

Biological Assessment of the City of

Bunnell Wastewater Treatment Plant

Flagler County

NPDES #FL0020907

Sampled January 2005

September 2005

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:	Bunnell Wastewater Treatment Plant		
Physical Address:	Tolman Street	County:	Flagler
NPDES Number:	FL0020907	Permit Expiration:	November 19, 2005

Toxics Sampling Inspection **(XSI)**

Date Sampled: January 10, 2005

Results: The metals aluminum, copper, iron, and zinc were detected in the effluent sample at levels that complied with Class III Freshwater Criteria and facility permit limits.

Atrazine was detected in the effluent (0.66 μg/L) at a level reported to produce adverse effects (50% reduction in growth) in the unicellular green alga, *Pseudokirchneriella subcapitata*, formerly known as *Selenastrum capricornutum* (Roberts et al. 1990).

Compliance Biomonitoring Inspection **(CBI)**

Date Sampled: January 10, 2005

Results: The effluent sample was not acutely 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: January 10, 2005

Results: Fecal and total coliforms were undetected in the effluent sample. Effluent total phosphorus (2.5 mg/L), ortho-phosphate (2 mg/L), nitrate+nitrite (16 mg/L), and total nitrogen (17.3 mg/L) contributed to elevated levels at the Test Site compared to the Control Site. Ammonia, total Kjeldahl nitrogen, and organic nitrogen were similar between the Test and Control Sites.

Dissolved oxygen at the Control Site (4.5 mg/L) failed to comply with the Class III Freshwater Quality Criterion (62-302.530(31) F.A.C.). Total coliforms in the Control and Test Site samples (1,018 CFU/100 ml and 1,072 (CFU/100 ml, respectively) exceeded the Class III Freshwater Criteria (62-302(7) F.A.C.) and fecal coliforms exceeded the criteria (62-302.530(6)) at the control Site (460 CFU/100 ml).

Impact Bioassessment Inspection **(IBI)**

Date Sampled: January 10, 2005

Results: The algal growth potential (AGP) values for the effluent sample (351 mg dry weight/L) and Test Site sample (368 mg dry wt/L) greatly exceeded the freshwater "problem'" threshold of 5.0 mg dry weight/L, indicating nutrient enrichment due to the effluent. The AGP value of the upstream Control Site sample (4.35 mg dry weight/L) was less than the "problem" threshold.

In the quantitative periphyton results, taxa richness declined 31%, algal density increased 87%, and diversity decreased 22% at the Test Site compared to the Control Site. Quantitative and qualitative measures of benthic macroinvertebrate assemblages from Hester-Dendy and dipnet samples indicated little or no differences between the Control and Test sites. The Control Site SCI_2004 score of 28 and the Test Site SCI_2004 score of 29 placed them both in the "Poor" category.

Biological assessments prepared by FDEP staff, provide information for NPDES permit renewal applications and in conjunction with other information concerning the subject facility and its receiving-water body, aid in determining appropriate permit conditions.

Introduction

The Bunnell Wastewater Treatment Plant is located in Flagler County, Florida (Appendix 1). Although this facility is permitted as a 0.60 MGD design capacity, step-feed aeration wastewater treatment facility, the permitted capacity is limited to 0.30 MGD annual average daily flow because the existing receiving stream cannot handle increased nutrient loading (see Facility Summary in Appendix 2). The annual average flow for September 2003 through August 2004 was 0.2169 MGD. According to the January discharge monitoring report, the actual flow during this survey was 0.192 MGD.

The facility consists of two manual bar screens (one before the equalization basin and one before the splitter box), one flow equalization basin (120,000 gallons), one splitter box, two aeration basins (155,000 gallons each), two clarifiers (95,000 gallons each), one aerobic digester (123,000 gallons), one sludge holding tank (34,500 gallons), one tertiary filter (600,000 GPD ADF capacity), one chlorine contact chamber (18,850 gallons), and one post aeration and dechlorination basin (9,000 gallons) (see Facility Summary in Appendix 2). The effluent is disinfected using chlorine gas, dechlorinated with sulfur dioxide, and discharged into an unnamed drainage canal that flows to Black Branch and eventually to the Class III freshwaters of Haw Creek.

Surface Water Quality Criteria and facility permit limits are listed in Table 1. The facility was issued an Administrative Order (AO 63 NE) in December 2000 for total recoverable silver. The AO requires the facility to monitor and report total recoverable silver from outfall D-001 on a quarterly basis beginning on the date the permit was issued (December 28, 2000) and lasting 18 calendar months. According to the facility's monthly discharge monitoring reports, the plant has had no violations or exceedences of any permit required parameters during the year prior to this sampling event (Appendix 2 and Facility Summary).

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 an unnamed drainage canal approximately 10 meters upstream of the discharge) and a Test Site (located in the unnamed drainage canal approximately 10 meters downstream of the discharge). Detailed methods and their relationship to Florida Administrative Code are given in Appendix 3.

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

The following were involved in this investigation: Pat O'Connor and Jeremy Parrish (FDEP Northeast District), and FDEP personnel from the Central Laboratory in Tallahassee. The report was reviewed by District representatives and the Point Source Studies Review Committee (Wayne Magley, Shannan Gunnoe, 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. The metals aluminum, copper, iron, and zinc were detected in the effluent at levels that complied with Class III Water Quality Criteria (62-302.530 F.A.C.) and facility permit limits. Atrazine was detected in the effluent at a level (0.66 µg/L) reported to produce adverse effects (50% reduction in growth) in the unicellular green alga, *Pseudokirchneriella subcapitata*, formerly known as *Selenastrum capricornutum* (Roberts et al. 1990).
- Effluent conductivity, pH, and dissolved oxygen complied with Class III Water Quality Criteria (62-302, F.A.C.) and facility permit limits.
- Dissolved oxygen at the Control Site (4.5 mg/L) failed to comply with the Class III Freshwater Criterion of 5.0 mg/L (62-302.530 (31) F.A.C). Conductivity and pH complied with Class III Water Quality Criteria at the Control and Test Sites (Table 1).
- 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). While the 48-hour acute screening toxicity test does not reflect the permit required conditions, the Department uses it to provide reasonable assurance that the facility does not adversely affect waters of the state.
- Fecal and total coliforms were undetected in the effluent sample (See Table 1 for results and Appendix 6 for laboratory worksheets). Total coliforms at the Control and Test Sites (1,018 CFU/100 ml and 1,072 CFU/100 ml, respectively) exceeded the

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

Bunnell WWTP	Class III Stds	Effluent Limits	Effluent Samples	Control Site	Test Site
Organic Constituents (µg/L)					
Atrazine	-	-	0.66	-	-
Metals (µg/L unless otherwise noted)					
Aluminum	-	-	38	-	-
Arsenic	≤ 50	-	6 U	-	-
Cadmium	≤ 1.6 b	-	0.075 U	-	-
Calcium (mg/L)	-	-	54.3	-	-
Chromium-III	≤ 127.1 b	-	2 U	-	-
Copper	≤ 14 b	-	3.8	-	-
Iron	≤ 1000	-	82	-	-
Lead	≤ 5.8 b	-	0.66 U	-	-
Magnesium (mg/L)	-	-	6.1	-	-
Nickel	≤ 77.9 b	-	2 U	-	-
Selenium	≤ 5	-	0.5 U	-	-
Silver	≤ 0.07	≤ 0.07 s	0.025 U	-	-
Zinc	≤ 179.1 b	-	36	-	-
Nutrients (mg/L)					
Ortho-phosphate	-	-	2	0.012	0.92
Total Phosphorus	-	-	2.5	0.12	1.1
Ammonia	-	-	0.036 A	0.18	0.11
Unionized Ammonia	≤ 0.02	-	< 0.02	< 0.02	< 0.02
Nitrate+Nitrite	-	-	16	0.042 I	7.6
Kjeldahl Nitrogen	-	5 s	1.3	1.4	1.7
Organic Nitrogen	-	-	1.26 c	1.22 c	1.59 c
Total Nitrogen	-	-	17.3 c	1.44 c	9.3 c
General Physical and Chemical Parameters					
Habitat Assessment	-	-	-	53	54
Dissolved Oxygen (mg/L)	≥ 5	≥ 6.0	8.8	4.5	6
pH (S.U.)	6-8.5	6-8.5	7.1	6.5	6.7
Conductivity (umhos/cm)	≤ 1275	-	747	388	563
Phytoplankton Chlorophyll a (µg/L)	-	-	0.85 U	1.7 U	1.7 U
Phytoplankton Phaeophytin (µg/L)	-	-	0.85 U	1.7 U	1.7 U
Temperature (C)	-	-	22.2	18.9	20.8
BOD (mg/L)	0	≤ 16 s	0.62 I	0.2 U	0.27 I
Flow (mgd)	-	≤ 0.3 a	0.192	-	-
Hardness (mg/L)	-	-	160.7 c	-	-
Total Residual Chlorine (mg/L)	≤ 0.01	0.01	0.03	-	-
TSS (mg/L)	-	60 s	4 U	14 I	12 I
Microbiology (CFU/100ml)					
Fecal Coliforms-Membrane Filter	≤ 400	800	10 U	460	210
Total Coliforms-Membrane Filter	≤ 1000	-	10 U	1018 AB	1072 AB
Toxicology Bioassays (48-hr acute screening, % mortality in 100% effluent)					
Fish (*Cyprinella leedsi*)	-	0%	0%	-	-
Water flea (*Ceriodaphnia dubia*)	-	0%	0%	-	-

Value fails to comply with the Class III Water Quality Criteria

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

B - Results based on colony counts outside the acceptable range.

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

b - Value is calculated based on hardness

c - Value is calculated

I - The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

a - Annual average

s - Single sample

Table 2. Measured and predicted algal growth potential (AGP; mg dry wt./L) for total soluble inorganic nitrogen (TSIN) and ortho phosphate (OP) limitation for *Pseudokirchneriella subcapitata*.

Bunnel WWTP	AGP (measured)	Predicted AGP (TSIN) ± 20%	Predicted AGP (OP) ± 20%	Predicted AGP (TN) ± 20%	Predicted AGP (TP) ± 20%	Inorganic N:P ratio	Total N:P ratio
Effluent Samples	351	609.37 ± 121.874	860 ± 172	657.4 ± 131.5	1075 ± 215	8.02	6.9
Control Site	4.35	8.44 ± 1.688	5.16 ± 1.032	54.8 ± 11.0	51.6 ± 10.3	18.5	12
Test Site	368	292.98 ± 58.596	395.6 ± 79.12	353.4 ± 70.7	395.6 ± 79.1	8.38	10.1

Class III Freshwater Criterion (62-302(7) F.A.C.). Fecal coliforms at the Control Site (460 CFU/ml) were below the 800 CFU/ml one day sample criterion, but above 400 CFU/ml; additional sampling may be warranted to determine if counts are on average greater than 400 CFU/ml in 10% or more of samples collected.

- Effluent levels of total nitrogen (17.3 mg/L), total phosphorus (2.5 mg/L), ortho-phosphate (2 mg/L), and nitrate + nitrite (16 mg/L, Table 1) contributed greatly to elevated levels at the Test Site compared to Control Site levels. Ortho-phosphate and nitrate + nitrite were two orders of magnitude higher at the Test Site compared to the Control Site and total phosphorus was approximately an order of magnitude higher. Test Site levels of total phosphorus and ortho-phosphate exceeded the 90th percentile while nitrate + nitrite exceeded the 95th percentile when compared to levels typical of Florida streams. The Control Site concentrations of these nutrients ranked between the 10th and 40th percentiles (Appendix 5). Levels of ammonia, organic nitrogen, and total Kjeldahl nitrogen were similar between the Test and Control Sites (Table 1). Quarterly DMR data from instream monitoring stations SWB-1 (~182 meters above the discharge) and SWD-3 (~182 meters below the discharge) showed substantially higher levels of these nutrients below the outfall compared to levels above the outfall (Figure 1 and 2).
- 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 for the upstream Control Site sample was 4.35 mg

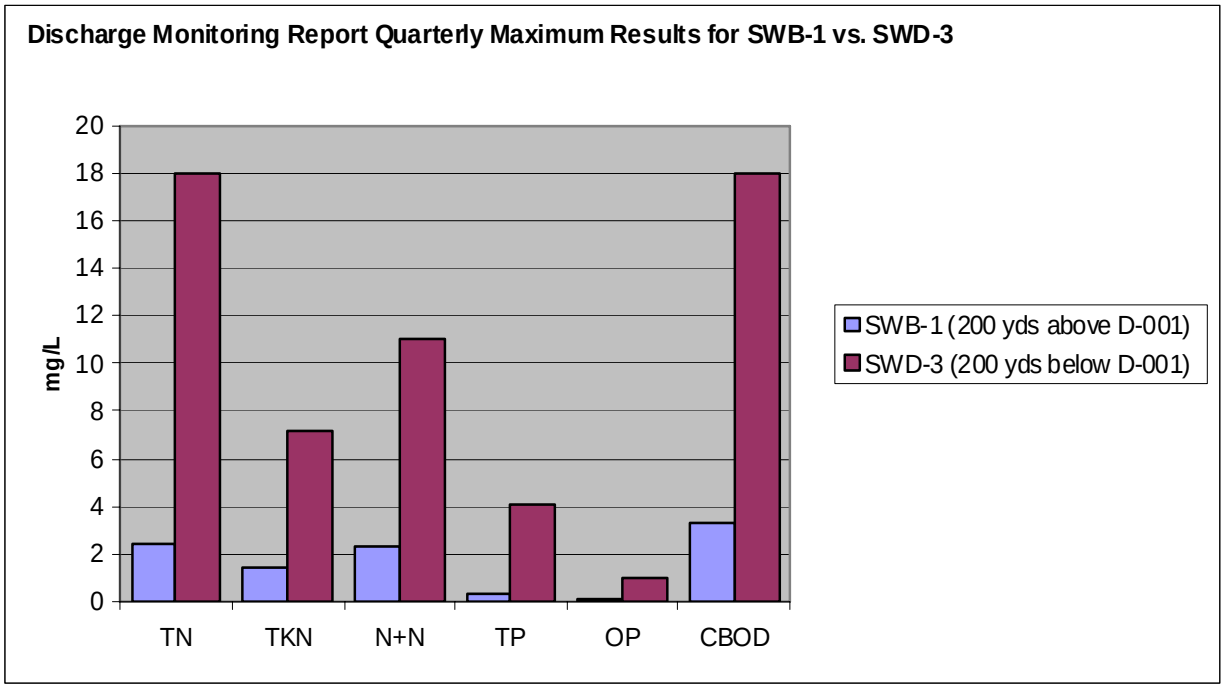


Figure 1. Results of Quarterly DMR Nutrient Data for Total nitrogen, Total Kjeldahl Nitrogen, Nitrate + Nitrite, Total Phosphorus, Orthophosphate, and Carbonaceous Biochemical Oxygen Demand.

