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	BNA-Water	alpha-BHC	1.4	ug/L	U	1.4	5.8
10/13/2003 10:50	29237	BNA-Water	beta-BHC	1.4	ug/L	U	1.4	5.8
10/13/2003 10:50	29237	BNA-Water	delta-BHC	1.4	ug/L	U	1.4	5.8
10/13/2003 10:50	29237	BNA-Water	gamma-BHC	1.4	ug/L	U	1.4	5.8
10/13/2003 10:50	29237	BNA-Water	m,p-Cresols	1.9	ug/L	U	1.9	7.7
10/13/2003 10:50	29237	BNA-Water	o-Cresol	1.9	ug/L	U	1.9	7.7
10/13/2003 10:50	29237	BNA-Water	o-Toluidine	0.96	ug/L	U	0.96	3.8
10/13/2003 10:50	29237	GC-Water	Alachlor	0.58	ug/L	U	0.58	2.32
10/13/2003 10:50	29237	GC-Water	Ametryn	0.048	ug/L	U	0.048	0.192
10/13/2003 10:50	29237	GC-Water	Atrazine	0.048	ug/L	U	0.048	0.192
10/13/2003 10:50	29237	GC-Water	Azinphos Methyl	0.048	ug/L	U	0.048	0.192
10/13/2003 10:50	29237	GC-Water	Bromacil	0.19	ug/L	U	0.19	0.76
10/13/2003 10:50	29237	GC-Water	Butylate	0.19	ug/L	U	0.19	0.76
10/13/2003 10:50	29237	GC-Water	Chlorpyrifos Ethyl	0.048	ug/L	U	0.048	0.192
10/13/2003 10:50	29237	GC-Water	Chlorpyrifos Methyl	0.096	ug/L	U	0.096	0.384
10/13/2003 10:50	29237	GC-Water	Diazinon	0.048	ug/L	U	0.048	0.192
10/13/2003 10:50	29237	GC-Water	Ethion	0.048	ug/L	U	0.048	0.192
10/13/2003 10:50	29237	GC-Water	Ethoprop	0.096	ug/L	U	0.096	0.384
10/13/2003 10:50	29237	GC-Water	Fenamiphos	0.19	ug/L	U	0.19	0.76
10/13/2003 10:50	29237	GC-Water	Fonofos	0.096	ug/L	U	0.096	0.384
10/13/2003 10:50	29237	GC-Water	Hexazinone	0.096	ug/L	U	0.096	0.384
10/13/2003 10:50	29237	GC-Water	Malathion	0.14	ug/L	U	0.14	0.56
10/13/2003 10:50	29237	GC-Water	Metalaxyl	0.24	ug/L	UJ	0.24	0.96
10/13/2003 10:50	29237	GC-Water	Metolachlor	0.48	ug/L	U	0.48	1.92
10/13/2003 10:50	29237	GC-Water	Metribuzin	0.096	ug/L	U	0.096	0.384
10/13/2003 10:50	29237	GC-Water	Mevinphos	0.19	ug/L	UJ	0.19	0.76
10/13/2003 10:50	29237	GC-Water	Naled	0.77	ug/L	U	0.77	3.08
10/13/2003 10:50	29237	GC-Water	Norflurazon	0.096	ug/L	U	0.096	0.384
10/13/2003 10:50	29237	GC-Water	Parathion Ethyl	0.14	ug/L	U	0.14	0.56
10/13/2003 10:50	29237	GC-Water	Parathion Methyl	0.096	ug/L	U	0.096	0.384
10/13/2003 10:50	29237	GC-Water	Phorate	0.048	ug/L	U	0.048	0.192
10/13/2003 10:50	29237	GC-Water	Prometryn	0.14	ug/L	U	0.14	0.56
10/13/2003 10:50	29237	GC-Water	Simazine	0.048	ug/L	U	0.048	0.192
10/13/2003 10:50	29237	Metals-Water	Aluminum	7	ug/L	U	7	28
10/13/2003 10:50	29237	Metals-Water	Arsenic	6	ug/L	U	6	24
10/13/2003 10:50	29237	Metals-Water	Cadmium	0.025	ug/L	U	0.025	0.1
10/13/2003 10:50	29237	Metals-Water	Calcium	0.05	mg/L	U	0.05	0.2
10/13/2003 10:50	29237	Metals-Water	Chromium	3	ug/L	U	3	12
10/13/2003 10:50	29237	Metals-Water	Copper	1	ug/L	U	1	4
10/13/2003 10:50	29237	Metals-Water	Iron	15	ug/L	U	15	60
10/13/2003 10:50	29237	Metals-Water	Lead	0.05	ug/L	U	0.05	0.2
10/13/2003 10:50	29237	Metals-Water	Magnesium	0.02	mg/L	U	0.02	0.08
10/13/2003 10:50	29237	Metals-Water	Nickel	3	ug/L	U	3	12
10/13/2003 10:50	29237	Metals-Water	Selenium	1	ug/L	U	1	4
10/13/2003 10:50	29237	Metals-Water	Silver	0.02	ug/L	U	0.02	0.08

