Biological Assessment of

# City of Winter Haven #3 Wastewater Treatment Plant

Polk County

NPDES #FL0036048

Sampled November 16, 2009

March 2010

**Biology Section**

**Bureau of Laboratories**

**Division of Environmental Assessment and Restoration**

Quality Manual No. 870346G
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**EPA End Sheet**

## Fifth Year Inspection Summary

The Fifth Year Inspection of Winter Haven #3 WWTP conducted November 16, 2009 produced the following notable results.

The No Observed Effect Concentration (NOEC) for the fish, *Pimephales promelas*, during the chronic definitive bioassay was less than 100% effluent. This is an exceedance of permit limits and Class III Freshwater Quality Criterion (62-302.530(61) F.A.C.).

Due to low flow at the Control Site (0.02 m/s) and no detectable flow at the Test Site, potential effects of the effluent with regard to water chemistry cannot be assessed since it cannot be established that the flow of effluent is reaching the Test Site. Total nitrogen and total phosphorus in the effluent composite sample were within permit limits.

Effluent metals were all within permit limits and Class III Freshwater Quality Criteria. Lead at both the Control and Test Sites (1.65 and 1.59 µg/L, respectively) exceeded Class III Freshwater Quality Criterion (62-302.530(39) F.A.C. Iron at the Test Site (1020 µg/L) exceeded Class III Freshwater Quality Criterion (62-302.530(38) F.A.C.).

Both the Control and Test Sites scored low on all categories of the habitat assessment. The Control Site had very low flow (0.02 m/s), and the Test Site had no detectable flow. Consequently, both sites scored low (Category 3) on the Stream Condition Index as is expected with low flow and lack of habitat for macroinvertebrate colonization. Normally, SCI sampling would not be conducted under these flow conditions because flow and habitat loss alone have such a negative impact on the condition of a macroinvertebrate community; but since the Control and Test Sites were in similar condition with respect to habitat and flow, they were sampled in order to see if any negative impact from the facility could be detected. Hester-Dendy samplers at the Test Site were buried by shifting sand and since no comparison could be made with the Control Site, no analysis was performed.

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

## Introduction

The City of Winter Haven #3 Wastewater Treatment Plant is a Domestic Wastewater Treatment plant. The effluent is collected in a holding pond and pumped to an open ditch lined with cement mat. The ditch meanders through a wetland area for approximately 2.5 miles (personal communication, Pete Wenner, FDEP Southwest District) and then discharges into an unnamed tributary of the Peace Creek Drainage Canal, a Class III Freshwater (see map Appendix A). The design flow of the wastewater system is 7.5 million gallons per day (MGD). The annual average flow for November, 2008 to October, 2009 was 3.710 MGD. The plant discharges via a metering flume, and the flow measured during this survey was 3.590 MGD (FDEP Southwest District). The facility is permitted for a 0.7 MGD land application system, but the system had no discharge for the 12 months prior to this survey.

See the Facility Summary (Appendix B) for a description of the facility, summary of permit limits, and administrative order (AO) and discharge monitoring report (DMR) information. The facility is operating under an Administrative Order that was executed on 7/13/05 for more frequent monitoring of copper and zinc.

## Methods

The purpose of this investigation was to determine the discharge's effects on the biota of the receiving waters. Chemical and biological comparisons were made between a Control Site (located in the Peace Creek Drainage Canal approximately 200 meters south of the confluence of the effluent and the canal) and a Test Site (located in the Peace Creek Drainage Canal just north of the confluence of the effluent ditch and the canal). The Control Site was located at a greater distance from the discharge in order to avoid any negative effects of the bridge at State Road 60 south of the effluent ditch and floating boundaries located north and south of the bridge that are designed to keep livestock from getting under the bridge. These are the approximate sites that the facility uses for ambient monitoring. Effluent samples for the toxicity tests were taken as composite samples from monitoring location EFD-01, after chlorine disinfection and dechlorination. Effluent samples for TSS, nutrients, and metals were taken as composite and grab samples. Effluent samples for all other analyses were taken as grab samples.