Table 3. Periphyton composition at control and test sites

Bunnell WWTP	Control Site	Test Site
Number of Taxa	39	27
Shannon-Weaver Diversity	3.77	3.08
Chlorophyll a (mg/m²)	4.5 A	4.1
Phaeophytin (mg/m²)	0 A	0
Algal Density (number/cm²)	178,058	1,327,451
Percent Dominant Taxon	31.5	50
Dominant Taxon (name)	*Achnanthes* sp.	*Achnanthes* sp.
Number of Algal Units Identified	305	302
Percentage Composition		
Blue-green algae	4.3	8.9
Diatoms	82.6	69.9
Green algae	11.8	21.2
Other	1.3	0

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

dry wt/L (Table 2). The AGP values for the downstream Test Site (368 mg dry wt/L) and effluent samples (351 mg dry wt/L) were above this threshold.

- Phytoplankton chlorophyll-*a* was not detected in the effluent or receiving water samples (Table 1). 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, temperature, 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 differences in the periphyton algal communities between the Control and Test Sites based upon samples collected from periphytometers (Table 3, Appendix 8). Taxa richness was 31% lower at the Test Site (27 taxa) compared to the Control Site (39 taxa) and diversity was 22% lower (Test Site 3.08, Control Site 3.77). The algal density increased nearly an order of magnitude from the Control Site (178,058 number/cm2) to the Test Site (1,327,451 number/cm2). A greater percentage of the Control Site community was comprised of diatoms while there was a shift towards more green and blue-green algae at the Test Site. The chlorophyll-*a* concentration was relatively low in samples from both sites.
- Habitat assessment scores rated both sites as "Marginal" with

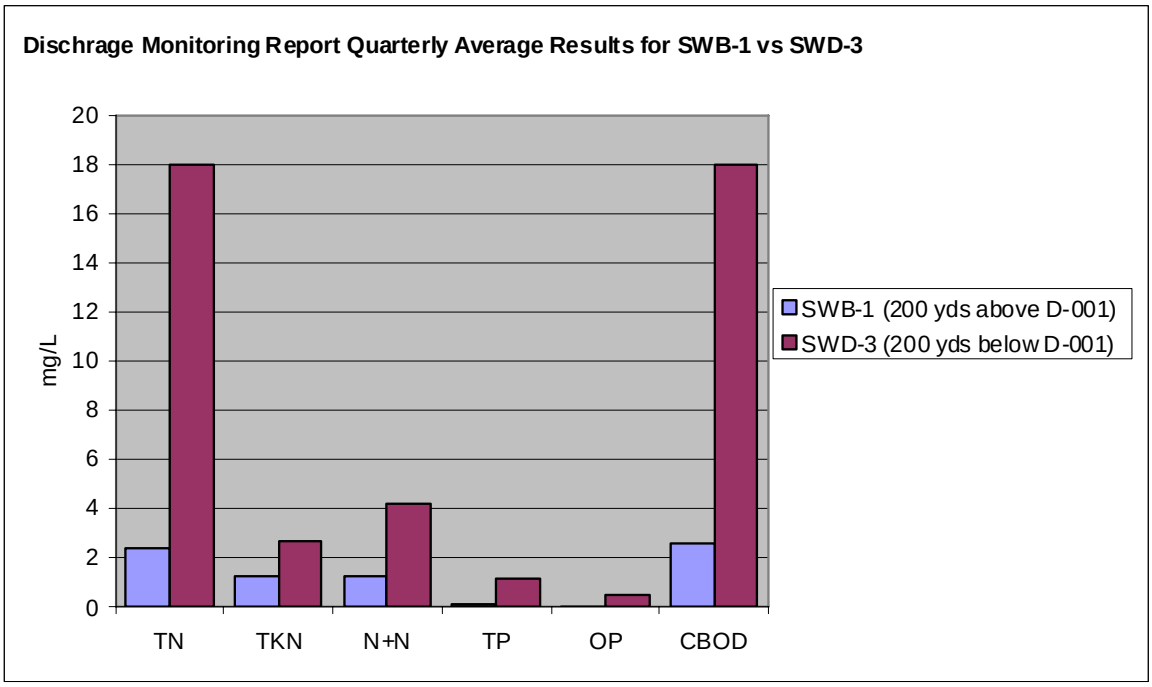


Figure 2. Results of Quarterly DMR Nutrient Data for Total nitrogen, Total Kjeldahl Nitrogen, Nitrate + Nitrite, Total Phosphorus, Orthophosphate, and Carbonaceous Biochemical Oxygen Demand.

Table 4. Macroinvertebrate Hester-Dendy Samples - Quantitative

Bunnell WWTP	Control Site	Test Site
Summary Statisics		
Shannon-Weaver Diversity	2.38	2.93
Number of Taxa	16	17
Florida Index	4	2
Number of EPT Taxa	1	1
Percent Dominant Taxon	45.2	39.8
Dominant Taxon (name)	*Chironomus* sp.	*Chironomus* sp.
Dominant Taxon (group)	Diptera	Diptera
Total Number of Individuals (#/m^2)	336	240
Community Composition: Percent of total		
Diptera	97.3	85.4
Ephemeroptera	1.2	1.3
Gastropoda	0	8.3
Hirudinea	0.9	3.3
Oligochaeta	0.3	0
Plecoptera	0	0
Trichoptera	0	0
Other	0.3	1.7
Functional Feeding Groups: Percent of total		
Burrowing Deposit Feeders	0.3	0
Predators	1.4	1.1
Surface Deposit Feeders	78.5	76.3
Suspension Feeders	14.2	12
Scrapers	0.6	4.4
Shredders	4	2.8
Unknown	0	0

scores of 53 and 54 at the Control and Test Sites, respectively (Table 1, data sheets in Appendix 7). Both sites' scores were reduced due to a lack of productive habitat, low water velocity, significant habitat smothering, and a poor quality riparian zone.

- Diversity was 22% higher at the Test Site compared to the Control Site in the quantitative measures of benthic macroinvertebrate assemblages from Hester-Dendy samplers. Other measures showed little difference between the Control and Test Site communities (Table 4, Appendix 9).
- Qualitative measures of benthic macroinvertebrate assemblages from dipnet samples are summarized in Tables 5 and 6 and in Appendix 10. The Control Site SCI_2004 score of 28 and the Test Site SCI_2004 score of 29 placed both sites in the "Poor" category. There were more filter-feeders and fewer tolerant taxa at the Test Site compared to the Control Site resulting in the slightly lower score at the Control Site.

Summary

Effluent and Test Site AGP levels greatly exceeded the "problem" threshold. The concentration of atrazine in the effluent sample has been shown to cause a 50% reduction in growth of the AGP algal test species, *Pseudokirchneriella subcapitata*, and may have inhibited the AGP from reaching even more elevated levels. Test Site concentrations of total phosphorus, ortho-phosphate, and nitrate + nitrite were appreciably higher than levels at the Control Site and correspond to elevated levels in the effluent, further suggesting nutrient enrichment from the facility. Test Site levels of total phosphorus and ortho-phosphate exceeded the 90th percentile while nitrate + nitrite exceeded the 95th percentile of levels typical of Florida streams. The Control Site concentrations of these nutrients ranked between the 10th and 40th percentiles.

Lower taxa richness and diversity and increased algal density and an increased proportion of blue-green algae in the Test Site periphyton community compared to the Control Site appears to be reflecting nutrient enriched conditions in the unnamed canal due to the addition of the Bunnell WWTP effluent.

Both DMR and data from this study indicate elevated levels of nitrate + nitrite, total phosphorus, and ortho-phosphate in the effluent, contributing to appreciably elevated levels at the Test Site in the unnamed canal. Reevaluation of monitoring frequency and/or permit limits for these parameters may be warranted based on these results.

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Table 5. Macroinvertebrate Dipnet Samples - Qualitative

Bunnell WWTP	Control Site	Test Site
Stream Condition Index (value)	28	29
Stream Condition Index (word)	Poor	Poor
Total Number of Individuals	100	105
Number of Taxa	25	21
Number of Ephemeroptera Taxa	1	0
Number of Trichoptera Taxa	0	0
Number of Clinger Taxa	0	1
Number of Long-lived Taxa	0	0
Number of Sensitive Taxa	0	0
Percent Contribution of Dominant Taxon	15	20
Percent Suspension Feeders and Filterers	5.5	28.1
Percent of Tanytarsini individuals	9	6.7
Percent of Very Tolerant individuals	40	27.6
Community Composition: Percent of total		
Dominant Taxon (name)	*Polypedilum illinoense grp.*	*Sphaeriidae*
Dominant Taxon (group)	Diptera	Gastropoda
Amphipoda	14	14
Bivalvia	0	20
Coleoptera	3	0
Collembola	2	0
Diptera	40	31
Ephemeroptera	8	0
Gastropoda	8	16
Hirudinea	0	2
Odonata	9	3
Oligochaeta	15	10
Plecoptera	0	0
Trichoptera	0	0
Other	1	4
Functional Feeding Groups: Percent of total		
Burrowing Deposit Feeders	16	10.5
Predators	14	7.1
Surface Deposit Feeders	33.5	20
Suspension Feeders and Filterers	5.5	28.1
Scrapers	13.5	17.6
Shredders	17	16.2
Unknown	0	0

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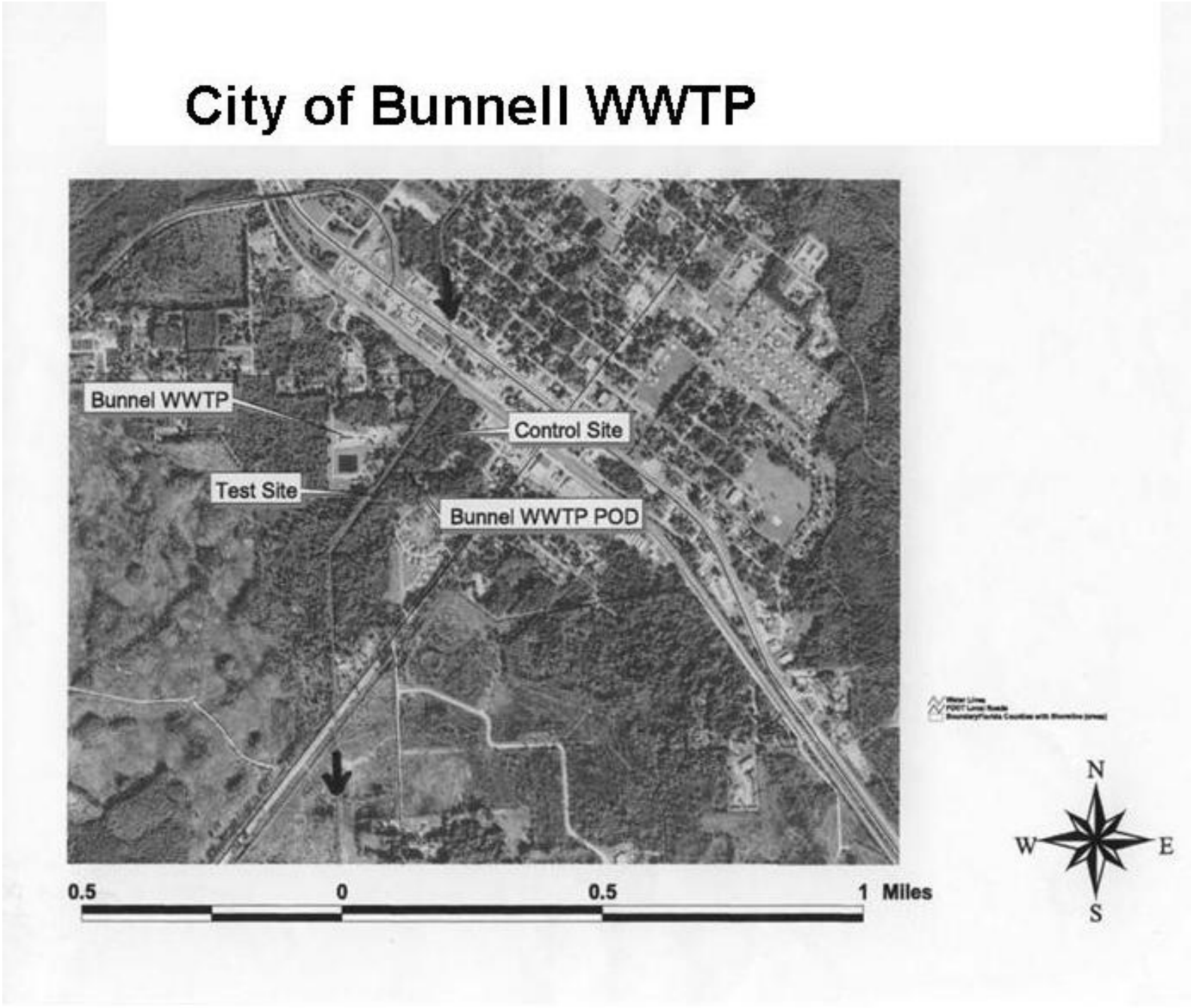
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Appendices

- Appendix 1. Map of facility
- Appendix 2. Facility summary and DMR data
- 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



Appendix 2

Facility Summary and DMR data

Facility Introduction

Bunnell WWTF – FL0020907– Flagler County

Type of facility: The facility is permitted as a 0.600 MGD design capacity step-feed aeration wastewater treatment facility. However, the permitted capacity is limited to 0.300 MGD annual average daily flow because existing receiving stream cannot handle increased nutrient loading. The effluent is disinfected using gas chlorine, dechlorinated with sulfur dioxide and discharged into a drainage canal that flows to Black Branch and then to Haw Creek (Class III fresh waters) at Discharge Location (D-001).