10/13/2003 10:50	29237	Metals-Water	Zinc	4	ug/L	U	4	16
10/13/2003 10:50	29237	Nutrients-Liquid	Ammonia-N	0.01	mg N/L	U	0.01	0.02
10/13/2003 10:50	29237	Nutrients-Liquid	NO2NO3-N	0.007	mg N/L	I	0.004	0.01
10/13/2003 10:50	29237	Nutrients-Liquid	N_KJEL_TOT	0.06	mg N/L	U	0.06	0.2
10/13/2003 10:50	29237	Nutrients-Liquid	O-Phosphate-P	0.004	mg P/L	U	0.004	0.01
10/13/2003 10:50	29237	Nutrients-Liquid	Organic Carbon	1.1	mg C/L	I	1	5
10/13/2003 10:50	29237	Nutrients-Liquid	Total-P	0.02	mg P/L	U	0.02	0.06
10/13/2003 10:50	29237	Overflow	Oil and Grease	4	mg/l	IV		
10/13/2003 10:50	29237	VOC-Water	Bromodichloromethane	0.2	ug/L	U	0.2	1
10/13/2003 10:50	29237	VOC-Water	Bromoform	0.2	ug/L	U	0.2	1
10/13/2003 10:50	29237	VOC-Water	Chloroform	0.2	ug/L	U	0.2	1
10/13/2003 10:50	29237	VOC-Water	Dibromochloromethane	0.2	ug/L	U	0.2	1
10/13/2003 11:15	29238	Bio-AGP/LimNut	Algal Growth Potential	24.2	mg DryWt/L		0.1	0.3
10/13/2003 11:15	29238	Bio-Chl-a	Chlorophyll-A, Monochromatic, Peri	19	mg/m2			0.43
10/13/2003 11:15	29238	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	1.2	ug/L	U	1.2	3.7
10/13/2003 11:15	29238	Bio-Chl-a	Phaeophytin-A, Monochromatic, Peri	0	mg/m2			0.43
10/13/2003 11:15	29238	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	1.2	ug/L	U	1.2	3.7
10/13/2003 11:15	29238	Bio-Invertebrates	Macroinvert-FW-Qual-Dipnetx20	14	# Taxa			
10/13/2003 11:15	29238	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr		# Taxa			
10/13/2003 11:15	29238	Bio-Peri/Phyto	Periphyton-Quantitative-# Diatom		#Taxa			
10/13/2003 11:15	29238	Bio-Peri/Phyto	Periphyton-Quantitative-# Wet Taxa	11	#Taxa			
10/13/2003 11:15	29238	Nutrients-Liquid	Ammonia-N	0.059	mg N/L		0.01	0.02
10/13/2003 11:15	29238	Nutrients-Liquid	NO2NO3-N	0.35	mg N/L		0.004	0.01
10/13/2003 11:15	29238	Nutrients-Liquid	N_KJEL_TOT	1.9	mg N/L		0.12	0.4
10/13/2003 11:15	29238	Nutrients-Liquid	O-Phosphate-P	0.098	mg P/L		0.004	0.01
10/13/2003 11:15	29238	Nutrients-Liquid	Total-P	0.18	mg P/L		0.04	0.12
10/13/2003 10:15	29295	Metals-Water	Aluminum	7	ug/L	U	7	28
10/13/2003 10:15	29295	Metals-Water	Arsenic	6	ug/L	U	6	24
10/13/2003 10:15	29295	Metals-Water	Cadmium	0.083	ug/L	I	0.025	0.1
10/13/2003 10:15	29295	Metals-Water	Calcium	0.05	mg/L	U	0.05	0.2
10/13/2003 10:15	29295	Metals-Water	Chromium	3	ug/L	U	3	12
10/13/2003 10:15	29295	Metals-Water	Copper	1.9	ug/L	I	1	4
10/13/2003 10:15	29295	Metals-Water	Iron	15	ug/L	U	15	60
10/13/2003 10:15	29295	Metals-Water	Lead	0.05	ug/L	U	0.05	0.2
10/13/2003 10:15	29295	Metals-Water	Magnesium	0.02	mg/L	U	0.02	0.08
10/13/2003 10:15	29295	Metals-Water	Nickel	3	ug/L	U	3	12
10/13/2003 10:15	29295	Metals-Water	Selenium	1	ug/L	U	1	4
10/13/2003 10:15	29295	Metals-Water	Silver	0.02	ug/L	U	0.02	0.08
10/13/2003 10:15	29295	Metals-Water	Zinc	8.1	ug/L	I	4	16
10/13/2003 10:15	29295	Nutrients-Liquid	Ammonia-N	0.01	mg N/L	U	0.01	0.02
10/13/2003 10:15	29295	Nutrients-Liquid	NO2NO3-N	0.008	mg N/L	I	0.004	0.01
10/13/2003 10:15	29295	Nutrients-Liquid	N_KJEL_TOT	0.06	mg N/L	U	0.06	0.2
10/13/2003 10:15	29295	Nutrients-Liquid	Total-P	0.02	mg P/L	U	0.02	0.06
10/14/2003 11:50	29296	Metals-Water	Aluminum	122	ug/L		7	28
10/14/2003 11:50	29296	Metals-Water	Arsenic	6	ug/L	U	6	24
10/14/2003 11:50	29296	Metals-Water	Cadmium	0.06	ug/L	I	0.025	0.1
10/14/2003 11:50	29296	Metals-Water	Calcium	36.1	mg/L		0.05	0.2
10/14/2003 11:50	29296	Metals-Water	Chromium	3	ug/L	U	3	12
10/14/2003 11:50	29296	Metals-Water	Copper	2.8	ug/L	I	1	4
10/14/2003 11:50	29296	Metals-Water	Iron	141	ug/L		15	60
10/14/2003 11:50	29296	Metals-Water	Lead	0.43	ug/L		0.05	0.2
10/14/2003 11:50	29296	Metals-Water	Magnesium	6.7	mg/L		0.02	0.08
10/14/2003 11:50	29296	Metals-Water	Nickel	4	ug/L	I	3	12
10/14/2003 11:50	29296	Metals-Water	Selenium	1	ug/L	U	1	4
10/14/2003 11:50	29296	Metals-Water	Silver	0.02	ug/L	U	0.02	0.08
10/14/2003 11:50	29296	Metals-Water	Zinc	40	ug/L		4	16
10/14/2003 11:50	29296	Nutrients-Liquid	Ammonia-N	0.035	mg N/L		0.01	0.02
10/14/2003 11:50	29296	Nutrients-Liquid	NO2NO3-N	0.34	mg N/L	A	0.02	0.05
10/14/2003 11:50	29296	Nutrients-Liquid	N_KJEL_TOT	0.82	mg N/L	A	0.06	0.2
10/14/2003 11:50	29296	Nutrients-Liquid	Total-P	1.6	mg P/L	A	0.08	0.24
10/13/2003 10:30	REP #1	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-	16	# Taxa			