All field and laboratory biological methods followed Bureau of Laboratories and Biology Section Standard Operating Procedures (see http://www.floridadep.org/labs/sop/index.htm for details) and met DEP quality assurance/quality control standards (see http://www.floridadep.org/labs/qa/index.htm). Explanations of specific methods and measurements can be found in Appendix C.

The following were involved in this investigation: Pete Wenner, Jason Cohen, Joe Squitieri, and Peggy Morgan (DEP Southwest District) and DEP Central Laboratory in Tallahassee. The report was reviewed by District representatives and the Point Source Studies Review Committee (Michael Tanski and Nancy Ross).

## Results and Discussion

Organic Constituents (See Table 1 and Appendix E)

- No organic constituents were detected in the effluent.

Metals (See Table 2 and Appendix E)

- Effluent copper, nickel, and zinc were detected in both the grab and composite samples at levels that complied with Class III Freshwater Quality Criteria (62-302.530 F.A.C).
- Effluent cadmium, chromium, iron, and lead in both the grab and composite samples and arsenic in the composite sample were present at levels between the minimum detection limit (MDL) and practical quantitation limit (PQL) and within the water quality criteria. Aluminum was also detected between the MDL and PQL, but there is no freshwater quality criterion for aluminum.

- Control and Test Site lead (1.65 and 1.59 µg/L, respectively) exceeded Class III Freshwater Quality Criterion (62-302.530(39) F.A.C.). Test Site iron (1020 µg/L) exceeded Class III Freshwater Quality Criterion (62-302.530(38) F.A.C).
- Control and Test Site arsenic, chromium, and copper and Control Site iron were detected at levels that complied with Class III Freshwater Quality Criteria. Control and Test Site aluminum was elevated, but there is no freshwater quality criterion for aluminum.
- Control and Test Site nickel and selenium were present at levels between the MDL and PQL and within the water quality criteria.

Toxicity Whole Effluent Test (See Table 1 and Appendices F and G)

- The effluent sample NOEC for the fish, *Pimephales promelas,* during the chronic definitive bioassay was less than 100%, an exceedance of the permit limit and Class III Freshwater Quality Criterion (62-302.530(61) F.A.C.).
- The effluent sample NOEC for the water flea, *Ceriodaphnia dubia,* during the chronic definitive bioassay was 100%; and therefore complied with effluent permit limits and Class III Freshwater Quality Criterion.

Physical and Chemical Parameters (See Table 1 and Appendices D, E and H)

- The Habitat Assessment scores at both the Control and Test Sites (36 and 33, respectively) were very low and placed both sites in the Poor category. Both sites scored in the lowest category on 6 to 7 of the 8 parameters of the habitat assessment.
- Dissolved oxygen (mg/L), pH (Standard Units), specific conductance (µmhos/cm), and temperature (°C) of the effluent measured during this inspection complied with Class III Freshwater Quality Criteria (62-302.530 F.A.C.) and effluent permit limits.
- Dissolved oxygen, pH, and specific conductance at both the Control and Test Sites complied with Class III Freshwater Quality Criteria. Temperature at the Control Site was higher than that of the Test Site, which is probably due to differences in shading. The Control Site was open, and the Test Site was lightly shaded.
- Chlorophyll *a* content estimates algal biomass, and high algal biomass implies nutrient stress (Stevenson and Bahls, 1999). Chlorophyll *a* was undetected in the effluent but was elevated at both the Control and Test Sites (33 and 44 µg/L, respectively).
- Total suspended solids (mg/L) and Carbonaceous Biological Oxygen Demand (CBOD; mg/L) of the effluent complied with permit limits.

Microbiology (See Table 1 and Appendix E)

- Fecal coliforms were detected in the effluent at a low level which complied with Class III Freshwater Quality Criterion (62-302.530(6) F.A.C) and permit limits.