Design flow: 0.600 MGD WWTF / 0.300 MGD permitted capacity

Average flow: The annual average flow for September 2003 through August 2004 was 0.2169 MGD

Description of the treatment process: An existing 0.600 MGD design capacity step-feed aeration WWTF with a permitted capacity limited to 0.300 MGD annual average daily flow because existing receiving stream cannot handle increased nutrient loading. The facility consists of the following process units:

- Two manual bar screens (one before the equalization basin and one before the splitter box),
- One flow equalization basin (120,000 gallons),
- One splitter box,
- Two aeration basins (155,000 gallons each),
- Two clarifiers (95,000 gallons each),
- One aerobic digester (123,000 gallons),
- One sludge holding tank (34,500 gallons),
- One tertiary filter (600,000 gpd ADF capacity),
- One chlorine contact chamber (18,850 gallons), and
- One post aeration & dechlorination basin (9,000 gallons).

Disinfection is provided using gas chlorine. Dechlorination is provided using sulfur dioxide.

Receiving water and classification: There is one surface water permitted discharge location:

Surface Water Discharge: An existing 0.3 MGD AADF permitted discharge to a drainage canal that flows to Black Branch and then to Haw Creek (Class III fresh waters) at Discharge Location (D-001). The diameter of the discharge pipe is 15 inches and discharges above the water surface. The point of discharge is located approximately at latitude 29° 27' 51" N, longitude 81° 15' 50" W.

Mixing zone: Presently, there is not a mixing zone.

Sampling location: Monthly samples for fecal coliform and total residual chlorine (for disinfection) are sampled at monitoring location EFA-1 (effluent, immediately after disinfection). All the other monthly parameters taken for discharge to Black Branch and Haw Creek are sampled at monitoring location EFD-1 (effluent, immediately after dechlorination). Quarterly samples are taken at EFD-1, SWB-1 (At least 200 yards above the outfall to determine background), SWD-3 (At least 200 yards below the outfall), SWD-4 (Below bend in canal where canal turns to run along S.R. 11) and SWD-5 (Canal just before it enters Black Branch).

Facility Summary

Facility Name (as it appears on permit): Bunnell WWTF		**Former Names**: Northeast WWTF
Physical Address: Tolman Street Bunnell, Florida 32110	**NPDES Permit No.**: FL0020907 **Expiration Date:** November 19, 2005	**Prepared By:** Gloria Berges
County: Duval **District:** Northeast	**State Permit No.**: FL0020907 **Expiration Date:** November 19, 2005	**Facility Type**: Domestic
Function of Facility: Treats domestic wastewater to 2° standards prior to discharge to Haw Creek.		
Sampling Location (specify lat/longs of NPDES point): latitude 29° 27' 39" N longitude 81° 15' 49" W		

Description of treatment process:

An existing 0.600 MGD design capacity step-feed aeration WWTF with a permitted capacity limited to 0.300 MGD annual average daily flow because existing receiving stream cannot handle increased nutrient loading. The facility consist of the following process units:

- Two manual bar screens (one before the equalization basin and one before the splitter box),
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- Two aeration basins (155,000 gallons each),
- Two clarifiers (95,000 gallons each),
- One aerobic digester (123,000 gallons),
- One sludge holding tank (34,500 gallons),
- One tertiary filter (600,000 gpd ADF capacity),
- One chlorine contact chamber (18,850 gallons), and
- One post aeration & dechlorination basin (9,000 gallons).

Receiving Waters: There is one surface water permitted discharge location: Surface Water Discharge: An existing 0.3 MGD AADF permitted discharge to a drainage canal that flows to Black Branch and then to Haw Creek (Class III fresh waters) at Discharge Location (D-001). The diameter of the discharge pipe is 15 inches and discharges above the water surface. The point of discharge is located approximately at latitude 29° 27' 51" N, longitude 81° 15' 50" W.	**Classification**: Class III fresh water

Mean Flow: The annual average flow for September 2003 through August 2004 was 0.2169 MGD	**Design Flow**: 0.600 MGD design 0.300 MGD permitted capacity

Discharge is: (Continuous) Intermittent Seasonal Rainfall Dependent Other

Facility Mixing Zone Details: Presently, there is not a mixing zone.

List Effluent Limits:		
Parameter and Units For Surface Discharge D001 Monthly at EFA-1	**Limit**	**Describe special permit conditions and permit modifications:**
Fecal Coliform	Annual Average: 200 #/100L Mo. Geom. Mean: Report Maximum: 800 #/100L	Sample every two weeks - Grab
Total Residual Chlorine (for Disinfection)	Minimum: 0.5 mg/L	Sample 5 days/week - Grab
Parameter and Units For Surface Discharge D001 Monthly at EFD-1	**Limit:**	**Describe special permit conditions and permit modifications:**
Flow	Annual Average: 0.3 mgd Monthly Average: Report mgd	Sample 5 days/week - Meter
$CBOD_5$	Annual Average: 8.0 mg/L Monthly Average: 8.0 mg/L Maximum: 16.0 mg/L	Sample every two weeks – 8 hr FPC
Total Suspended Solids	Annual Average: 20.0 mg/L Monthly Average: 30 mg/L Maximum: 60.0 mg/L	Sample every two weeks – 8 hr FPC
Total Kjeldahl, Nitrogen	Annual Average: 2.5 mg/L Monthly Average: 2.5 mg/L Maximum: 5.0 mg/L	Sample every two weeks – 8 hr FPC
Dissolved Oxygen	Minimum: 6.0 mg/L	Sample 5 days/week - Meter
pH	Minimum: 6.0 s.u Maximum: 8.5 s.u	Sample 5 days/week - Grab
Total Residual Chlorine (for dechlorination)	Maximum: 0.01 mg/L	Sample 5 days/week - Grab
Parameter and Units For Surface Discharge D001 Toxicity at EFD-1	**Limit:**	**Describe special permit conditions and permit modifications**:
LC50 Stat RE 96 hour Acute Ceriodaphnia dubia (Routine)	Minimum: 100 %	Sample semi-annually – 4 grabs/24 hr
LC50 Stat RE 96 hour Acute Cyprinella leedsi (Routine)	Minimum: 100 %	Sample semi-annually – 4 grabs/24 hr
Parameter and Units	**Limit:**	**Describe special permit conditions and permit modifications**

For Surface Discharge D001 Quarterly at SWB-1, SWD-3, SWD-4, SWD-5		
Dissolved Oxygen	Minimum: Report mg/L	Quarterly – Grab
PH	Maximum: Report s.u.	Quarterly – Grab
Temperature	Maximum: Report °C	Quarterly – Grab
Specific Conductance	Maximum: Report µmho/cm	Quarterly – Grab
$CBOD_5$	Maximum: Report mg/L	Quarterly – Grab
Total Nitrogen	Maximum: Report mg/L	Quarterly – Calculated
Nitrogen, Ammonia, Total	Maximum: Report mg/L as N	Quarterly - Grab
Nitrogen, Organic, Total	Maximum: Report mg/L as	Quarterly – Calculated
Nitrite + Nitrate	Maximum: Report mg/L as N	Quarterly – Grab
Total Phosphorus	Maximum: Report mg/L as P	Quarterly – Grab
Phosphate, Ortho	Maximum: Report mg/L as P	Quarterly – Filtered Grab
Total Kjeldahl Nitrogen	Maximum: Report mg/L as N	Quarterly – Grab
Fecal Coliform	Maximum: Report #/100 mL	Quarterly – Grab
Total Coliform	Maximum: Report #/100 mL	Quarterly – Grab
Chlorophyll a	Maximum: Report mg/L	
Parameter and Units For Surface Discharge D001 Quarterly at EFD-1	**Limit:**	**Describe special permit conditions and permit modifications:**
Dissolved Oxygen	Minimum: Report mg/L	Quarterly – Grab
PH	Maximum: Report s.u.	Quarterly – Grab
Temperature	Maximum: Report °C	Quarterly – Grab
Specific Conductance	Maximum: Report µmho/cm	Quarterly – Grab
$CBOD_5$	Maximum: Report mg/L	Quarterly – 8 hr FPC
Total Nitrogen Nitrogen, Ammonia, Total	Maximum: Report mg/L as N	Quarterly – 8 hr FPC
Nitrogen, Organic, Total	Maximum: Report mg/L as N	Quarterly – 8 hr FPC
	Maximum: Report mg/L as N	Quarterly – 8 hr FPC

Nitrite + Nitrate	Maximum: Report mg/L as P	Quarterly – 8 hr FPC
Total Phosphorus	Maximum: Report mg/L as P	Quarterly – 8 hr FPC
Phosphate, Ortho	Maximum: Report mg/L as N	Quarterly – Filtered Grab
Total Kjeldahl Nitrogen	Maximum: Report #/100 mL	Quarterly – 8 hr FPC
Fecal Coliform	Maximum: Report #/100 mL	Quarterly – Grab
Total Coliform	Maximum: Report mg/L	Quarterly – Grab
Nitrogen, Ammonia, Total Unionized	Maximum: Report μg/L	Quarterly – Calculated
Silver, Total Recoverable	Maximum: Report mg/L	Quarterly – Grab
Hardness, Total	Maximum: Report mg/L	Quarterly – 8 hr FPC
Chlorophyll a		Quarterly – 8 hr FPC

Description of permitted outfall: There is one surface water permitted discharge location:

Surface Water Discharge: An existing 0.3 MGD AADF permitted discharge to a drainage canal that flows to Black Branch and then to Haw Creek (Class III fresh waters) at Discharge Location (D-001). The diameter of the discharge pipe is 15 inches and discharges above the water surface. The point of discharge is located approximately at latitude 29° 27' 51" N, longitude 81° 15' 50" W.

List permit violations (DMR data) and plant upsets that occurred at the plant within the last year:

Reviewed past 12 months (September 2003 – August 2004) – No violations

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:
Admin. Order 63 NE - Total Silver Recoverable - interim value of Report only for EFD-1 quarterly sample

Discuss DMR trends to prior data; is trend improving or declining: Graphical data from WAFR for September 2003 to August 2004:

Monthly Data for EFD-1 & EFA-1 (EFD -1 effluent, immediately after disinfection; EFA-1 effluent, immediately after dechlorination)

Flow (Mo. Avg): Highest Data Value: 0.296 Lowest Data Value: 0.158 Data Average: 0.2107
$CBOD_5$ (Mo. Avg): Highest Data Value: 2.7 Lowest Data Value: 2.1 Data Average: 2.28
TSS (Mo Avg): Highest Data Value: 2.3 Lowest Data Value: 0.84 Data Average: 1.3855
pH (min.): Highest Data Value: 7.1 Lowest Data Value: 6.5 Data Average: 6.9
pH (max): Highest Data Value: 7.4 Lowest Data Value: 7 Data Average: 7.3
Fecal Coliform (Mo. Geom Mean): Highest Data Value: 14 Lowest Data Value: 21.4Data Average: 3.27
TRC (Disinfection): Highest Data Value: 1.27 Lowest Data Value: 0.74 Data Average: 0.96
Nitrogen, Kjedahl Total (as N) (Mo. Avg.): Highest Data Value: 1.7 Lowest Data Value: 1.2 Data Average: 1.37

Quarterly Data for EFD-1 (EFD -1 effluent, immediately after disinfection)

Temperature (Max.): Highest Data Value: 27.6 Lowest Data Value: 20 Data Average: 22.9
Specific Conductance (Max.): Highest Data Value: 871 Lowest Data Value: 698 Data Average: 748.75
pH (Max.): Highest Data Value: 7.07 Lowest Data Value: 6.75 Data Average: 6.875
Nitrogen Total (as N) (Max.): Highest Data Value: 20 Lowest Data Value: 15 Data Average: 16.75
Ammonia Unionized (Max.): Highest Data Value: 0.004 Lowest Data Value: 0.004 Data Average: 0.004
Nitrogen Kjeldahl Total (as N) (Max.) Highest Data Value: 1.4 Lowest Data Value: 1.3 Data Average: 1.325
Nitrite + Nitrate (as N) (Max.): Highest Data Value: 19 Lowest Data Value: 14 Data Average: 15.75
Phosphorus, Total (as P) (Max.): Highest Data Value: 2.8 Lowest Data Value: 1.1 Data Average: 1.75
Hardness, Total (Max.) Highest Data Value: 200 Lowest Data Value: 150 Data Average: 177.5
Chlorophyll a (Max.): Highest Data Value: 0 Lowest Data Value: 0 Data Average: 0
Orthophosphate (Max.): Highest Data Value: 2.6 Lowest Data Value: 1.1 Data Average: 1.8
Fecal Coliform (Max.): Highest Data Value: 6 Lowest Data Value: 2 Data Average: 4
Total Coliform (Max.) Highest Data Value: 4000 Lowest Data Value: 2000 Data Average: 3000
$CBOD_5$ (Max.): Highest Data Value: 4 Lowest Data Value: 2 Data Average: 2.7333