10/13/2003 11:15	REP #1	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-		11	# Taxa		
10/13/2003 10:30	REP #2	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-		17	# Taxa		
10/13/2003 11:15	REP #2	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-		15	# Taxa		
10/13/2003 10:30	REP #3	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-		22	# Taxa		
10/13/2003 11:15	REP #3	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-		15	# Taxa		
10/13/2003 22:30	TRIP BLANK	VOC-Water	Bromodichloromethane		0.2	ug/L	U	0.2	1
10/13/2003 22:30	TRIP BLANK	VOC-Water	Bromoform		0.2	ug/L	U	0.2	1
10/13/2003 22:30	TRIP BLANK	VOC-Water	Chloroform		0.2	ug/L	U	0.2	1
10/13/2003 22:30	TRIP BLANK	VOC-Water	Dibromochloromethane		0.2	ug/L	U	0.2	1

Field ID	Site Location
29234	Outfall – Effluent grab samples
29235	Test Site
29236	Test Site 2
29237	Field Blank
29238	Control Site
29295	Field Blank – Composite Sampler
29296	Outfall – Effluent composite samples

Appendix 5

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	**19**
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	**3.5**
Hester-Dendy Taxa Richness	6	6.5	9	11.5	13	15	**17**	21.5	26	29	32	**20**
Dipnet Taxa Richness	9	**12**	17	20	22	24.5	26	28	31	37	53	**14**
Total Kjeldahl Nitrogen	0.30	0.39	0.56	0.73	0.87	1.00	1.11	1.26	1.49	**1.93**	2.80	**1.9**
Total Ammonia	0.02	0.02	0.04	0.05	**0.06**	0.08	0.11	0.14	0.20	0.34	0.60	**0.059**
Nitrate plus Nitrite	0.01	0.01	0.03	0.05	0.07	0.10	0.14	0.20	**0.32**	0.64	1.05	**0.35**
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	**0.18**	0.25	0.39	0.74	1.51	**0.18**
Orthophosphate	0.01	0.01	0.03	0.04	0.05	**0.08**	0.11	0.17	0.27	0.59	1.37	**0.098**
Turbidity (NTU)	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	**10.45**	16.30	**11**

TEST SITE 1

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	**42**
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	**3.3**
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	**14**
Total Kjeldahl Nitrogen	0.30	0.39	0.56	0.73	0.87	1.00	1.11	1.26	1.49	**1.93**	2.80	**1.9**
Total Ammonia	0.02	0.02	0.04	0.05	**0.06**	0.08	0.11	0.14	0.20	0.34	0.60	**0.055**
Nitrate plus Nitrite	0.01	0.01	0.03	0.05	0.07	0.10	0.14	0.20	**0.32**	0.64	1.05	**0.35**
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	**0.18**	0.25	0.39	0.74	1.51	**0.18**
Orthophosphate	0.01	0.01	0.03	0.04	0.05	**0.08**	0.11	0.17	0.27	0.59	1.37	**0.097**
Turbidity (NTU)	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	**10.45**	16.30	**14.0**

Taxa richness and diversity values are for benthic macroinvertebrates. Hester-Dendy sample= benthic macroinvertebrates collected from a standardized multi-plate sampler. Dipnet taxa richness = number of taxa collected in standardized dipnet sweep samples. Diversity = Shannon-Weaver H'. NTU = Nephelometric turbidity units. Adapted from Joe Hand, FDER, personal communication, 1991 (data collected 1980-1989). ND = No data.

TEST SITE 2

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	**ND**
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	**ND**
Hester-Dendy Taxa Richness	6	6.5	9	11.5	13	15	17	21.5	26	29	32	**ND**
Dipnet Taxa Richness	9	12	17	20	22	24.5	26	28	31	37	53	**ND**
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	**0.9**
Total Ammonia	0.02	**0.02**	0.04	0.05	0.06	0.08	0.11	0.14	0.20	0.34	0.60	**0.022**
Nitrate plus Nitrite	0.01	0.01	0.03	0.05	0.07	0.10	**0.14**	0.20	0.32	0.64	1.05	**0.14**
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	0.18	0.25	0.39	**0.74**	1.51	**1.1**
Orthophosphate	0.01	0.01	0.03	0.04	0.05	0.08	0.11	0.17	0.27	**0.59**	1.37	**1.0**
Turbidity (NTU)	0.60	0.90	1.20	1.45	2.10	**2.80**	3.60	4.50	6.65	10.45	16.30	**2.9**

Taxa richness and diversity values are for benthic macroinvertebrates. Hester-Dendy sample= benthic macroinvertebrates collected from a standardized multi-plate sampler. Dipnet taxa richness = number of taxa collected in standardized dipnet sweep samples. Diversity = Shannon-Weaver H'. NTU = Nephelometric turbidity units. Adapted from Joe Hand, FDER, personal communication, 1991 (data collected 1980-1989). ND = No data.

Appendix 6

Additional physical, chemical, toxicological and microbiological results

Table 1. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the Winter Haven Wastewater Treatment Plant, 4400 Pollard Drive, Winter Haven, Polk County, Florida, NPDES# FL0036048, performed from 14 to 16 October, 2003.

Facility:	**Winter Haven WWTP**		**NPDES #:**	**FL0036048**	Facility Type: **WWTP**	**Analysts:**	Christa Pierini
Location:	4400 Pollard Drive, Winter Haven		Contact/District:	N. Cornwell/Southwest			Joshua Ayres
County:	Polk		Test type:	static acute screen			Marshall Faircloth
Sample Collection Date:	10/13/2003	Time: 1445	# tests:	2	Receiving Water:	Unnamed tributary of Peace Canal to Peace River	
Test Beginning Date:	10/14/2003	Time: 1500	Chlorination Type:	chlorinated		Class III freshwater	
Test Ending Date:	10/16/2003	Time: 1400	FDEP SOP#:	TA07_01 / 02	**Page 1 of 1**	**Reviewer:**	Rob Buda

Organism: ***Ceriodaphnia dubia*** (water flea) Life stage: <24 hours Chamber size: 30 mL [A]Feeding: YCT/Algae Food Batch #: # 3/# 19