Nutrients (See Table 1 and Appendix E)

- Effluent nutrient levels in both the grab and composite samples were in compliance with the permit limit.
- Nutrient levels at the Control and Test Sites cannot be compared to the effluent or to each other since neither site had sufficient flow to indicate that they were influencing each other or receiving water from the effluent.

Algal Growth Potential (See Table 3 and Appendix E)

- Algal growth potential (AGP) is a measure of nutrients available for algal growth (Miller *et al*. 1978). Raschke and Shultz (1987) found that AGP values above 5.0 mg dry weight/L represent a “problem” threshold for fresh receiving waters, implying nutrient enrichment. The AGP value of the effluent was well above the problem threshold (171.0 mg dry wt/L).

- AGP values of the Control and Test Sites were also above the threshold at 10.7 and 11.3 mg dry wt/L, respectively. The analytical chemistry suggests that the Control and Test Sites are nitrogen limited and the effluent is likely co-limited.

**Bioassessment**

Periphyton (See Table 4 and Appendices I-1 and I-2)

- Periphyton communities at both the Control and Test Sites consisted mostly of diatoms. The dominant taxon at both sites was the diatom, *Achnanthes exiguum*.

Macroinvertebrates (See Table 5 and Appendices J-1, J-2)

- Quantitative macroinvertebrate data from Hester-Dendys at the Test Site was lost due to sand smothering of the samplers during incubation. Although Hester-Dendys were recovered from the Control Site, the samples were not analyzed since there was no Test Site data for comparison.
- Qualitative macroinvertebrate data from dipnet samples indicated that the macroinvertebrate community is similar at both the Control and Test Sites. The samples were dominated by the amphipod, *Hyalella azteca*. Both sites scored very low (Category 3) on the SCI, which is to be expected with low or no flow and lack of habitat. Normally, SCI sampling would not be conducted under these flow conditions because flow and habitat loss alone have such a negative impact on the condition of a macroinvertebrate community; but since the Control and Test Sites were in similar condition with respect to habitat and flow, they were sampled in order to see if any negative impact from the facility could be detected.

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

| Winter Haven #3 | Class III Criteria | Effluent Limits | Effluent - Composite Sample | Effluent - Grab Sample | Control Site | Test Site |
|---|---|---|---|---|---|---|
| **Organic Constituents (µg/L)** | | | | | | |
| None Detected | - | | | None Detected | | |
| **Nutrients (mg/L)** | | | | | | |
| Ortho-phosphate | - | | - | 0.14 | 0.053 | 0.045 |
| Total Phosphorus | - | ≤ 2.0 p | 0.18 | 0.21 | 0.2 | 0.19 |
| Total Ammonia | - | ≤ 7.5 mp | 0.068 | 0.058 | 0.024 | 0.056 |
| Un-ionized Ammonia | ≤ 0.02 s | ≤ 0.02 s | ≤ 0.02 c | ≤ 0.02 c | ≤ 0.02 c | ≤ 0.02 c |
| Organic Carbon | - | - | 6.4 | 6.3 | - | - |
| Nitrate and Nitrite | - | | 1.2 | 2.7 | 0.026 | 0.06 |
| Total Kjeldahl Nitrogen | - | | 0.84 | 0.82 | 1.7 | 1.8 |
| Organic Nitrogen | - | | 0.772 c | 0.762 c | 1.676 c | 1.744 c |
| Total Nitrogen | - | ≤ 6.0 p | 2.04 c | 3.52 c | 1.726 c | 1.86 c |
| **General Physical and Chemical Parameters** | | | | | | |
| Habitat Assessment | - | | - | - | 36 | 33 |
| Dissolved Oxygen (mg/L) | ≥ 5.0 | | - | 8.3 | 10.7 | 8.0 |
| pH (SU) | 6.0 - 8.5 | 6.0 - 8.5 | - | 7.4 | 7.7 | 7.5 |
| Conductivity (µmhos/cm) | ≤ 1,275 | | - | 764 | 158 | 210 |
| Temperature (°C) | - | | - | 26.7 | 21.1 | 18.9 |
| Sample Depth (m) | - | | - | 0.2 | 0.2 | 0.2 |
| Total Residual Chlorine (mg/L) | ≤ 0.01 | | - | ≤ 0.01 | - | - |
| Chlorophyll *a* (µg/L) - Corrected | - | | - | 0.55 U | 33 | 44 |
| Phaeophytin (µg/L) | - | | - | 0.4 U | 6.8 | 7.5 |
| Total Suspended Solids (mg/L) | - | ≤ 60.0 p | 4 U | 4 U | 18 | 22 |
| Color (pt-Co) | - | | - | 15 A | 200 | 200 |
| CBOD, 5 day (mg/L), N - inhibited | - | ≤ 10.0 mp | - | 1.9 I | 2.4 | 2.2 |
| Chloride (mg/L) | - | | - | 110 | 22 | 22 |
| Cyanide (µg/L) | ≤ 5.2 | | - | - | - | - |
| Fluoride (mg/L) | ≤ 10.0 | | - | 0.57 | 0.1 | 0.098 I |
| Sulfate (mg/L) | - | | - | 66 | 19 | 19 |
| Flow (MGD) | - | 7.5 | - | 3.59 | - | - |
| Hardness (mg $CaCO_3$) | - | | 136.91 c | 136.91 c | 38.99 c | 42.12 c |
| **Toxicity (Chronic screen - NOEC - % Effluent)** | | | | | | |
| Bioassay - Water flea *(Ceriodaphnia dubia)* | - | 100 | 100 | - | - | - |
| Bioassay - Fish *(Pimephales promelas)* | - | 100 | **< 100** | - | - | - |
| **Microbiology (Number of colony forming units/100ml)** | | | | | | |
| Fecal Coliforms @ | ≤ 400s # | ≤ 400s # | - | 5 B | - | - |