Quarterly Data for SWB-1 (SWB-1 - background, at least 200 yards above outfall)

Temperature (Max.): Highest Data Value: 26.1 Lowest Data Value: 16.5 Data Average: 21.0975
Specific Conductance (Max.): Highest Data Value: 433 Lowest Data Value: 179 Data Average: 264.25
pH (Max.): Highest Data Value: 6.81 Lowest Data Value: 6.57 Data Average: 6.63
Nitrogen Total (as N) (Max.): Highest Data Value: 2.4 Lowest Data Value: 0.93 Data Average: 1.4075
Nitrogen Ammonia Total (as N): Highest Data Value: 0.24 Lowest Data Value: 0.09 Data Average: 0.184
Nitrogen Kjeldahl Total (as N) (Max.) Highest Data Value: 1.4 Lowest Data Value: 1.3 Data Average: 1.325
Nitrite + Nitrate (as N) (Max.): Highest Data Value: 2.3 Lowest Data Value: 0.75 Data Average: 1.3125
Phosphorus, Total (as P) (Max.): Highest Data Value: 0.38 Lowest Data Value: 0.03 Data Average: 0.1275
Chlorophyll a (Max.): Highest Data Value: 44 Lowest Data Value: 4.9 Data Average: 24.45
Orthophosphate (Max.): Highest Data Value: 0.11 Lowest Data Value: 0.71 Data Average: 0.084
Fecal Coliform (Max.): Highest Data Value: 1000 Lowest Data Value: 140 Data Average: 475
Total Coliform (Max.) Highest Data Value: 42000 Lowest Data Value: 6000 Data Average: 19000
$CBOD_5$ (Max.): Highest Data Value: 3.3 Lowest Data Value: 2 Data Average: 2.65

Quarterly Data for SWD-3 (SWD-3 – at least 200 yards below outfall)

Temperature (Max.): Highest Data Value: 26.8 Lowest Data Value: 11 Data Average: 20.7
Specific Conductance (Max.): Highest Data Value: 280 Lowest Data Value: 227 Data Average: 259
pH (Max.): Highest Data Value: 7.1 Lowest Data Value: 6.34Data Average: 6.725
Nitrogen Total (as N) (Max.): Highest Data Value: 18 Lowest Data Value: 1.8 Data Average: 6.85
Nitrogen Ammonia Total (as N): Highest Data Value: 0.18 Lowest Data Value: 0.1 Data Average: 0.155
Nitrogen Kjeldahl Total (as N) (Max.) Highest Data Value: 7.2 Lowest Data Value: 0.95 Data Average: 2.6875
Nitrite + Nitrate (as N) (Max.): Highest Data Value: 11 Lowest Data Value: 0.84 Data Average: 4.21
Phosphorus, Total (as P) (Max.): Highest Data Value: 4.1 Lowest Data Value: 0.11 Data Average: 1.1775
Chlorophyll a (Max.): Highest Data Value: 810 Lowest Data Value: 1 Data Average: 208.775
Orthophosphate (Max.): Highest Data Value: 0.99Lowest Data Value: 0.07 Data Average: 0.487
Fecal Coliform (Max.): Highest Data Value: 970 Lowest Data Value: 40 Data Average: 382.5
Total Coliform (Max.) Highest Data Value: 40000 Lowest Data Value: 8000 Data Average: 27000
$CBOD_5$ (Max.): Highest Data Value: 18 Lowest Data Value: 18 Data Average: 18

Quarterly Data for SWD-4 (SWD-4 – below bend in canal where canal turns top run along S.R. 11)

Temperature (Max.): Highest Data Value: 26.8 Lowest Data Value: 17.4 Data Average: 22.105
Specific Conductance (Max.): Highest Data Value: 753 Lowest Data Value: 228 Data Average: 375.25
pH (Max.): Highest Data Value: 6.9 Lowest Data Value: 6.59 Data Average: 6.76
Nitrogen Total (as N) (Max.): Highest Data Value: 11 Lowest Data Value: 1.6 Data Average: 4.15
Nitrogen Ammonia Total (as N): Highest Data Value: 0.25 Lowest Data Value: 0.00 Data Average: 0.1355
Nitrogen Kjeldahl Total (as N) (Max.) Highest Data Value: 1.9 Lowest Data Value: 0.88 Data Average: 1.345
Nitrite + Nitrate (as N) (Max.): Highest Data Value: 9.1 Lowest Data Value: 0.23 Data Average: 2.8
Phosphorus, Total (as P) (Max.): Highest Data Value: 1 Lowest Data Value: 0.14 Data Average: 0.4275
Chlorophyll a (Max.): Highest Data Value: 80 Lowest Data Value: 2.1 Data Average: 22.5
Orthophosphate (Max.): Highest Data Value: 0.18 Lowest Data Value: 0.18 Data Average: 0.18
Fecal Coliform (Max.): Highest Data Value: 70000 Lowest Data Value: 140 Data Average: 475
Total Coliform (Max.) Highest Data Value: 40000 Lowest Data Value: 4000 Data Average: 31500
$CBOD_5$ (Max.): Highest Data Value: 3 Lowest Data Value: 2.1 Data Average: 2.55

Quarterly Data for SWD-5 (SWD-5 – canal just before it enters Black Branch)

Temperature (Max.): Highest Data Value: 26.6 Lowest Data Value: 17.1 Data Average: 22.175
Specific Conductance (Max.): Highest Data Value: 743 Lowest Data Value: 272 Data Average: 420.75
pH (Max.): Highest Data Value: 7.2 Lowest Data Value: 6.52 Data Average: 6.7975
Nitrogen Total (as N) (Max.): Highest Data Value: 6 Lowest Data Value: 0.98 Data Average: 2.595
Nitrogen Ammonia Total (as N): Highest Data Value: 0.28 Lowest Data Value: 0.05 Data Average: 0.1543
Nitrogen Kjeldahl Total (as N) (Max.) Highest Data Value: 1.6 Lowest Data Value: 0.93 Data Average: 1.975
Nitrite + Nitrate (as N) (Max.): Highest Data Value: 4.7 Lowest Data Value: 0.01 Data Average: 1.3913
Phosphorus, Total (as P) (Max.): Highest Data Value: 0.13 Lowest Data Value: 0.03 Data Average: 0.0925
Chlorophyll a (Max.): Highest Data Value: 17 Lowest Data Value: 1.1 Data Average: 6.1
Orthophosphate (Max.): Highest Data Value: 0.071 Lowest Data Value: 0.071 Data Average: 0.071
Fecal Coliform (Max.): Highest Data Value: 810 Lowest Data Value: 25 Data Average: 249.75
Total Coliform (Max.) Highest Data Value: 45000 Lowest Data Value: 2000 Data Average: 13750

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..

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. This Index was revised in 2004 using data from qualitative dipnet samples. The SCI now assigns points to ten parameters; depending on how closely each parameter approaches an expected value (QA Rule SOP LT 7200). Points are assigned depending on which bioregion (Panhandle, Northeast, or Peninsula) the sampling location exists in and summed to yield a final SCI score (range 0-100). Included in the calculation of SCI are taxa richness, number of Ephemeroptera taxa, number of Trichoptera taxa, percent contribution of the dominant taxon, number of sensitive taxa, number of clinger taxa, number of long-lived taxa, percent contribution

of Tanytarsini, percent contribution of very tolerant, and the percent contribution of suspension and filter feeders. Scores are broken into four ordinal groups: Good, Fair, 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

Sampled	Field ID	Analysis Group	Component	Result	Units	Code	MDL	PQL
1/10/2005	Effluent	Bio-AGP/LimNut	Algal Growth Potential	351	mg DryWt/L		0.3	0.9
1/10/2005	Effluent	Bio-BOD	BOD-5 Day,N-Inhib	0.62	mg/L	I		
1/10/2005	Effluent	Bio-Chl-a	Chl-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
1/10/2005	Effluent	Bio-Chl-a	Phphytn-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
1/10/2005	Effluent	Bio-Toxicology	Bssy-Acte-Scrn-FW-C.dubia, LC50	100	LC50	L		
1/10/2005	Effluent	Bio-Toxicology	Bssy-Acte-Scrn-FW-Fish, LC50	100	LC50	L		
1/10/2005	Effluent	BNA-Water	1,2,4-Trichlorobenzene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	1,2-Dichlorobenzene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	1,3-Dichlorobenzene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	1,4-Dichlorobenzene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	2,4,6-Trichlorophenol	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	2,4-Dichlorophenol	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	2,4-Dimethylphenol	49	ug/L	U	49	190
1/10/2005	Effluent	BNA-Water	2,4-Dinitrophenol	15	ug/L	UJ	15	58
1/10/2005	Effluent	BNA-Water	2,4-Dinitrotoluene	0.97	ug/L	UJ	0.97	3.9
1/10/2005	Effluent	BNA-Water	2,6-Dinitrotoluene	0.97	ug/L	UJ	0.97	3.9
1/10/2005	Effluent	BNA-Water	2-Chloronaphthalene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	2-Chlorophenol	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	2-Methyl-4,6-dinitrophenol	2.9	ug/L	UJ	2.9	12
1/10/2005	Effluent	BNA-Water	2-Nitrophenol	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	3,3'-Dichlorobenzidine	39	ug/L	U	39	160
1/10/2005	Effluent	BNA-Water	4,4'-DDD	1.5	ug/L	U	1.5	5.8
1/10/2005	Effluent	BNA-Water	4,4'-DDE	1.5	ug/L	UJ	1.5	5.8
1/10/2005	Effluent	BNA-Water	4,4'-DDT	1.5	ug/L	UJ	1.5	5.8
1/10/2005	Effluent	BNA-Water	4-Bromophenyl phenyl ether	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	4-Chloro-3-methylphenol	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	4-Chlorophenyl phenyl ether	1.9	ug/L	U	1.9	7.8
1/10/2005	Effluent	BNA-Water	4-Nitrophenol	15	ug/L	U	15	58
1/10/2005	Effluent	BNA-Water	Acenaphthene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	Acenaphthylene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	Aldrin	1.5	ug/L	UJ	1.5	5.8
1/10/2005	Effluent	BNA-Water	alpha-BHC	1.5	ug/L	U	1.5	5.8
1/10/2005	Effluent	BNA-Water	Anthracene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	Benzidine	97	ug/L	U	97	390
1/10/2005	Effluent	BNA-Water	Benzo(a)anthracene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	Benzo(a)pyrene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	Benzo(b)fluoranthene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	Benzo(g,h,i)perylene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	Benzo(k)fluoranthene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	beta-BHC	1.5	ug/L	UJ	1.5	5.8
1/10/2005	Effluent	BNA-Water	Bis(2-chloroethoxy)methane	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	Bis(2-chloroethyl)ether	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	Bis(2-chloroisopropyl)ether	2.9	ug/L	U	2.9	12
1/10/2005	Effluent	BNA-Water	Bis(2-ethylhexyl)phthalate	15	ug/L	U	15	58
1/10/2005	Effluent	BNA-Water	Butyl benzyl phthalate	4.9	ug/L	U	4.9	19
1/10/2005	Effluent	BNA-Water	Chrysene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	delta-BHC	1.5	ug/L	U	1.5	5.8
1/10/2005	Effluent	BNA-Water	Dibenzo(a,h)anthracene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	Dieldrin	1.5	ug/L	UJ	1.5	5.8
1/10/2005	Effluent	BNA-Water	Diethyl phthalate	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	Dimethyl phthalate	49	ug/L	UJ	49	190
1/10/2005	Effluent	BNA-Water	Di-n-butyl phthalate	4.9	ug/L	U	4.9	19
1/10/2005	Effluent	BNA-Water	Di-n-octyl phthalate	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	Endosulfan I	3.9	ug/L	UJ	3.9	16
1/10/2005	Effluent	BNA-Water	Endosulfan II	3.9	ug/L	UJ	3.9	16
1/10/2005	Effluent	BNA-Water	Endosulfan sulfate	1.5	ug/L	UJ	1.5	5.8
1/10/2005	Effluent	BNA-Water	Endrin	1.5	ug/L	UJ	1.5	5.8
1/10/2005	Effluent	BNA-Water	Endrin aldehyde	3.9	ug/L	U	3.9	16
1/10/2005	Effluent	BNA-Water	Fluoranthene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	Fluorene	0.97	ug/L	U	0.97	3.9