	Sample/Diluen	SURVIVAL # Alive			pH			[B]Temperature (C)			Diss. Oxygen (mg/L)			Conductivity Uncorrected umhos/cm	
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	8.1	-	8.2	24.5	-	25.8	8.0	-	7.6	169	230
Control B	0/20	5	5	5	-	-	8.2	-	-	25.9	-	-	7.5	-	220
Control C	0/20	5	5	5	-	-	8.2	-	-	25.2	-	-	7.4	-	200
Control D	0/20	5	5	5	-	-	8.2	-	-	24.5	-	-	7.6	-	220
100% A	20/0	5	5	5	8.3	-	8.7	24.6	-	25.8	8.1	-	7.4	543	780
100% B	20/0	5	5	5	-	-	8.7	-	-	25.8	-	-	7.3	-	815
100% C	20/0	5	5	5	-	-	8.7	-	-	24.9	-	-	7.4	-	690
100% D	20/0	5	5	5	-	-	8.7	-	-	24.4	-	-	7.5	-	710

[A]Organisms fed prior to testing.

[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 - 24.0°C.

Incubator #3 temperature range for the test period was 24.5 - 25.9 °C.

Light Intensity during the test was 50-100 foot candles.

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

LIMS	
Job number:	TLH-2003-10-14-05
sample number:	709311

Data Transcription Verification
date: 12/15/03
by: Josh Ayres/James Daniels

Total Residual CL2	mg/L	Method
Field 100% sample:	-	-
Lab 100% sample	0.02	Hach
Control water (water flea):	0.00	Hach
Control water: (fish):	0.01	Hach

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

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control water: (water flea):	79	88
Control water: (fish)	79	91
100% Sample:	185	122

Mortality	Percent
Control water (water flea):	0%
100% (water flea):	0%
Control water (fish):	0%
100 % (fish):	0%

Organism: ***Pimephales promelas*** (fish) Life stage: 10 days ' Chamber size: 1000 ml [C]Feeding: *Artemia* Food Batch #: 0194025G

	Sample/Diluen	SURVIVAL # Alive			pH			[B]Temperature (C)			Diss. Oxygen (mg/L)			Conductivity Uncorrected umhos/cm	
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	8.1	7.6	7.6	24.0	24.6	25.0	8.2	7.6	7.1	288	320
Control B	0/500	5	5	5	8.1	7.6	7.6	24.1	25.2	25.9	8.2	7.6	7.1	293	335
Control C	0/500	5	5	5	8.1	7.7	7.6	24.1	25.9	25.3	8.3	7.4	7.0	294	330
Control D	0/500	5	5	5	8.1	7.7	7.6	24.0	24.6	25.2	8.2	7.5	7.1	295	340
100% A	500/0	5	5	5	8.2	8.4	8.4	24.2	24.2	26.0	8.1	8.2	6.6	585	675
100% B	500/0	5	5	5	8.2	8.4	8.4	24.2	25.5	24.6	8.1	7.5	6.9	562	655
100 % C	500/0	5	5	5	8.2	8.4	8.4	24.1	25.0	25.9	8.1	7.3	7.0	583	670
100% D	500/0	5	5	5	8.2	8.4	8.4	24.0	25.1	24.1	8.2	7.2	7.0	552	650

[C]Organisms fed prior to testing.

[D]Temperatures of room and test incubator were continuously recorded on a strip chart recorder.

Room Temperature range for the test period was 23.0 - 24.0°C.

Incubator #3 temperature range for the test period was 24.5 - 25.9 °C.

Light Intensity during the test was 50-100 foot candles.

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

[E]Salinity	ppt
100% sample:	<1
Control:	<1

[E]Salinity based on conductivity and temperature.

Appendix 7

Habitat Assessment Field Sheets.

DEP-SOP-001/01: Form FD 9000-3 (June 20 2001)

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y): 10/13/03	TIME:	RECEIVING BODY OF WATER: Poorn Drainage Canal
REMARKS:	COUNTY: POLK	LOCATION: 27° 54' 45.7" 81° 41' 50.4" Winter Haven 3		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)
		80 CROPLAND/PASTURE		15	5		

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

LOCAL WATERSHED NPS POLLUTION (check box): None ☐ Slight ☐ Moderate potential ☐ Obvious sources ☒ (dirt road run off)

WIDTH OF RIPARIAN VEGETATION (m) On least buffered side: 0	LIST & MAP DOMINANT VEGETATION ON BACK	TYPICAL WIDTH (M) DEPTH (M)/VELOCITY (M/SEC) TRANSECT
ARTIFICIALLY CHANNELIZED ☐ no ☒ recent severe ☐ some recovery ☐ mostly recovered ARTIFICIALLY IMPOUNDED ☐ yes		0-50 m → 30 m width 50-100 → 20 m wide
HIGH WATER MARK: 1 + 0.95 = 1.95 (m above present water level) (present depth in m) (m above bed)		0.14 m/s; 0.16 m/s; 0.14 m/s 0.95 m deep; 0.8 m deep; 0.95 m deep

CANOPY COVER %: OPEN: ☒ LIGHTLY SHADED (11-45%): ☐ MODERATELY SHADED (46-80%): ☐ HEAVILY SHADED: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: NORMAL: ☐ SEWAGE: ☐ PETROLEUM: ☐ CHEMICAL: ☐ ANAEROBIC ☒ OTHER: ☐ Sulfur - especially on sides

Sediment Oils: ABSENT: ☒ SLIGHT: ☐ MODERATE: ☐ PROFUSE: ☐

Sediment Deposition: SLUDGE: ☐ SAND SMOTHERING: NONE SLIGHT MODERATE SEVERE SILT SMOTHERING: NONE SLIGHT MODERATE SEVERE OTHER: _____

SUBSTRATE TYPE	% COVERAGE	# TIMES SAMPLED	METHOD	SUBSTRATE TYPES	% COVERAGE	# TIMES SAMPLED	METHOD
WOODY DEBRIS (SNAGS)				SAND			
LEAF PACKS OF MATS				MUD/MUCK/SILT	85	10	SC1 x 20
AQUATIC VEGETATION	15	10	SC1 x 20	OTHER:			
ROCK OR SHELL RUBBLE				OTHER:			
UNDERCUT BANKS/ROOTS				DRAW AERIAL VIEW SKETCH OF HABITATS FOUND IN 100 M SECTION			