Value exceeds the Class III Water Quality Criteria or permit limits

c - Value is calculated
m - monthly average
p - 24-hour flow proportioned composite
s - Single sample
A - Value reported is the mean of two or more determinations
B - Results based on colony counts outside the acceptance range
I - The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit
K - Actual value is known to be less than value given
U - Material analyzed for but not detected; value reported is the method detection limit
NOEC - A no observed effect concentration less than 100% effluent will constitute a violation of this permit
@ - Fecal coliform analysis performed by Advanced Environmental Laboratories - Tampa, Florida
# - If 10 or fewer samples are taken within a month, the single sample limit is 400 CFU (62-302.530(6), F.A.C.)

**Table 2. Effluent limits, Class III Freshwater Criteria and metals data. Class III Criteria based on hardness are presented individually for each site based on hardness at that site.**

| Winter Haven #3 | Effluent - Class III Criteria | Effluent - Composite Sample | Effluent - Grab Sample | Control Site Class III Criteria | Control Site | Test Site Class III Criteria | Test Site |
|---|---|---|---|---|---|---|---|
| **Metals (µg/L unless otherwise noted)** | | | | | | | |
| Aluminum | - | 190 I | 200 I | - | 970 | - | 1440 |
| Arsenic | ≤ 50 | 0.26 I | 0.25 U | ≤ 50 | 1.44 | ≤ 50 | 1.39 |
| Cadmium | ≤ 0.34 b | 0.055 I | 0.064 I | ≤ 0.13 b | 0.03 U | ≤ 0.14 b | 0.03 U |
| Calcium (mg/L) | - | 41.9 | 42 | - | 7.65 | - | 8.39 |
| Chromium-III | ≤ 111.47 b | 0.35 I | 0.41 I | ≤ 39.85 b | 1.7 | ≤ 42.45 b | 1.7 |
| Copper | ≤ 12.20 b | 2.57 | 2.76 | ≤ 4.17 b | 1.98 | ≤ 4.46 b | 1.89 |
| Iron | ≤ 1,000 | 50 I | 53 I | ≤ 1,000 | 980 | ≤ 1,000 | **1020** |
| Lead | ≤ 4.75 b | 0.44 I | 0.37 I | ≤ 0.96 b | **1.65** | ≤ 1.06 b | **1.59** |
| Magnesium (mg/L) | - | 7.84 | 7.78 | - | 4.83 | - | 5.14 |
| Mercury | ≤ 0.012 | - | - | ≤ 0.012 | - | ≤ 0.012 | - |
| Nickel | ≤ 68.04 b | 1.57 | 1.48 | ≤ 23.51 b | 0.83 I | ≤ 25.10 b | 0.79 I |
| Selenium | ≤ 5.0 | 0.2 U | 0.2 U | ≤ 5.0 | 0.6 I | ≤ 5.0 | 0.46 I |
| Silver | ≤ 0.07 | 0.025 U | 0.025 U | ≤ 0.07 | 0.025 U | ≤ 0.07 | 0.025 U |
| Zinc | ≤ 156.36 b | 79 | 75 | ≤ 53.94 b | 5 U | ≤ 57.59 b | 5 U |