Sampled	Field ID	Analysis Group	Component	Result	Units	Code	MDL	PQL
1/10/2005	Effluent	BNA-Water	gamma-BHC	1.5	ug/L	UJ	1.5	5.8
1/10/2005	Effluent	BNA-Water	Heptachlor	1.5	ug/L	UJ	1.5	5.8
1/10/2005	Effluent	BNA-Water	Heptachlor epoxide	1.5	ug/L	UJ	1.5	5.8
1/10/2005	Effluent	BNA-Water	Hexachlorobenzene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	Hexachlorobutadiene	2.9	ug/L	U	2.9	12
1/10/2005	Effluent	BNA-Water	Hexachlorocyclopentadiene	2.9	ug/L	U	2.9	12
1/10/2005	Effluent	BNA-Water	Hexachloroethane	2.9	ug/L	UJ	2.9	12
1/10/2005	Effluent	BNA-Water	Indeno(1,2,3-cd)pyrene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	Isophorone	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	Naphthalene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	Nitrobenzene	1.9	ug/L	U	1.9	7.8
1/10/2005	Effluent	BNA-Water	N-Nitrosodimethylamine	1.9	ug/L	U	1.9	7.8
1/10/2005	Effluent	BNA-Water	N-Nitrosodi-n-propylamine	1.9	ug/L	UJ	1.9	7.8
1/10/2005	Effluent	BNA-Water	N-Nitrosodiphenylamine	2.9	ug/L	U	2.9	12
1/10/2005	Effluent	BNA-Water	Pentachlorophenol	2.9	ug/L	U	2.9	12
1/10/2005	Effluent	BNA-Water	Phenanthrene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	Phenol	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	BNA-Water	Pyrene	0.97	ug/L	U	0.97	3.9
1/10/2005	Effluent	GC-Water	Alachlor	0.6	ug/L	U	0.6	2.4
1/10/2005	Effluent	GC-Water	Ametryn	0.05	ug/L	U	0.05	0.2
1/10/2005	Effluent	GC-Water	Atrazine	0.66	ug/L		0.05	0.2
1/10/2005	Effluent	GC-Water	Azinphos Methyl	0.05	ug/L	U	0.05	0.2
1/10/2005	Effluent	GC-Water	Bromacil	0.2	ug/L	U	0.2	0.8
1/10/2005	Effluent	GC-Water	Butylate	0.2	ug/L	U	0.2	0.8
1/10/2005	Effluent	GC-Water	Chlorpyrifos Ethyl	0.05	ug/L	U	0.05	0.2
1/10/2005	Effluent	GC-Water	Chlorpyrifos Methyl	0.1	ug/L	U	0.1	0.4
1/10/2005	Effluent	GC-Water	Diazinon	0.05	ug/L	UJ	0.05	0.2
1/10/2005	Effluent	GC-Water	Ethion	0.05	ug/L	U	0.05	0.2
1/10/2005	Effluent	GC-Water	Ethoprop	0.1	ug/L	U	0.1	0.4
1/10/2005	Effluent	GC-Water	Fenamiphos	0.2	ug/L	U	0.2	0.8
1/10/2005	Effluent	GC-Water	Fonofos	0.1	ug/L	U	0.1	0.4
1/10/2005	Effluent	GC-Water	Hexazinone	0.1	ug/L	U	0.1	0.4
1/10/2005	Effluent	GC-Water	Malathion	0.15	ug/L	U	0.15	0.6
1/10/2005	Effluent	GC-Water	Metalaxyl	0.25	ug/L	U	0.25	1
1/10/2005	Effluent	GC-Water	Metolachlor	0.5	ug/L	U	0.5	2
1/10/2005	Effluent	GC-Water	Metribuzin	0.1	ug/L	U	0.1	0.4
1/10/2005	Effluent	GC-Water	Mevinphos	0.2	ug/L	U	0.2	0.8
1/10/2005	Effluent	GC-Water	Naled	0.8	ug/L	UJ	0.8	3.2
1/10/2005	Effluent	GC-Water	Norflurazon	0.1	ug/L	U	0.1	0.4
1/10/2005	Effluent	GC-Water	Parathion Ethyl	0.15	ug/L	U	0.15	0.6
1/10/2005	Effluent	GC-Water	Parathion Methyl	0.1	ug/L	U	0.1	0.4
1/10/2005	Effluent	GC-Water	Phorate	0.05	ug/L	U	0.05	0.2
1/10/2005	Effluent	GC-Water	Prometryn	0.15	ug/L	U	0.15	0.6
1/10/2005	Effluent	GC-Water	Simazine	0.05	ug/L	U	0.05	0.2
1/10/2005	Effluent	Metals-Water	Aluminum	38	ug/L		5	20
1/10/2005	Effluent	Metals-Water	Arsenic	6	ug/L	U	6	24
1/10/2005	Effluent	Metals-Water	Cadmium	0.075	ug/L	U	0.075	0.3
1/10/2005	Effluent	Metals-Water	Calcium	54.3	mg/L		0.075	0.3
1/10/2005	Effluent	Metals-Water	Chromium	2	ug/L	U	2	8
1/10/2005	Effluent	Metals-Water	Copper	3.8	ug/L		0.5	2
1/10/2005	Effluent	Metals-Water	Iron	82	ug/L		10	40
1/10/2005	Effluent	Metals-Water	Lead	0.66	ug/L	U	0.66	2.6
1/10/2005	Effluent	Metals-Water	Magnesium	6.1	mg/L		0.02	0.08
1/10/2005	Effluent	Metals-Water	Nickel	2	ug/L	U	2	8
1/10/2005	Effluent	Metals-Water	Selenium	0.5	ug/L	U	0.5	2
1/10/2005	Effluent	Metals-Water	Silver	0.025	ug/L	U	0.025	0.1
1/10/2005	Effluent	Metals-Water	Zinc	36	ug/L		3	12
1/10/2005	Effluent	Nutrients-Liquid	Ammonia-N	0.036	mg N/L	A	0.01	0.02
1/10/2005	Effluent	Nutrients-Liquid	Kjeldahl Nitrogen	1.3	mg N/L		0.12	0.4
1/10/2005	Effluent	Nutrients-Liquid	NO2NO3-N	16	mg N/L		0.4	1
1/10/2005	Effluent	Nutrients-Liquid	O-Phosphate-P	2	mg P/L		0.04	0.1
1/10/2005	Effluent	Nutrients-Liquid	Total-P	2.5	mg P/L		0.2	0.6
1/10/2005	Effluent	Nutrients-Liquid	TSS	4	mg/L	U	4	16
1/10/2005	Control	Bio-AGP/LimNut	Algal Growth Potential	4.35	mg DryWt/L		0.3	0.9
1/10/2005	Control	Bio-BOD	BOD-5 Day,N-Inhib	0.2	mg/L	U		

Sampled	Field ID	Analysis Group	Component	Result	Units	Code	MDL	PQL
1/10/2005	Control	Bio-Chl-a	Chl-A, Monochromatic, Periphyton	4.5	mg/m2	A	0.36	1.1
1/10/2005	Control	Bio-Chl-a	Chl-A, Monochromatic, Water	1.7	ug/L	U	1.7	5.1
1/10/2005	Control	Bio-Chl-a	Phphytn-A, Monochromatic, Prphytn	0	mg/m2	A	0.36	1.1
1/10/2005	Control	Bio-Chl-a	Phphytn-A, Monochromatic, Water	1.7	ug/L	U	1.7	5.1
1/10/2005	Control	Bio-Invertebrates	Invert-FW-Qual-Dipnetx20-# Taxa	26	# Taxa			
1/10/2005	Control	Bio-Peri/Phyto	Prphytn-Quantitative-# Diatom Taxa	24	#Taxa			
1/10/2005	Control	Bio-Peri/Phyto	Prphytn-Quantitative-# Wet Taxa	16	#Taxa			
1/10/2005	Control	Nutrients-Liquid	Ammonia-N	0.18	mg N/L		0.01	0.02
1/10/2005	Control	Nutrients-Liquid	Kjeldahl Nitrogen	1.4	mg N/L		0.12	0.4
1/10/2005	Control	Nutrients-Liquid	NO2NO3-N	0.042	mg N/L	I	0.02	0.05
1/10/2005	Control	Nutrients-Liquid	O-Phosphate-P	0.012	mg P/L		0.004	0.01
1/10/2005	Control	Nutrients-Liquid	Total-P	0.12	mg P/L		0.02	0.06
1/10/2005	Control	Nutrients-Liquid	TSS	14	mg/L	I	4	16
1/10/2005	Control Rep. 1	Bio-Invertebrates	Invert-FW-Quan-ArtSubstr-# Taxa	10	# Taxa			
1/10/2005	Control Rep. 2	Bio-Invertebrates	Invert-FW-Quan-ArtSubstr-# Taxa	9	# Taxa			
1/10/2005	Control Rep. 3	Bio-Invertebrates	Invert-FW-Quan-ArtSubstr-# Taxa	13	# Taxa			
1/10/2005	Test Rep. 1	Bio-Invertebrates	Invert-FW-Quan-ArtSubstr-# Taxa	13	# Taxa			
1/10/2005	Test Rep. 2	Bio-Invertebrates	Invert-FW-Quan-ArtSubstr-# Taxa	12	# Taxa			
1/10/2005	Test Rep. 3	Bio-Invertebrates	Invert-FW-Quan-ArtSubstr-# Taxa	12	# Taxa			
1/10/2005	Test	Bio-AGP/LimNut	Algal Growth Potential	368	mg DryWt/L		0.3	0.9
1/10/2005	Test	Bio-BOD	BOD-5 Day,N-Inhib	0.27	mg/L	I		
1/10/2005	Test	Bio-Chl-a	Chl-A, Monochromatic, Periphyton	4.1	mg/m2		0.076	0.23
1/10/2005	Test	Bio-Chl-a	Chl-A, Monochromatic, Water	1.7	ug/L	U	1.7	5.1
1/10/2005	Test	Bio-Chl-a	Phphytn-A, Monochromatic, Prphytn	0	mg/m2		0.076	0.23
1/10/2005	Test	Bio-Chl-a	Phphytn-A, Monochromatic, Water	1.7	ug/L	U	1.7	5.1
1/10/2005	Test	Bio-Invertebrates	Invert-FW-Qual-Dipnetx20-# Taxa	22	# Taxa			
1/10/2005	Test	Bio-Peri/Phyto	Prphytn-Quantitative-# Diatom Taxa	17	#Taxa			
1/10/2005	Test	Bio-Peri/Phyto	Prphytn-Quantitative-# Wet Taxa	11	#Taxa			
1/10/2005	Test	Nutrients-Liquid	Ammonia-N	0.11	mg N/L		0.01	0.02
1/10/2005	Test	Nutrients-Liquid	Kjeldahl Nitrogen	1.7	mg N/L		0.12	0.4
1/10/2005	Test	Nutrients-Liquid	NO2NO3-N	7.6	mg N/L		0.08	0.2
1/10/2005	Test	Nutrients-Liquid	O-Phosphate-P	0.92	mg P/L		0.08	0.2
1/10/2005	Test	Nutrients-Liquid	Total-P	1.1	mg P/L		0.04	0.12
1/10/2005	Test	Nutrients-Liquid	TSS	12	mg/L	I	4	16
1/10/2005	Equip Blank	BNA-Water	1,2,4-Trichlorobenzene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	1,2-Dichlorobenzene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	1,3-Dichlorobenzene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	1,4-Dichlorobenzene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	2,4,6-Trichlorophenol	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	2,4-Dichlorophenol	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	2,4-Dimethylphenol	48	ug/L	U	48	190
1/10/2005	Equip Blank	BNA-Water	2,4-Dinitrophenol	14	ug/L	UJ	14	58
1/10/2005	Equip Blank	BNA-Water	2,4-Dinitrotoluene	0.96	ug/L	UJ	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	2,6-Dinitrotoluene	0.96	ug/L	UJ	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	2-Chloronaphthalene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	2-Chlorophenol	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	2-Methyl-4,6-dinitrophenol	2.9	ug/L	UJ	2.9	12
1/10/2005	Equip Blank	BNA-Water	2-Nitrophenol	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	3,3'-Dichlorobenzidine	38	ug/L	U	38	150
1/10/2005	Equip Blank	BNA-Water	4,4'-DDD	1.4	ug/L	U	1.4	5.8
1/10/2005	Equip Blank	BNA-Water	4,4'-DDE	1.4	ug/L	UJ	1.4	5.8
1/10/2005	Equip Blank	BNA-Water	4,4'-DDT	1.4	ug/L	UJ	1.4	5.8
1/10/2005	Equip Blank	BNA-Water	4-Bromophenyl phenyl ether	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	4-Chloro-3-methylphenol	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	4-Chlorophenyl phenyl ether	1.9	ug/L	U	1.9	7.7
1/10/2005	Equip Blank	BNA-Water	4-Nitrophenol	14	ug/L	U	14	58
1/10/2005	Equip Blank	BNA-Water	Acenaphthene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	Acenaphthylene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	Aldrin	1.4	ug/L	UJ	1.4	5.8
1/10/2005	Equip Blank	BNA-Water	alpha-BHC	1.4	ug/L	U	1.4	5.8
1/10/2005	Equip Blank	BNA-Water	Anthracene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	Benzidine	96	ug/L	U	96	380
1/10/2005	Equip Blank	BNA-Water	Benzo(a)anthracene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	Benzo(a)pyrene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	Benzo(b)fluoranthene	0.96	ug/L	U	0.96	3.8