WATER QUALITY	DEPTH (M):	TEMP. (°C):	PH (SU):	D.O. (MG/L):	COND. (UMHO/CM) OR SALINITY (PPT):			SECCHI (M):
TOP								
MID-DEPTH		27.30	7.55	3.21	159/.07			0.2
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: clear skies, sunny, slight breeze

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

SAMPLING TEAM: Melissa Gunter; Peggy Morgan

SIGNATURE: [signature] DATE: 10/13/03

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

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (MM/DD/YY):	RECEIVING BODY OF WATER:
		10/13/03	Peace Creek Drain. Canal

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
	Polk	Winter Haven 3	CONTROL SITE

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components **Substrate Diversity** 4	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 10	Greater than 30% productive habitat present at site 20 19 18 17 16	16% to 30% productive habitat, by aerial extent 15 14 13 12 11	6% to 15% productive habitat (10) 9 8 7 6	Less than 5% productive habitat 5 4 3 2 1
Water Velocity 12	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 sheet flow occurring; > 1 m/sec 5 4 3 2 1
Habitat Smothering 7 Primary Score 35	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 50	Smothering of >80% of habitats with sand or silt, as severe problem, pools absent 5 4 3 2 1
Secondary Habitat Components **Artificial Channelization** 5	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered (5) 4 3 2 1
Bank Stability Right Bank 9 Left Bank 8	Stable. No evidence of erosion or bank failure. Little potential for future problems 10 (9) R	Moderately stable. Infrequent or small areas of erosion, mostly healed over. (8) L 7 6	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 5 4	Unstable. Many (60%-80%) raw, eroded areas. Covious bank sloughing. 3 2 1
Riparian Buffer Zone Width Right Bank 1 Left Bank 1	Width of native vegetation (least buffered side) greater than 18 m 10 9	Width of native vegetation (least buffered side) 12 to 18 m 8 7 6	Width of native vegetation 6 to 12 m; human activities still close to system 5 4	Less than 5 m of native buffer zone due to intensive human activities 3 2 (1) L,R
Riparian Zone Vegetation Quality Right Bank 1 Left Bank 1 Secondary Score 26	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions 10 9	50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 8 7 6	25% to 50% of riparian zone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 5 4	Less than 25% of stream bank surfaces are vegetated and/or poor plant community (e.g. grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less 3 2 (1) L,R

59 TOTAL SCORE

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10/13/03	Melissa Turner	

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

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
		10/13/03	1115	Peace Creek Canal

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
FYI Training	POLK	Winter Haven #3 WWTP	Test Site 1

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)
		50	50				

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

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

WIDTH OF RIPARIAN VEGETATION (m) On least buffered side: 10

LIST & MAP DOMINANT VEGETATION ON BACK

TYPICAL WIDTH (M) DEPTH (M)/VELOCITY (M/SEC) TRANSECT: 20 m wide

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

ARTIFICIALLY IMPOUNDED ☐ yes more sinuous

.25 m/s | .07 m/s | .25 m/s

HIGH WATER MARK: 1.75 (m above present water level) + .15 (present depth in m) = 1.9 (m above bed)

.9 m deep | .15 m deep | .4 m deep

CANOPY COVER %: OPEN: ☐ LIGHTLY SHADED (11-45%): ☑ MODERATELY SHADED (46-80%): ☐ HEAVILY SHADED: ☐

SEDIMENT/SUBSTRATE

SEDIMENT ODORS: NORMAL: ☐ SEWAGE: ☐ PETROLEUM: ☐ CHEMICAL: ☐ ANAEROBIC: ☑ OTHER: ☐

SEDIMENT OILS: ABSENT: ☑ SLIGHT: ☐ MODERATE: ☐ PROFUSE: ☐

SEDIMENT DEPOSITION: SLUDGE: ☐ SAND SMOTHERING: NONE (MODERATE) SLIGHT SEVERE SILT SMOTHERING: NONE (MODERATE) SLIGHT SEVERE OTHER: _____

SUBSTRATE TYPE	% COVERAGE	# TIMES SAMPLED	METHOD	SUBSTRATE TYPES	% COVERAGE	# TIMES SAMPLED	METHOD
WOODY DEBRIS (SNAGS)	1%	10	DIPNET	SAND			
LEAF PACKS OF MATS				MUD/MUCK/SILT			
AQUATIC VEGETATION	1%	10	DIPNET	OTHER:			
ROCK OR SHELL RUBBLE				OTHER:			
UNDERCUT BANKS/ROOTS				DRAW AERIAL VIEW SKETCH OF HABITATS FOUND IN 100 M SECTION			

WATER QUALITY	DEPTH (M):	TEMP. (°C):	PH (SU):	D.O. (MG/L):	COND. (UMHO/CM) OR SALINITY (PPT):			SECCHI (M):
TOP	0.2	28.6	7.22	2.83	160			VOB
MID-DEPTH								
BOTTOM								

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

WATER ODORS (CHECK BOX): NORMAL: ☑ SEWAGE: ☐ PETROLEUM: ☐ CHEMICAL: ☐ OTHER: ☐

WATER SURFACE OILS (CHECK BOX): NONE: ☑ SHEEN: ☐ GLOBS: ☐ SLICK: ☐

CLARITY (CHECK BOX): CLEAR: ☐ SLIGHTLY TURBID: ☑ TURBID: ☐ OPAQUE: ☐

COLOR (CHECK BOX): TANNIC: ☑ GREEN (ALGAE): ☐ CLEAR: ☐ OTHER: ☐

WEATHER CONDITIONS/NOTES: clear, sunny, hot

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

SAMPLING TEAM: FAULKNER, CORNWELL, PILLSBURY, ESPY

SIGNATURE: Julie Espy

DATE: 10/13/03

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (MM/DD/YY):	RECEIVING BODY OF WATER:
		10/13/03	Peace Creek Canal