See Table 1 for calculated hardness.

Value exceeds the Class III Water Quality Criteria or permit limits

b - Value is calculated based on hardness

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

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

**Table 3. Measured and predicted algal growth potential (AGP; mg dry weight/L) for total soluble inorganic nitrogen (TSIN), orthophosphate (OP), total nitrogen (TN) and total phosphorus (TP) limitation of the freshwater species *Pseudokirchneriella subcapitata* and ratios of nitrogen to phosphorus.**

| Winter Haven #3 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Location | 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 | 171.0 | 104.8 ± 21.0 | 60.2 ± 12.0 | 133.8 ± 26.8 | 90.3 ± 18.1 | 19.7 | 16.8 |
| Control Site | 10.7 A | 1.9 ± 0.4 | | 65.6 ± 13.1 | | 0.9 | 8.6 |
| Test Site | 11.3 | 4.4 ± 0.9 | | 70.7 ± 14.1 | | 2.6 | 9.8 |

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

**Table 4. Periphyton Composition - Qualitative.**

| Winter Haven #3 | Control Site | Test Site |
|---|---|---|
| Number of Wet Taxa | 21 | 16 |
| Number of Wet Algal Units Identified | 302 | 301 |
| Percent Dominant Wet Taxon | 69.9 | 92.4 |
| Dominant Wet Taxon Name | Bacillariophyta (Diatoms) | Bacillariophyta (Diatoms) |
| Number of Diatom Taxa | 53 | 50 |
| Number of Diatom Algal Units Identified | 500 | 500 |
| Percent Dominant Diatom Taxon | 21.2 | 30.2 |
| Dominant Diatom Taxon Name | *Achnanthidium exiguum* | *Achnanthidium exiguum* |
| **Percentage Composition for Wet Algae** | | |
| Blue-green algae | 5.3 | 1.3 |
| Green algae | 23.5 | 5.3 |
| Diatoms | 69.9 | 92.4 |
| Euglenophytes | 1.3 | 1.0 |