Sampled	Field ID	Analysis Group	Component	Result	Units	Code	MDL	PQL
1/10/2005	Equip Blank	BNA-Water	Benzo(g,h,i)perylene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	Benzo(k)fluoranthene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	beta-BHC	1.4	ug/L	UJ	1.4	5.8
1/10/2005	Equip Blank	BNA-Water	Bis(2-chloroethoxy)methane	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	Bis(2-chloroethyl)ether	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	Bis(2-chloroisopropyl)ether	2.9	ug/L	U	2.9	12
1/10/2005	Equip Blank	BNA-Water	Bis(2-ethylhexyl)phthalate	14	ug/L	U	14	58
1/10/2005	Equip Blank	BNA-Water	Butyl benzyl phthalate	4.8	ug/L	U	4.8	19
1/10/2005	Equip Blank	BNA-Water	Chrysene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	delta-BHC	1.4	ug/L	U	1.4	5.8
1/10/2005	Equip Blank	BNA-Water	Dibenzo(a,h)anthracene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	Dieldrin	1.4	ug/L	UJ	1.4	5.8
1/10/2005	Equip Blank	BNA-Water	Diethyl phthalate	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	Dimethyl phthalate	48	ug/L	UJ	48	190
1/10/2005	Equip Blank	BNA-Water	Di-n-butyl phthalate	4.8	ug/L	U	4.8	19
1/10/2005	Equip Blank	BNA-Water	Di-n-octyl phthalate	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	Endosulfan I	3.8	ug/L	UJ	3.8	15
1/10/2005	Equip Blank	BNA-Water	Endosulfan II	3.8	ug/L	UJ	3.8	15
1/10/2005	Equip Blank	BNA-Water	Endosulfan sulfate	1.4	ug/L	UJ	1.4	5.8
1/10/2005	Equip Blank	BNA-Water	Endrin	1.4	ug/L	UJ	1.4	5.8
1/10/2005	Equip Blank	BNA-Water	Endrin aldehyde	3.8	ug/L	U	3.8	15
1/10/2005	Equip Blank	BNA-Water	Fluoranthene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	Fluorene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	gamma-BHC	1.4	ug/L	UJ	1.4	5.8
1/10/2005	Equip Blank	BNA-Water	Heptachlor	1.4	ug/L	UJ	1.4	5.8
1/10/2005	Equip Blank	BNA-Water	Heptachlor epoxide	1.4	ug/L	UJ	1.4	5.8
1/10/2005	Equip Blank	BNA-Water	Hexachlorobenzene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	Hexachlorobutadiene	2.9	ug/L	U	2.9	12
1/10/2005	Equip Blank	BNA-Water	Hexachlorocyclopentadiene	2.9	ug/L	U	2.9	12
1/10/2005	Equip Blank	BNA-Water	Hexachloroethane	2.9	ug/L	UJ	2.9	12
1/10/2005	Equip Blank	BNA-Water	Indeno(1,2,3-cd)pyrene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	Isophorone	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	Naphthalene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	Nitrobenzene	1.9	ug/L	U	1.9	7.7
1/10/2005	Equip Blank	BNA-Water	N-Nitrosodimethylamine	1.9	ug/L	U	1.9	7.7
1/10/2005	Equip Blank	BNA-Water	N-Nitrosodi-n-propylamine	1.9	ug/L	UJ	1.9	7.7
1/10/2005	Equip Blank	BNA-Water	N-Nitrosodiphenylamine	2.9	ug/L	U	2.9	12
1/10/2005	Equip Blank	BNA-Water	Pentachlorophenol	2.9	ug/L	U	2.9	12
1/10/2005	Equip Blank	BNA-Water	Phenanthrene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	Phenol	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	BNA-Water	Pyrene	0.96	ug/L	U	0.96	3.8
1/10/2005	Equip Blank	GC-Water	Alachlor	0.58	ug/L	U	0.58	2.3
1/10/2005	Equip Blank	GC-Water	Ametryn	0.048	ug/L	U	0.048	0.19
1/10/2005	Equip Blank	GC-Water	Atrazine	0.048	ug/L	U	0.048	0.19
1/10/2005	Equip Blank	GC-Water	Azinphos Methyl	0.048	ug/L	U	0.048	0.19
1/10/2005	Equip Blank	GC-Water	Bromacil	0.19	ug/L	U	0.19	0.76
1/10/2005	Equip Blank	GC-Water	Butylate	0.19	ug/L	U	0.19	0.76
1/10/2005	Equip Blank	GC-Water	Chlorpyrifos Ethyl	0.048	ug/L	U	0.048	0.19
1/10/2005	Equip Blank	GC-Water	Chlorpyrifos Methyl	0.096	ug/L	U	0.096	0.38
1/10/2005	Equip Blank	GC-Water	Diazinon	0.048	ug/L	UJ	0.048	0.19
1/10/2005	Equip Blank	GC-Water	Ethion	0.048	ug/L	U	0.048	0.19
1/10/2005	Equip Blank	GC-Water	Ethoprop	0.096	ug/L	U	0.096	0.38
1/10/2005	Equip Blank	GC-Water	Fenamiphos	0.19	ug/L	U	0.19	0.76
1/10/2005	Equip Blank	GC-Water	Fonofos	0.096	ug/L	U	0.096	0.38
1/10/2005	Equip Blank	GC-Water	Hexazinone	0.096	ug/L	U	0.096	0.38
1/10/2005	Equip Blank	GC-Water	Malathion	0.14	ug/L	U	0.14	0.56
1/10/2005	Equip Blank	GC-Water	Metalaxyl	0.24	ug/L	U	0.24	0.96
1/10/2005	Equip Blank	GC-Water	Metolachlor	0.48	ug/L	U	0.48	1.9
1/10/2005	Equip Blank	GC-Water	Metribuzin	0.096	ug/L	U	0.096	0.38
1/10/2005	Equip Blank	GC-Water	Mevinphos	0.19	ug/L	U	0.19	0.76
1/10/2005	Equip Blank	GC-Water	Naled	0.77	ug/L	UJ	0.77	3.1
1/10/2005	Equip Blank	GC-Water	Norflurazon	0.096	ug/L	U	0.096	0.38
1/10/2005	Equip Blank	GC-Water	Parathion Ethyl	0.14	ug/L	U	0.14	0.56
1/10/2005	Equip Blank	GC-Water	Parathion Methyl	0.096	ug/L	U	0.096	0.38
1/10/2005	Equip Blank	GC-Water	Phorate	0.048	ug/L	U	0.048	0.19

Sampled	Field ID	Analysis Group	Component	Result	Units	Code	MDL	PQL
1/10/2005	Equip Blank	GC-Water	Prometryn	0.14	ug/L	U	0.14	0.56
1/10/2005	Equip Blank	GC-Water	Simazine	0.048	ug/L	U	0.048	0.19
1/10/2005	Equip Blank	Metals-Water	Aluminum	5	ug/L	U	5	20
1/10/2005	Equip Blank	Metals-Water	Arsenic	6	ug/L	U	6	24
1/10/2005	Equip Blank	Metals-Water	Cadmium	0.075	ug/L	U	0.075	0.3
1/10/2005	Equip Blank	Metals-Water	Calcium	0.075	mg/L	U	0.075	0.3
1/10/2005	Equip Blank	Metals-Water	Chromium	2	ug/L	U	2	8
1/10/2005	Equip Blank	Metals-Water	Copper	0.5	ug/L	U	0.5	2
1/10/2005	Equip Blank	Metals-Water	Iron	10	ug/L	U	10	40
1/10/2005	Equip Blank	Metals-Water	Lead	0.075	ug/L	U	0.075	0.3
1/10/2005	Equip Blank	Metals-Water	Magnesium	0.02	mg/L	U	0.02	0.08
1/10/2005	Equip Blank	Metals-Water	Nickel	2	ug/L	U	2	8
1/10/2005	Equip Blank	Metals-Water	Selenium	0.5	ug/L	U	0.5	2
1/10/2005	Equip Blank	Metals-Water	Silver	0.025	ug/L	U	0.025	0.1
1/10/2005	Equip Blank	Metals-Water	Zinc	3	ug/L	U	3	12
1/10/2005	Equip Blank	Nutrients-Liquid	Ammonia-N	0.01	mg N/L	U	0.01	0.02
1/10/2005	Equip Blank	Nutrients-Liquid	Kjeldahl Nitrogen	0.06	mg N/L	U	0.06	0.2
1/10/2005	Equip Blank	Nutrients-Liquid	NO2NO3-N	0.004	mg N/L	U	0.004	0.01
1/10/2005	Equip Blank	Nutrients-Liquid	O-Phosphate-P	0.004	mg P/L	U	0.004	0.01
1/10/2005	Equip Blank	Nutrients-Liquid	Total-P	0.02	mg P/L	U	0.02	0.06

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	**4.5 A**
Hester-Dendy Diversity	0.84	2.12	2.48	2.74	2.88	3.09	3.25	3.40	3.52	3.76	3.90	**2.38**
Hester-Dendy Taxa Richness	6	6.5	9	11.5	13	15	17	21.5	26	29	32	**16**
Dipnet Taxa Richness	9	12	17	20	22	24.5	26	28	31	37	53	**25**
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	**1.4**
Total Ammonia	0.02	0.02	0.04	0.05	0.06	0.08	0.11	0.14	0.20	0.34	0.60	**0.18**
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	**0.042 I**
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	0.18	0.25	0.39	0.74	1.51	**0.12**
Orthophosphate	0.01	0.01	0.03	0.04	0.05	0.08	0.11	0.17	0.27	0.59	1.37	**0.012**
Turbidity (NTU)	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	10.45	16.30	**ND**

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

I - The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

TEST SITE

Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%	Measured
Periphyton Chlorophyll *a* (mg/m^2)	0.31	0.43	0.77	1.04	2.16	2.94	6.45	10.51	17.00	39.51	60.85	**4.1**
Hester-Dendy Diversity	0.84	2.12	2.48	2.74	2.88	3.09	3.25	3.40	3.52	3.76	3.90	**2.93**
Hester-Dendy Taxa Richness	6	6.5	9	11.5	13	15	17	21.5	26	29	32	**17**
Dipnet Taxa Richness	9	12	17	20	22	24.5	26	28	31	37	53	**21**
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	**1.7**
Total Ammonia	0.02	0.02	0.04	0.05	0.06	0.08	0.11	0.14	0.20	0.34	0.60	**0.11**
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	**7.6**
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	**0.92**
Turbidity (NTU)	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	10.45	16.30	**ND**

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.

FDEP Biology Section - Acute Bioassay Bench Sheets

Facility: Bunnell WWTF

Address: Tolman Street at Dean Road

City: Bunnell County: Flagler

Contact/District: Gloria Borges / Northeast

NPDES Permit #: FL 00 20907

LIMS Job #: TLH-2005-01-11-49 LIMS Sample #: 307878

Sample Collection: Date: 01/10/05 Time: 1210 TSH (B)

Hold time Start: Date: 01/10/05 Time: 1210 TSH

Comments: (A) Corrected Time entry error MF 1-12-05

Lims Data Entry: 1-13-05 MF

Data Entry Verification: 1/13/05 DN

Instructions (for below): Circle appropriate wording. If yes is circled complete blanks.

Test Type: Screening/Definitive

Static / Static Renewal / Flow-through

Test Duration: (48) 96 Hours.

Light Intensity : 50 - 100 ft. candles.

Photoperiod : 16 hours light 8 hours dark.

Initial sample handling:

Test 1 validation:
Control survival ≥90%: (Yes) No
Temperature Range ≤3°C: (Yes) No

Test 2 validation:
Control survival ≥90%: (Yes) No
Temperature Range ≤3°C: (Yes) No

PH adjustment : yes (no) Initial pH NaOH N HCl N Drops mL Final pH

Aeration : yes (no) Initial DO: mg/L Final DO: mg/L Duration: minutes Rate: ~ bubbles/min

Salinity adjusted (Test 1): yes (no) Initial Salinity: Final Salinity: Salts Hypersaline brine

Salinity adjusted (Test 2): yes (no) Initial Salinity: Final Salinity: Salts Hypersaline brine

Dechlorination: yes (no) mL of 0.025N Sodium Thiosulfate per liter of sample. Final TRC

Sample Validation:

Temperature: Shipped ≤6°C (Yes) No Hand Delivered: Cooling (received °C < collected °C) Yes No

Holding Time: ≤36 Hours (Yes) No (Composite-end of collection; grab-when collected; 4 in 24 - time last sample collected)

Temperature Range °C

Incubator # 3 Range 24.4 - 25.1 °C

Room B246: 24.1 - 24.5°C

Waterbath: N/A

Investigators' Signatures

Christa A Lucini

Deanna Nicholson

Sarah Pickard

Marshall Faircloth

REVIEWER

Water Quality Parameters	20% DMW	Well Water	Salt Water ASW NSW Test 1	Salt Water ASW NSW Test 2	Moderately Hard Water	Original Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):	N/A	N/A	N/A	N/A	N/A	0.03	—	Gloria Borges	MF
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03				<0.03	HACH	JD	SP
Alkalinity (mg/L as $CaCO_3$):	90	148				100	HACH	JD	SP
Hardness (mg/L as $CaCO_3$):	133	146				256	HACH	JD	SP
Total Ammonia (mg/L as N):	<0.017	<0.017				<0.017	DENVER	DN	MF
Salinity (ppth):	<1	<1				<1	YSI Mettler	JD	MF

V.3 10/12/04

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FDEP Biology Section - - Bioassay Bench Sheet

Survival

LIMS Sample #: 807878 Test #: 1 Test Started: Date 01/11/05 Time: 1215

Organism: C. dubia Test Ended: Date 1-13-05 Time: 1200

Organism Batch: 2-05 Diluent/ Batch: DMW / 1.05

Organism Age: <24 hr Food: YCT (P. subcapitata) Artemia

Chamber Size 30 mL Batch: 5 41

Test Volume 20 mL Feeding: (Prior to test) Prior to renewal - Daily

Concentration	Replicate	Chamber #	Test Hour 0 hr	24 hr	48 hr BR	48 hr AR	72 hr	96 hr
CTRL	A	A	5	5	5			
	B	B	5	5	5			
	C	C	5	5	5			
	D	D	5	5	5			
100%	A	A	5	5	5			
	B	B	5	5	5			
	C	C	5	5	5			
	D	D	5	5	5			
Organisms loaded by: DN		Checked by:	DN	DN	DN			
Loading Verified by: SP		(initials)						

Comments:

m = missing d = dead BR = before renewal AR = after renewal

Test Results:

% mortality in 100% sample 0

LC_{50}: >100 If Calculated: 95% CI _____ Method: _____

Screening Tests: Report LC50 as >100%, =100%, or <100%.

Substitue highest test concentration used if other than 100% (example: Ocean outfall tested at 30% concentration).