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
FYI Training	POLK	Winter Haven WWTP #3	Test Site 1

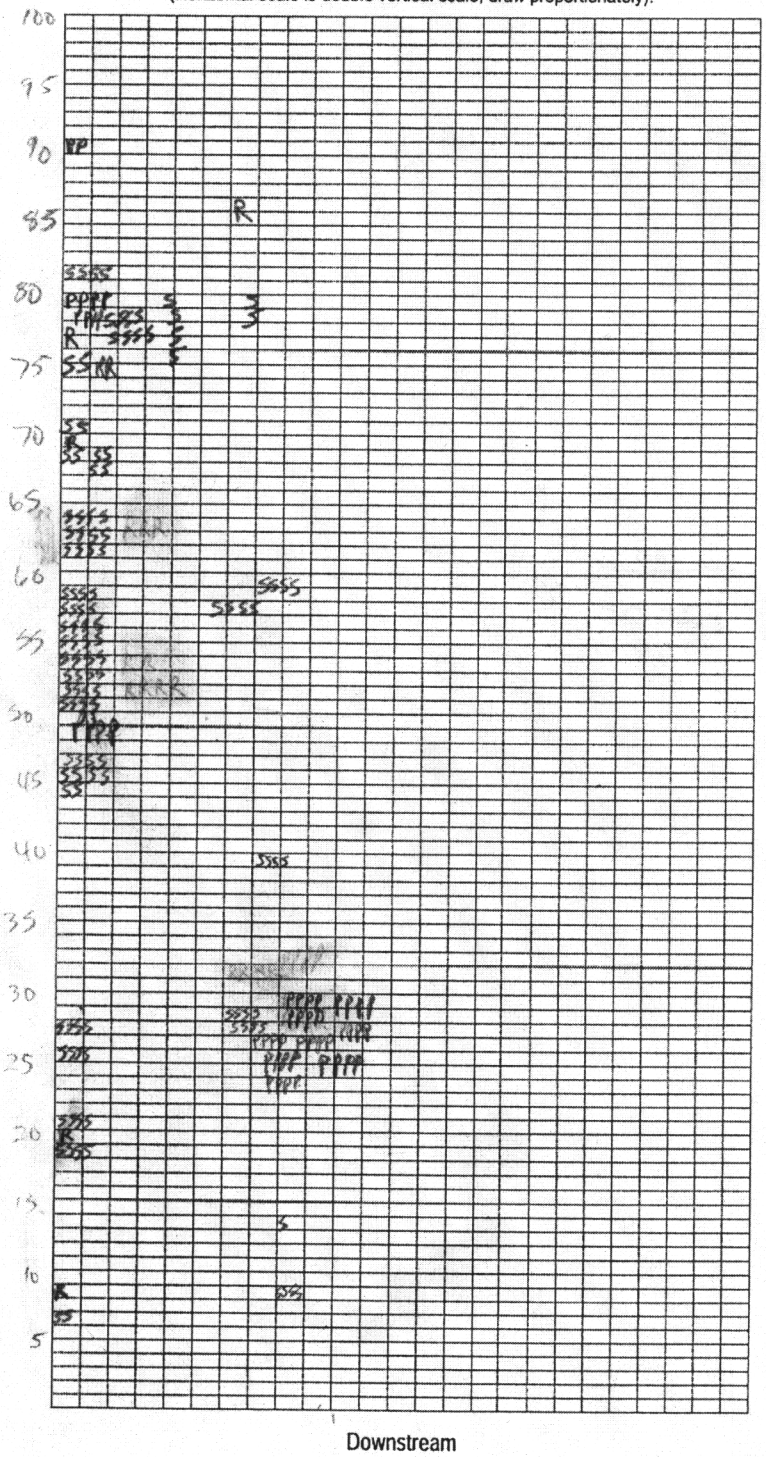
Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components **Substrate Diversity** 10	Four or more productive habitats present [snags, tree roots/undercut banks, aquatic vegetation, leaf packs (partially decayed), rock] 20 19 18 17 16	Three productive habitats present. Adequate habitat. 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 3	Greater than 30% productive habitat present at site 20 19 18 17 16	16% to 30% productive habitat, by aerial extent 15 14 13 12 11	6% to 15% productive habitat 10 9 8 7 6	Less than 5% productive habitat 5 4 3 2 1
Water Velocity 17	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 7 Primary Score 37	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of the habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, as severe problem, pools absent 5 4 3 2 1
Secondary Habitat Components **Artificial Channelization** 8	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Bank Stability Right Bank 4 Left Bank 5	Stable. No evidence of erosion or bank failure. Little potential for future problems. 10 9	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 8 7 6	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 5 4	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 3 2 1
Riparian Buffer Zone Width Right Bank 5 Left Bank 5	Width of native vegetation (least buffered side) greater than 18 m 10 9	Width of native vegetation (least buffered side) 12 to 18 m. 8 7 6	Width of native vegetation 6 to 12 m. human activities still close to system 5 4	Less than 6 m of native buffer zone due to intensive human activities 3 2 1
Riparian Zone Vegetation Quality Right Bank 5 Left Bank 5 Secondary Score 37	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions 10 9	50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 8 7 6	25% to 50% of riparian zone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 5 4	Less than 25% of stream bank surfaces are vegetated and/or poor plant community (e.g. grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less 3 2 1

74 **TOTAL SCORE**

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10/13/03	Todd Faulkner Julie Espy	Julie Espy

Stream/River Habitat Sketch Sheet

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



Substrates: Code key, draw proportionate habitat abundance.

- [S] Snags
- [R] Roots/undercut banks
- [L] Leaf Packs (or mats)
- [M] Macrophytes
- [ ] _____
- [ ] _____
- [ ] _____

Velocity:

Note where velocity measures were taken.

Habitat Smothering:

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

Bank Stability:

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

Riparian Buffer Width:

Note areas (on map) where natural vegetation is altered or eliminated.

Plants observed/other notes:

20 meters wide

S 32 1%

P 12 13%

Appendix 8a

Taxa list and density (number/cm^2) for periphyton collected from glass microscope slides incubated for 28 days upstream and downstream of the Winter Haven facility discharge, October 13, 2003.