**Table 5. Macroinvertebrate Dipnet Samples - Qualitative.**

| Winter Haven #3 | Control Site | | Test Site | |
|---|---|---|---|---|
| **Summary Statistics** | | | | |
| Stream Condition Index 2007 (value) | 28 A | | 34 A | |
| Stream Condition Index 2007 (category) * | Category 3 | | Category 3 | |
| **Stream Condition Index Metrics** | Rep 1 | Rep 2 | Rep 1 | Rep 2 |
| Number of Total Taxa | 28 | 34 | 38 | 31 |
| Number of Ephemeroptera Taxa | 1 | 2 | 3 | 2 |
| Number of Trichoptera Taxa | 1 | 1 | 1 | 2 |
| Number of Clinger Taxa | 0 | 0 | 1 | 2 |
| Number of Long-lived Taxa | 1 | 1 | 1 | 1 |
| Number of Sensitive Taxa | 0 | 0 | 0 | 0 |
| Percent of Dominant Taxon | 43.5 | 41.2 | 34.0 | 37.8 |
| Percent Suspension Feeders and Filterers | 4.8 | 2.6 | 6.1 | 2.9 |
| Percent of Tanytarsini Individuals | 5.5 | 2.0 | 2.7 | 0.6 |
| Percent of Very Tolerant Individuals | 9.0 | 10.5 | 15.7 | 11.5 |
| Total Number of Individuals | 145 | 153 | 147 | 156 |
| **Community Composition: Percent of total** | | | | |
| Dominant Taxon Name | *Hyalella azteca* (Amphipoda) | *Hyalella azteca* (Amphipoda) | *Hyalella azteca* (Amphipoda) | *Hyalella azteca* (Amphipoda) |
| Amphipoda | 43.5 | 41.2 | 34.0 | 37.8 |
| Bivalvia | 2.1 | 1.3 | 1.4 | 0.0 |
| Coleoptera | 3.5 | 2.0 | 3.4 | 5.8 |
| Decapoda | 2.1 | 3.3 | 1.4 | 3.2 |
| Diptera | 14.5 | 13.1 | 21.1 | 12.2 |
| Ephemeroptera | 13.8 | 13.1 | 14.3 | 23.1 |
| Gastropoda | 4.1 | 11.1 | 9.5 | 4.5 |
| Odonata | 5.5 | 9.8 | 2.7 | 5.8 |
| Oligochaeta | 2.1 | 1.3 | 5.4 | 1.3 |
| Trichoptera | 1.4 | 1.3 | 2.7 | 3.9 |
| Other | 7.58 | 2.61 | 4.09 | 2.55 |
| **Functional Feeding Groups: Percent of total** | | | | |
| Browser-Grazers | 1.0 | 1.6 | 0.7 | 1.6 |
| Burrowing Deposit Feeders | 2.1 | 1.3 | 5.4 | 1.3 |
| Piercers | 0.3 | 0.3 | 0.0 | 0.3 |
| Predators | 12.4 | 14.1 | 9.2 | 9.3 |
| Scavengers | 1.0 | 1.6 | 0.7 | 1.6 |
| Scrapers | 11.7 | 18.0 | 16.3 | 16.4 |
| Shredders | 28.3 | 24.8 | 23.5 | 25.6 |
| Surface Deposit Feeders | 38.3 | 35.6 | 35.0 | 37.8 |
| Suspension Feeders | 4.8 | 2.6 | 6.1 | 2.9 |
| Unknown | 0.0 | 0.0 | 2.7 | 3.2 |

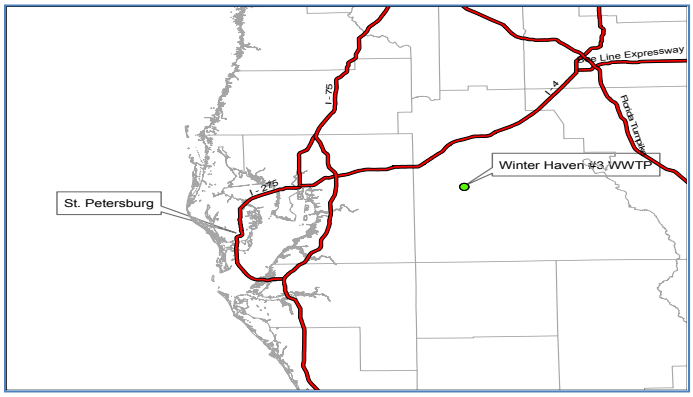
A - Value reported is the mean of two determinations

* SCI_2007 categories from Table LT 7200-2 of DEP-SOP-002/01 as referenced in Quality Assurance Rule (62-160 F.A.C.), December 3, 2008: Values 0 ≤ 34 are Category 3; Values 35 < 67 are Category 2; Values 68 ≤ 100 are Category 1