FDEP Biology Section - - Bioassay Bench Sheet

Survival

LIMS Sample #: 807878 Test #: 2 Test Started: Date 1/11/05 Time: ~~1200~~ 1520 Time error MF 1-11-05

Organism: C. leedsi Test Ended: Date 1-13-05 Time: 1300

Organism Batch: 2-05 Diluent/ Batch: Well 1

Organism Age: 5 days Food: YCT P. subcapitata (Artemia)

Chamber Size 1000 mL Batch: 41254256

Test Volume 500 mL Feeding: (Prior to test) - Prior to renewal - Daily

Concentration	Replicate	Chamber #	0 hr	24 hr	48 hr BR	48 hr AR	72 hr	96 hr
CTRL	A	A13	5	5	5			
	B	A14	5	5	5			
	C	A 15	5	5	5			
	D	A 16	5	5	5			
100%	A	A 17	5	5	5			
	B	A 18	5	5	5			
	C	A 19	5	5	5			
	D	A 20	5	5	5			
Organisms loaded by: DN Loading Verified by: SP		Checked by: (initials)	DN	DN	SD			

Comments:

m = missing d = dead BR = before renewal AR = after renewal

Test Results:

% mortality in 100% sample Ø

LC_{50}: >100 If Calculated: 95% CI ________ Method: ________

Screening Tests: Report LC50 as >100%, =100%, or <100%.

Substitue highest test concentration used if other than 100% (example: Ocean outfall tested at 30% concentration).

Bioassay Parameters

LIMS Sample # : 807878 Test # : 1 of 2

TEST SOP: TA07_01_ Test Species: (Ceriodaphnia dubia) Cyprinella leedsi Pimephales promelas Americamysis bahia Menidia beryllina Other:_____

V.1 2/24/04

Concentration CTRL	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Replicate	A		B			
pH (S.U.)	8.2		8.1			
Temperature °C	24.0		24.3			
Dissolved Oxygen mg/L	7.3		6.8			
Conductivity (µmhos) mmhos	187		215			
(initials) Measured by:	JD		JD			
(initials) Recorded by:	JD		JD			

Comments:

Concentration 100%	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Replicate	A		B			
pH (S.U.)	7.5		8.2			
Temperature °C	24.0		24.1			
Dissolved Oxygen mg/L	8.1		7.2			
Conductivity (µmhos) mmhos	730		920			
(initials) Measured by:	JD		JD			
(initials) Recorded by:	JD		JD			

Comments:

Concentration	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Replicate						
pH (S.U.)						
Temperature °C						
Dissolved Oxygen mg/L						
Conductivity µmhos mmhos						
(initials) Measured by:						
(initials) Recorded by:						

Comments:

Concentration	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Replicate						
pH (S.U.)						
Temperature °C						
Dissolved Oxygen mg/L						
Conductivity µmhos mmhos						
(initials) Measured by:						
(initials) Recorded by:						

Comments:

V.1 2/24/04

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Bioassay Parameters

LIMS Sample # : 807878 **Test # :** 2 **of** 2

TEST SOP: TA07_ 02 **Test Species:** *Ceriodaphnia dubia* (*Cyprinella leedsi*) *Pimephales promelas* *Americamysis bahia* *Menidia beryllina* Other:_____

V.1 2/24/04

Concentration CTRL	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Replicate	A	B	C			
pH (S.U.)	7.8	8.0	8.3			
Temperature °C	24.6	24.8	24.8			
Dissolved Oxygen mg/L	7.9	7.1	7.3			
Conductivity (µmhos) mmhos	305	(a) 270	280			
(initials) Measured by:	DD	DN	DD			
(initials) Recorded by:	DD	DN	DD			

Comments: (a) 3 measurements were taken for the conductivity and all agree with the first measurement of 270 µmhos D.N. 01/12/05

Concentration 100%	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Replicate	A	B	C			
pH (S.U.)	7.5	7.9	8.0			
Temperature °C	24.4	24.6	24.6			
Dissolved Oxygen mg/L	8.0	7.1	7.1			
Conductivity (µmhos) mmhos	730	745	765			
(initials) Measured by:	DD	DN	DD			
(initials) Recorded by:	DD	DN	DD			

Comments:

Concentration	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Replicate						
pH (S.U.)						
Temperature °C						
Dissolved Oxygen mg/L						
Conductivity µmhos mmhos						
(initials) Measured by:						
(initials) Recorded by:						

Comments:

Concentration	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Replicate						
pH (S.U.)						
Temperature °C						
Dissolved Oxygen mg/L						
Conductivity µmhos mmhos						
(initials) Measured by:						
(initials) Recorded by:						

Comments:

V.1 2/24/04

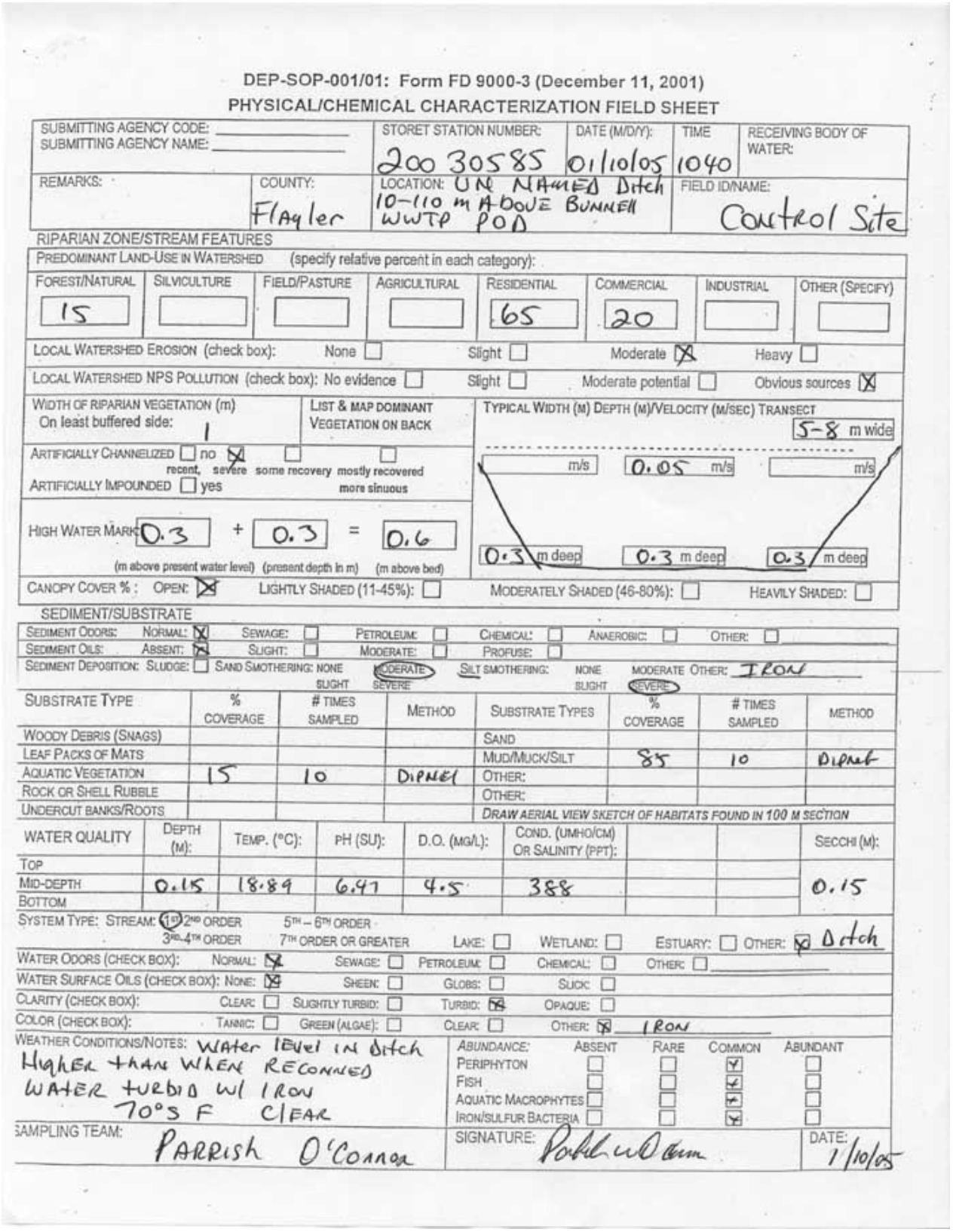
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Appendix 7

Habitat Assessment Field Sheets



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:
	200 30585	01/10/05	1040	

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
	Flagler	UN NAMED Ditch 10–110 m ABOVE BUNNELL WWTP POD	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)
15				65	20		

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: 1

LIST & MAP DOMINANT VEGETATION ON BACK

ARTIFICIALLY CHANNELIZED ☐ no ☒ recent, severe ☐ some recovery ☐ mostly recovered more sinuous

ARTIFICIALLY IMPOUNDED ☐ yes

HIGH WATER MARK: 0.3 (m above present water level) + 0.3 (present depth in m) = 0.6 (m above bed)

TYPICAL WIDTH (M) DEPTH (M)/VELOCITY (M/SEC) TRANSECT

5-8 m wide

m/s | 0.05 m/s | m/s

0.3 m deep | 0.3 m deep | 0.3 m deep

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

SEDIMENT/SUBSTRATE

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

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

SEDIMENT DEPOSITION: SLUDGE: ☐ SAND SMOTHERING: NONE SLIGHT MODERATE SEVERE SILT SMOTHERING: NONE SLIGHT MODERATE SEVERE OTHER: IRON

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	DIPNET
AQUATIC VEGETATION	15	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								
MID-DEPTH	0.15	18.89	6.47	4.5	388			0.15
BOTTOM								

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

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: ☒ IRON

WEATHER CONDITIONS/NOTES: Water level in ditch higher than when reconned water turbid w/ iron 70°s F clear

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

SAMPLING TEAM: Parrish O'Connor

SIGNATURE: [signature]

DATE: 1/10/05

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: 20030585	DATE (MM/DD/YY): 01/10/05	RECEIVING BODY OF WATER:
REMARKS:	COUNTY: Flagler	LOCATION: UN NAMED Ditch 10-410 M ABOVE BUNNELL WWTP POD	FIELD ID/NAME: Control Site

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components Substrate Diversity 5	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 14	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 6	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 10 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	Smothering of >80% of habitats with sand or silt, as severe problem, pools absent 5 4 3 2 1
Secondary Habitat Components Artificial Channelization 3	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 3 Left Bank 3	Stable. No evidence of erosion or bank failure. Little potential for future problems. 10 9	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 8 7 6	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 5 4	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 3 2 1
Riparian Buffer Zone Width Right Bank 1 Left Bank 3	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 1 Left Bank 4 Secondary Score 18	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

53 TOTAL SCORE

ANALYSIS DATE: 1/10/05	ANALYST: O'Connor	SIGNATURE: Patricia O'Connor

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:
	20030586	1/10/04	1200	

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
	Flagler	UNNAMED Ditch 10-110 m below Bunnell WWTP POD	Test 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)
15				65	20		

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:

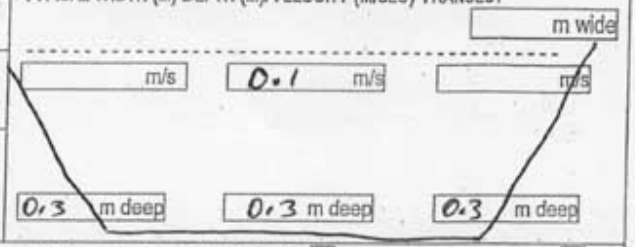
LIST & MAP DOMINANT VEGETATION ON BACK

ARTIFICIALLY CHANNELIZED ☐ no ☐ recent, severe ☐ some recovery ☐ mostly recovered more sinuous

ARTIFICIALLY IMPOUNDED ☐ yes

HIGH WATER MARK: 0.3 (m above present water level) + 0.3 (present depth in m) = 0.6 (m above bed)

TYPICAL WIDTH (M) DEPTH (M)/VELOCITY (M/SEC) TRANSECT



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

SEDIMENT/SUBSTRATE

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

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

SEDIMENT DEPOSITION: SLUDGE: ☐ SAND SMOTHERING: NONE SLIGHT MODERATE SEVERE SILT SMOTHERING: NONE SLIGHT MODERATE SEVERE OTHER: IRON

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	DIPNET
AQUATIC VEGETATION	15	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								
MID-DEPTH	0.15	20.75	6.7	6.0	563			0.3C
BOTTOM								

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

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: ☒ IRON

WEATHER CONDITIONS/NOTES: Water Levels appear Higher than when Site was Reconned

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

SAMPLING TEAM: Parrish O'Connor

SIGNATURE: [signature] DATE: 1/10/05

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: 20030586	DATE (MM/DD/YY): 01/10/05	RECEIVING BODY OF WATER:
REMARKS:	COUNTY: Flagler	LOCATION: UN NAMED Ditch 10-110 m below Bunnell WWTP POD	FIELD ID/NAME: TEST SITE

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components Substrate Diversity 5	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 10	Max. observed at typical transect: > 0.25 m/sec. But < 1 m/sec 20 19 18 17 16	Max. observed at typical transect: 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed at typical transect: 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed at typical transect: <0.05 m/sec; or spate occuring: > 1 m/sec 5 4 3 2 1
Habitat Smothering 8 Primary Score 33	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 3	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 4	Stable. No evidence of erosion or bank failure. Little potential for future problems. 10 9	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 8 7 6	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 5 4	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing 3 2 1
Riparian Buffer Zone Width Right Bank 1 Left Bank 4	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 1 Left Bank 4 Secondary Score 21	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

54 **TOTAL SCORE**

ANALYSIS DATE: 1/10/05	ANALYST: O'Connor	SIGNATURE:

Appendix 8a

Taxa list and density (number/cm^2) for periphyton collected from glass microscope slides incubated for 28 days upstream and downstream of Bunnell WWTP facility discharge, January 10, 2005.