	Control Site	Test Site
Bacillariophyta		
Achnanthes exigua	-	1,339
Achnanthes hungarica	-	1,339
Bacillariaceae	-	6,693
Bacillariophyceae	5,206	1,339
Caloneis sp.	-	1,339
Cocconeis placentula	-	1,339
Encyonema neomesianum	-	1,339
Encyonema silesiacum	-	1,339
Eunotia incisa	-	1,339
Eunotia sp.	-	22,756
Fragilaria sp.	-	1,339
Fragilariaceae	-	2,677
Frustulia sp.	-	2,677
Gomphonema affine	-	1,339
Gomphonema augur	-	6,693
Gomphonema gracile	-	4,016
Gomphonema parvulum	-	1,339
Gomphonema sp.	-	8,032
Hippodonta sp.	-	1,339
Navicula minima	-	1,339
Navicula sp.	-	1,339
Nitzschia clausii	-	1,339
Nitzschia palea	-	1,339
Nitzschia sp.	-	4,016
Pinnularia sp.	-	1,339
Rhopalodia sp.	-	1,339
Synedra ulna	-	1,339
Chlorophycota		
Ankistrodesmus falcatus	5,206	-
Aphanochaete repens	6,247	10,709
Characium sp.	11,452	22,756
Chlamydomonas sp.	3,644	4,016
Chlorella sp.	-	16,063
Chlorophyceae	5,726	4,016
Closterium sp.	-	1,339
Oedogonium sp.	2,082	-
Scenedesmus quadricauda	-	2,677
Stigeoclonium sp.	114,524	226,222
Cryptophycophyta		
Cryptomonas sp.	-	1,339
Cyanophycota		
Chamaesiphon sp.	1,562	9,370
Cyanobium parvum	-	4,016
Cyanobium plancticum	-	10,709
Jaaginema sp.	3,123	13,386

Appendix 8a continued

	Control Site	Test Site
Cyanophycota cont'd		
Planktolyngbya sp.	-	4,016
Pseudanabaena sp.	-	2,677
Synechocystis sp.	-	1,339
Euglenophycota		
Trachelomonas zorensis	521	-
Pyrrophycophyta		
Glenodinium sp.	-	1,339
Xanthophyta		
Ophiocytium sp.	-	1,339

Appendix 8b

Taxa list and number of individuals counted for periphyton collected from glass microscope slides incubated for 28 days upstream and downstream of the Winter Haven facility discharge, October 13, 2003.

	Control Site	Test Site
Bacillariophyta		
Achnanthes exigua	-	1
Achnanthes hungarica	-	1
Bacillariaceae	-	5
Bacillariophyceae	10	1
Caloneis sp.	-	1
Cocconeis placentula	-	1
Encyonema neomesianum	-	1
Encyonema silesiacum	-	1
Eunotia incisa	-	1
Eunotia sp.	-	17
Fragilaria sp.	-	1
Fragilariaceae	-	2
Frustulia sp.	-	2
Gomphonema affine	-	1
Gomphonema augur	-	5
Gomphonema gracile	-	3
Gomphonema parvulum	-	1
Gomphonema sp.	-	6
Hippodonta sp.	-	1
Navicula minima	-	1
Navicula sp.	-	1
Nitzschia clausii	-	1
Nitzschia palea	-	1
Nitzschia sp.	-	3
Pinnularia sp.	-	1
Rhopalodia sp.	-	1
Synedra ulna	-	1
Chlorophycota		
Ankistrodesmus falcatus	10	-
Aphanochaete repens	12	8
Characium sp.	22	17
Chlamydomonas sp.	7	3
Chlorella sp.	-	12
Chlorophyceae	11	3
Closterium sp.	-	1
Oedogonium sp.	4	-
Scenedesmus quadricauda	-	2
Stigeoclonium sp.	220	169
Cryptophycophyta		
Cryptomonas sp.	-	1
Cyanophycota		
Chamaesiphon sp.	3	7
Cyanobium parvum	-	3
Cyanobium plancticum	-	8
Jaaginema sp.	6	10

Appendix 8b continued

	Control Site	Test Site
Cyanophycota cont'd		
Planktolyngbya sp.	-	3
Pseudanabaena sp.	-	2
Synechocystis sp.	-	1
Euglenophycota		
Trachelomonas zorensis	1	-
Pyrrophycophyta		
Glenodinium sp.	-	1
Xanthophyta		
Ophiocytium sp.	-	1

Appendix 9a

Benthic macroinvertebrates collected from Hester-Dendy artificial substrates incubated upstream and downstream of the Winter Haven WWTP facility for 28 days (October 13, 2003). Taxa collected and density (average number of individuals/m^2) rounded to the nearest individual (n = 3 samples). See SOP LT 7100 sect. 4.2.1 for method on collapsing taxa.

	Control Site	Test Site
Annelida		
Hirudinea		
Desserobdella phalera	82	3
Helobdella stagnalis	-	5
Helobdella triserialis	3	3
Arthropoda		
Crustacea		
Amphipoda		
Hyalella azteca	-	243
Decapoda		
Cambaridae	-	13
Palaemonetes sp.	-	5
Insecta		
Coleoptera		
Dubiraphia vittata	-	3
Diptera		
Ablabesmyia mallochi	-	3
Ablabesmyia rhamphe grp.	6	33
Chironomus sp.	11	14
Glyptotendipes sp.	8	3
Goeldichironomus sp.	-	3
Goeldichironomus carus	3	-
Goeldichironomus holoprasinus	3	-
Kiefferulus sp.	17	3
Labrundinia pilosella	-	11
Odontomyia sp.	-	3
Parachironomus carinatus	-	3
Polypedilum beckae	8	-
Polypedilum illinoense grp.	-	3
Polypedilum scalaenum grp.	8	8
Tanytarsus sp. L Epler	-	5
Ephemeroptera		
Caenis sp.	103	156
Stenacron sp.	34	32
Odonata		
Enallagma sp.	-	13
Enallagma concisum	8	-
Libellulidae	-	5
Pachydiplax longipennis	5	-
Trichoptera		
Cyrnellus fraternus	8	5

Appendix 9a continued

	Control Site	Test Site
Mollusca		
Bivalvia		
Sphaeriidae(mollusca)	-	11
Undetermined Bivalvia	3	-
Gastropoda		
Ferrissia sp.	59	111
Micromenetus dilatatus	-	4
Micromenetus dilatatus avus	41	7
Amnicola dalli johnsoni	30	37
Viviparus georgianus	18	40

Appendix 9b

Benthic macroinvertebrates collected from Hester-Dendy artificial substrates incubated upstream and downstream of the Winter Haven WWTP facility for 28 days (October 13, 2003). Taxa collected and total number of individuals counted (n = 3 samples).