## Appendix A

## Map of Facility



## Appendix B

## Facility Summary

**State of Florida**
**Department of Environmental Protection**
**Facility Introduction & Summary**

| **PART I: Information gathered prior to sampling event** | |
|---|---|
| **Prepared By:** Pete Wenner<br>Peter.Wenner@dep.state.fl.us | **Contact Number:**<br>813-632-7600 x442 |
| **Facility Name (as it appears on permit):**<br>Winter Haven WWTP #3 | **Former Names:** |
| **NPDES Permit Number:**<br>FL0036048 | **Permit Expiration Date:**<br>July 12, 2010 |
| **Physical Address:**<br>4400 Pollard Drive, Winter Haven, FL 33880 | |
| **District:** Southwest | **County:**<br>Polk |
| **Function of Facility:** Domestic Waste Water Treatment Plant | |
| **Facility Type:**<br>Major | **Permitted Capacity (MGD):**<br>7.5 MGD |
| **Mean Flow for previous 12 months for all EXTERNAL outfalls listed in permit (list date range including months):** Outfall D-001: 3.65 MGD | |
| **If applicable, Mean Flow for previous 12 months for REUSE outfall(s) (list date range including months):**<br>Outfall R-001: 0 MGD | |
| **Description of type of Discharge:**<br>☒ **Continuous** ☐ **Intermittent** ☐ **Seasonal** ☐ **Rainfall Dependent** ☐ **Other, please specify** | |

**Description of Sampling Location(s) - actual permit designation of permitted sampling point(s):**

| Monitoring Location | Description of Monitoring Location |
|---|---|
| EFA-01 | Effluent after disinfection prior to R-001. |
| EFF-01 | At the discharge to the receiving stream D-001. |
| FLW-02 | At the flume prior to the unnamed tributary |

**Description of Permitted Outfall(s):**

**EFFLUENT DISPOSAL: Surface Water Discharge:** A 7.5 MGD Annual Average Daily Flow (AADF) 150-acre overland flow treatment system. The overland flow system is located at latitude 27° 56' 36" N, longitude 81° 42' 02" W. For this discharge (D-001), effluent is collected in an open ditch lined with a cement mat and discharged through a metering flume into an unnamed tributary of the Peace Creek Drainage Canal and ultimately to the Peace River. The outfall is located approximately at latitude 27° 56' 04" N, longitude 81° 41' 38" W.

**REUSE: Land Application:** An existing 0.7 MGD annual average daily flow (AADF) permitted capacity slow-rate restricted public access land application system (R-001) consisting of the 86-acre on-site irrigation spray field. Land application system R-001 is located approximately at latitude 27° 56' 30" N, longitude 81° 43' 00" W. Wet weather storage is not required with the existence of the surface water discharge component.

**Description of Treatment Process (if multiple discharge points, include a detailed map or diagram of facility):**

**TREATMENT FACILITIES:** An existing 7.5* MGD Annual Average Daily Flow (AADF) Type I activated sludge domestic wastewater treatment plant consisting of: two mechanical bar screens, one aerated grit chamber of 60,318 gallons, three aeration basins with a total volume of 4.746 million gallons (aeration basin No. 2 has one anoxic basin of 340,000 gallons partitioned off from the rest of the basin and aeration basin No. 3 has one anoxic basin of 340,000 gallons partitioned off from the rest of the basin for a total anoxic volume of 680,000 gallons), three clarifier basins with a total volume of 1.41 million gallons with a total surface area of 15,239 SF, and two chlorine contact chambers with a total volume of 167,800 gallons. Disinfected effluent is routed to a 30-acre on-site polishing pond prior to land application and discharge. This facility is operated to achieve advanced secondary treatment with basic disinfection. An on-site spray field and an overland flow treatment system to a surface water discharge are permitted as provided by Chapter 62-610, FAC for effluent reuse and disposal. Effluent from the overland flow system ultimately discharges to an unnamed tributary of the Peace River.