	Control Site	Test Site
Bacillariophyta		
Achnanthes exigua	-	17,582
Achnanthes minutissima	13,427	8,791
Achnanthes sp.	56,043	663,724
Aulacoseira granulata	584	-
Bacillariophyceae	1,168	4,396
Brachysira sp.	584	-
Brachysira vitrea	12,259	-
Capartogramma crucicula	584	17,582
Cocconeis sp.	-	4,396
Cymbella minuta	1,168	-
Cymbellaceae	1,168	-
Encyonema neomesianum	584	-
Eunotia sp.	25,103	48,351
Fragilariaceae	584	-
Gomphonema affine	-	4,396
Gomphonema augur	-	8,791
Gomphonema gracile	584	-
Gomphonema parvulum	8,757	8,791
Gomphonema sp.	8,757	17,582
Hippodonta sp.	584	-
Navicula cryptocephala	1,168	-
Navicula minima	-	35,164
Navicula sp.	3,503	35,164
Nitzschia frustulum	-	8,791
Nitzschia nana	584	-
Nitzschia palea	584	-
Nitzschia sp.	7,005	39,560
Pinnularia sp.	1,168	-
Sellaphora pupula	584	-
Stauroneis sp.	-	4,396
Surirella minuta	584	-
Chlorophycota		
Ankistrodesmus falcatus	-	4,396
Characium sp.	-	8,791
Chlamydomonas sp.	1,751	-
Chlorella sp.	4,086	57,142
Chlorococcum sp.	1,751	70,328
Microspora sp.	1,751	-
Oedogonium sp.	5,838	13,187
Protococcus sp.	-	48,351
Stigeoclonium sp.	5,838	79,119
Cyanophycota		
Anabaena sp.	1,168	-
Chroococcus minutus	584	13,187
Jaaginema sp.	1,751	13,187
Oscillatoria limosa	584	-
Pseudanabaena sp.	1,168	21,978
Schizothrix calcicola	1,751	-
Synechocystis sp.	584	70,328
Euglenophycota		
Trachelomonas sp.	1,751	-
Xanthophyta		
Ophiocytium arbuscula	584	-

Appendix 8b

Taxa list and number of individuals counted for periphyton collected from glass microscope slides incubated for 28 days upstream and downstream of Bunnell WWTP discharge, January 10, 2005.

	Control Site	Test Site
Bacillariophyta		
Achnanthes exigua	-	4
Achnanthes minutissima	23	2
Achnanthes sp.	96	151
Aulacoseira granulata	1	-
Bacillariophyceae	2	1
Brachysira sp.	1	-
Brachysira vitrea	21	-
Capartogramma crucicula	1	4
Cocconeis sp.	-	1
Cymbella minuta	2	-
Cymbellaceae	2	-
Encyonema neomesianum	1	-
Eunotia sp.	43	11
Fragilariaceae	1	-
Gomphonema affine	-	1
Gomphonema augur	-	2
Gomphonema gracile	1	-
Gomphonema parvulum	15	2
Gomphonema sp.	15	4
Hippodonta sp.	1	-
Navicula cryptocephala	2	-
Navicula minima	-	8
Navicula sp.	6	8
Nitzschia frustulum	-	2
Nitzschia nana	1	-
Nitzschia palea	1	-
Nitzschia sp.	12	9
Pinnularia sp.	2	-
Sellaphora pupula	1	-
Stauroneis sp.	-	1
Surirella minuta	1	-
Chlorophycota		
Ankistrodesmus falcatus	-	1
Characium sp.	-	2
Chlamydomonas sp.	3	-
Chlorella sp.	7	13
Chlorococcum sp.	3	16
Microspora sp.	3	-
Oedogonium sp.	10	3
Protococcus sp.	-	11
Stigeoclonium sp.	10	18
Cyanophycota		
Anabaena sp.	2	-
Chroococcus minutus	1	3
Jaaginema sp.	3	3
Oscillatoria limosa	1	-
Pseudanabaena sp.	2	5
Schizothrix calcicola	3	-
Synechocystis sp.	1	16
Euglenophycota		
Trachelomonas sp.	3	-
Xanthophyta		
Ophiocytium arbuscula	1	-

Appendix 9a

Benthic macroinvertebrates collapsed taxa list and density (average number of individuals/m^2 rounded to the nearest individual, n = 3 samples) from Hester-Dendy artificial substrates incubated for 28 days upstream and downstream of the Bunnell WWTP and collected January 10, 2005. See SOP LT 7100 sect. 4.2.1 for method on collapsing taxa.

	Control Site	Test Site
Annelida		
Hirudinea		
Rhynchobdellida		
Desserobdella phalera	8	8
Helobdella triserialis	-	13
Oligochaeta		
Haplotaxida		
Haber speciosus	3	-
Arthropoda		
Crustacea		
Amphipoda		
Hyalella azteca	-	5
Insecta		
Coleoptera		
Hydroporus sp.	3	-
Diptera		
Ablabesmyia mallochi	6	-
Ablabesmyia rhamphe grp. sp.	3	3
Chironomus sp.	402	253
Cryptochironomus sp.	3	-
Dicrotendipes modestus	-	14
Dicrotendipes simpsoni	36	47
Goeldichironomus holoprasinus	105	81
Kiefferulus sp.	19	22
Monopelopia sp.	3	-
Paratanytarsus sp.	215	91
Polypedilum illinoense grp. sp.	26	14
Polypedilum tritum	46	17
Tanytarsus sp. G Epler	3	-
Ephemeroptera		
Caenis sp.	11	8
Odonata		
Ischnura sp.	-	3
Pachydiplax longipennis	-	3
Mollusca		
Gastropoda		
Basommatophora		
Ancylidae .	-	24
Mesogastropoda		
Hydrobiidae	-	29

Appendix 9b

Benthic macroinvertebrates taxa list and counts (number of individuals counted) collected from Hester-Dendy artificial substrates (n= 3 samples) incubated upstream and downstream of the Bunnell WWTP for 28 days and collected January 10, 2005.

	Control Site	Test Site
Annelida		
Hirudinea		
Rhynchobdellida		
Desserobdella phalera	3	3
Helobdella sp.	-	1
Helobdella triserialis	-	4
Oligochaeta		
Haplotaxida		
Haber speciosus	1	-
Arthropoda		
Crustacea		
Amphipoda		
Hyalella azteca	-	2
Insecta		
Coleoptera		
Hydroporus sp.	1	-
Diptera		
Ablabesmyia mallochi	2	-
Ablabesmyia rhamphe grp.	1	1
Chironomidae	13	10
Chironomus sp.	146	91
Cryptochironomus sp.	1	-
Dicrotendipes sp.	1	-
Dicrotendipes modestus	-	5
Dicrotendipes simpsoni	12	17
Goeldichironomus holoprasinus	38	29
Kiefferulus sp.	7	8
Monopelopia sp.	1	-
Paratanytarsus sp.	78	33
Polypedilum sp.	1	-
Polypedilum illinoense grp.	9	5
Polypedilum tritum	16	6
Tanytarsus sp. G Epler	1	-
Ephemeroptera		
Caenis sp.	4	3
Odonata		
Ischnura sp.	-	1
Pachydiplax longipennis	-	1
Mollusca		
Gastropoda		
Basommatophora		
Ancylidae	-	9
Mesogastropoda		
Hydrobiidae	-	11

Appendix 10a

Qualitative benthic macroinvertebrate collapsed taxa list and number of individuals counted from 20-discrete-dipnet sweeps upstream and downstream of Bunnell WWTP discharge, January 10, 2005. See SOP LT 7100 sect. 4.2.1 for method on collapsing taxa.

	Control Site	Test Site
Annelida		
Hirudinea		
Arhynchobdellida		
Mooreobdella sp.	-	2
Oligochaeta		
Haplotaxida		
Aulodrilus pigueti	4	-
Limnodrilus hoffmeisteri	12	11
Arthropoda		
Crustacea		
Amphipoda		
Hyalella azteca	14	15
Decapoda		
Cambaridae	-	1
Insecta		
Coleoptera		
Chrysomelidae	2	-
Peltodytes sp.	1	-
Collembola		
Undetermined	2	-
Diptera		
Chironomus sp.	1	-
Dasyhelea sp.	3	3
Dicrotendipes modestus	1	-
Dicrotendipes simpsoni	1	-
Goeldichironomus holoprasinus	3	-
Labrundinia becki	-	1
Megistocera sp.	-	5
Monopelopia sp.	-	1
Monopelopia boliekae	3	-
Odontomyia sp.	-	1
Palpomyia/bezzia grp. sp.	3	-
Parachironomus sp.	1	-
Paratanytarsus sp.	8	7
Polypedilum illinoense grp. sp.	15	11
Polypedilum tritum	-	4
Tanytarsus sp. F Epler	1	-
Ephemeroptera		
Caenis sp.	8	-
Lepidoptera		
Undetermined	-	2
Odonata		
Argia sp.	1	-
Enallagma sp.	7	-
Libellulidae	1	2
Telebasis byersi	-	1
Mollusca		
Bivalvia		
Veneroida		
Sphaeriidae	-	21
Gastropoda		
Basommatophora		
Ancylidae	-	3

Appendix 10a (con't)

Qualitative benthic macroinvertebrate collapsed taxa list and number of individuals counted from 20-discrete-dipnet sweeps upstream and downstream of Bunnell WWTP discharge, January 10, 2005. See SOP LT 7100 sect. 4.2.1 for method on collapsing taxa.

	Control Site	Test Site
Hebetancylus excentricus	4	-
Micromenetus sp.	-	2
Physidae	1	-
Planorbidae	2	-
Pseudosuccinea columella	-	1
Mesogastropoda		
Amnicola sp.	-	7
Viviparus georgianus	1	4

Appendix 10b

Qualitative benthic macroinvertebrate taxa list and number of individuals counted from 20-discrete-dipnet sweeps upstream and downstream of Bunnell WWTP discharge, January 10, 2005.

	Control Site	Test Site
Annelida		
Hirudinea		
Arhynchobdellida		
Undetermined.	-	1
Mooreobdella sp.	-	1
Oligochaeta		
Haplotaxida		
Aulodrilus pigueti	1	-
Limnodrilus hoffmeisteri	3	3
Tubificidae	12	8
Arthropoda		
Crustacea		
Amphipoda		
Undetermined	-	1
Hyalella azteca	14	14
Decapoda		
Cambaridae	-	1
Insecta		
Coleoptera		
Chrysomelidae	2	-
Peltodytes sp.	1	-
Collembola		
Undetermined	2	-
Diptera		
Ceratopogonidae	2	1
Chironomidae	3	2
Chironomus sp.	1	-
Dasyhelea sp.	2	2
Dicrotendipes modestus	1	-
Dicrotendipes simpsoni	1	-
Goeldichironomus holoprasinus	3	-
Labrundinia becki	-	1
Megistocera sp.	-	5
Monopelopia sp.	-	1
Monopelopia boliekae	3	-
Odontomyia sp.	-	1
Palpomyia/bezzia grp. sp.	2	-
Parachironomus sp.	1	-
Paratanytarsus sp.	7	6
Polypedilum illinoense grp. sp.	13	10
Polypedilum tritum	-	4
Tanytarsus sp. F Epler	1	-
Ephemeroptera		
Caenis sp.	8	-
Lepidoptera		
Undetermined	-	2
Odonata		
Argia sp.	1	-
Coenagrionidae	2	-
Enallagma sp.	5	-
Libellulidae	1	2
Telebasis byersi	-	1

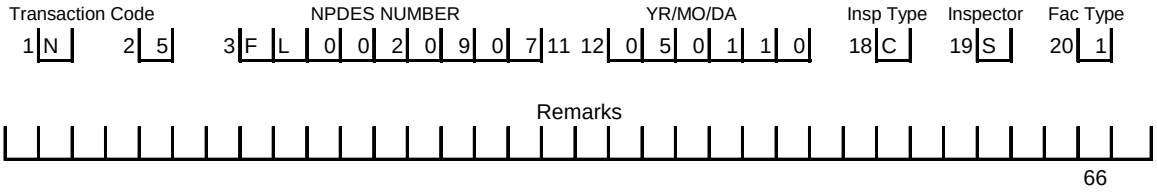
Appendix 10b (con't)

Qualitative benthic macroinvertebrate taxa list and number of individuals counted from 20-discrete-dipnet sweeps upstream and downstream of Bunnell WWTP discharge, January 10, 2005.

	Control Site	Test Site
Mollusca		
Bivalvia		
Bivalvia		
Undetermined	-	5
Veneroida		
Sphaeriidae	-	16
Gastropoda		
Basommatophora		
Ancylidae	-	3
Hebetancylus excentricus	4	-
Micromenetus sp.	-	2
Physidae	1	-
Planorbidae	2	-
Pseudosuccinea columella	-	1
Mesogastropoda		
Amnicola sp.	-	7
Viviparus georgianus	1	4

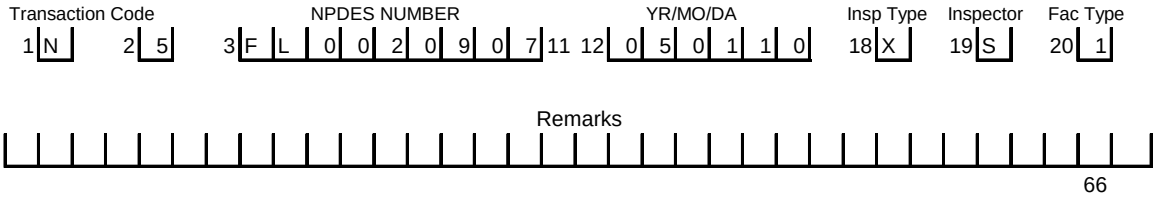
The Bioassay of the Bunnell WWTP effluent sampled on January 10, 2005, NPDES #FL0020907.

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



The Priority Pollutants Analysis for Bioassay of the Bunnell WWTP effluent sampled on January 10, 2005, NPDES #FL0020907.

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



Biological Analyses of the xx WWTP effluent sampled on Bunnell WWTP effluent sampled on January 10, 2005, NPDES #FL0020907.

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