	Control Site	Test Site
Annelida		
Hirudinea		
Desserobdella phalera	31	1
Helobdella stagnalis	-	2
Helobdella triserialis	1	1
Arthropoda		
Crustacea		
Amphipoda		
Hyalella azteca	-	92
Decapoda		
Cambaridae	-	5
Palaemonetes sp.	-	2
Insecta		
Coleoptera		
Dubiraphia vittata	-	1
Diptera		
Ablabesmyia mallochi	-	1
Ablabesmyia rhamphe grp.	2	13
Chironomus sp.	4	5
Glyptotendipes sp.	3	1
Goeldichironomus sp.	-	1
Goeldichironomus carus	1	-
Goeldichironomus holoprasinus	1	-
Kiefferulus sp.	7	1
Labrundinia pilosella	-	4
Odontomyia sp.	-	1
Parachironomus carinatus	-	1
Polypedilum beckae	3	-
Polypedilum illinoense grp.	-	1
Polypedilum scalaenum grp.	3	3
Tanytarsus sp. L Epler	-	2
Ephemeroptera		
Caenis sp.	39	59
Stenacron sp.	13	12
Odonata		
Enallagma sp.	-	5
Enallagma concisum	3	-
Libellulidae	-	2
Pachydiplax longipennis	2	-
Trichoptera		
Cyrnellus fraternus	3	2

Appendix 9b continued

	Control Site	Test Site
Mollusca		
Bivalvia		
Sphaeriidae(mollusca)	-	4
Undetermined Bivalvia	1	-
Gastropoda		
Ferrissia sp.	22	42
Micromenetus dilatatus	-	1
Micromenetus dilatatus avus	16	3
Amnicola dalli johnsoni	11	14
Viviparus georgianus	7	15

Appendix 10a

Qualitative benthic macroinvertebrate collections (n = 20 discrete dipnet sweeps) upstream and downstream of the Winter Haven WWTP facility (October 13, 2003). Taxa list and number of individuals counted (collapsed). See SOP LT 7100 sect. 4.2.1 for method on collapsing taxa.

	Control Site	Test Site
Annelida		
Oligochaeta		
Limnodrilus sp.	1	-
Arthropoda		
Crustacea		
Amphipoda		
Hyalella azteca	57	27
Decapoda		
Cambaridae	-	1
Palaemonetes sp.	1	-
Insecta		
Coleoptera		
Curculionidae	2	1
Dubiraphia vittata	-	1
Microcylloepus pusillus	-	1
Stenelmis sp.	-	9
Tropisternus sp.	1	-
Diptera		
Ablabesmyia mallochi	1	-
Larsia decolorata	1	-
Polypedilum halterale grp.	3	-
Polypedilum illinoense grp.	1	3
Polypedilum scalaenum grp.	1	-
Rheotanytarsus exiguus grp.	-	3
Tribelos fuscicornis	-	1
Ephemeroptera		
Caenis sp.	26	48
Pseudocloeon sp.	-	1
Stenonema sp.	-	1
Heteroptera		
Belostoma sp.	-	1
Mesovelia sp.	1	-
Odonata		
Aphylla williamsoni	1	-
Coenagrionidae	3	-
Trichoptera		
Cheumatopsyche sp.	-	11

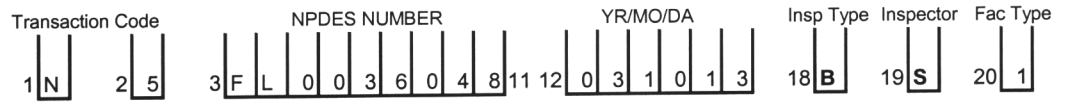
Appendix 10b

Qualitative benthic macroinvertebrate collections (n = 20 discrete dipnet sweeps) upstream and downstream of the Winter Haven WWTP facility (October 13, 2003). Taxa list and number of individuals counted.

	Control Site	Test Site
Annelida		
Oligochaeta		
Limnodrilus sp.	1	-
Arthropoda		
Crustacea		
Amphipoda		
Hyalella azteca	57	27
Decapoda		
Cambaridae	-	1
Palaemonetes sp.	1	-
Insecta		
Coleoptera		
Curculionidae	2	1
Dubiraphia vittata	-	1
Microcylloepus pusillus	-	1
Stenelmis sp.	-	9
Tropisternus sp.	1	-
Diptera		
Ablabesmyia mallochi	1	-
Chironomidae	-	2
Larsia decolorata	1	-
Polypedilum halterale grp.	3	-
Polypedilum illinoense grp.	1	2
Polypedilum scalaenum grp.	1	-
Rheotanytarsus exiguus grp.	-	2
Tribelos fuscicornis	-	1
Ephemeroptera		
Caenis sp.	26	48
Pseudocloeon sp.	-	1
Stenonema sp.	-	1
Heteroptera		
Belostoma sp.	-	1
Mesovelia sp.	1	-
Odonata		
Aphylla williamsoni	1	-
Coenagrionidae	3	-
Trichoptera		
Cheumatopsyche sp.	-	11

The Bioassay of Winter Haven WWTP effluent sampled on October 13, 2003, NPDES #FL0036048.

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





The Priority Pollutants Analysis for Bioassay of Winter Haven WWTP effluent sampled on October 13, 2003, NPDES #FL0036048.

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