Residuals are processed in two digester tanks with a combined volume of 1.582 million gallons. A sludge thickener with a total volume of 79,309 gallons is used for sludge concentration and increased digester space. One digester is aerobic and one is anaerobic with internal recycling. A belt-press is used to dewater sludge before land application. This facility accepts residuals from the Winter Haven #2 WWTP for stabilization (if needed) and land application.

* This facility is re-rated based on existing tankage and available treatment capacity in the plant. The re-rating is contingent on the permittee adding a new dewatering facility consisting of disk thickeners and two new belt filter presses, and modifying the weir height on the chlorine contact chamber in accordance with the completion schedule (see condition VI).

## PART I: Continued

**List current Effluent Limits of Outfall(s) to be Sampled: This should include any AO or CO limits the facility may be under**
**(Leave cell blank if not applicable)**

FACILITY: City of Winter Haven #3 WWTP PERMIT NUMBER: FL0036048
PERMITTEE: City of Winter Haven

### I. INTERIM – RECLAIMED WATER AND EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

A. Surface Water Discharge

1. During the period beginning on the issuance date and lasting for a period of twelve months, the permittee is authorized to discharge effluent from Outfall D-001 to an unnamed tributary to the Peace Creek Drainage Canal to Peace the Peace River. Such discharge shall be limited and monitored by the permittee as specified below for this twelve month period:

| | | | Effluent Limitations | | | | Monitoring Requirements | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Units | Max/Min | Annual Average | Monthly Average | Weekly Average | Single Sample | Monitoring Frequency | Sample Type | Monitoring Location Site Number | Notes |
| Flow (post re-rating) | MGD | Maximum | 7.5 | Report | - | - | Continuous | Recording flow meters and totalizers | FLW-02 | See Cond.I.A.3&5 |
| Temperature | °C | Report | - | Report | Report | - | 5 Days/Week | Grab | EFF-01 | See Cond.I.A.10 |
| BOD, Carbonaceous 5 day, 20C | MG/L | Maximum | See Permit Condition I.A.11. | | | | 5 Days/Week | 24-hour FPC | EFF-01 | |
| Solids, Total Suspended | MG/L | Maximum | 20.0 | 30.0 | 45.0 | 60.0 | 5 Days/Week | 24-hour FPC | EFF-01 | |
| pH | SU | Range | - | - | - | 6.0 to 8.5 | Continuous | Meter | EFF-01 | See Cond.I.A.4 |
| Coliform, Fecal | #/100ML | Maximum | See Permit Condition I.A.6. | | | | 5 Days/Week | Grab | EFA-01 | |
| Total Residual Chlorine (For Disinfection) | MG/L | Minimum | - | - | - | 0.5 | Continuous | Meter | EFA-01 | See Cond.I.A.4,7 |
| Total Residual Chlorine (For Dechlorination) | MG/L | Maximum | - | - | - | 0.01 | 5 Days/Week | Grab | EFF-01 | |
| Un-ionized Ammonia (as N) | MG/L | Maximum | - | - | - | 0.02 | 5 Days/Week | Calculated | EFF-01 | See Cond.I.A.10. |
| Total Ammonia Nitrogen (as N) | MG/L | Maximum | See Permit Condition I.A.11. | | | | 5 Days/Week | 24-hour FPC | EFF-01 | |
| Total Ammonia Nitrogen (as N) | MG/L | Maximum | - | - | - | - | 5 Days/Week | Grab | EFF-01 | See Cond.I.A.10. |
| Total Nitrogen | MG/L | Maximum | - | - | - | Report | 5 Days/Week | 24-hour FPC | EFF-01 | |
| Dissolved Oxygen | MG/L | Minimum | - | - | - | 5.0 | 5 Days/Week | Grab | EFF-01 | |
| Phosphorus, Total | MG/L | Maximum | - | - | - | Report | 5 Days/Week | 24-hour FPC | EFF-01 | |
| Ortho-phosphate | MG/L | Report | - | - | - | Report | 5 Days/Week | Grab | EFF-01 | |

**I. INTERIM – RECLAIMED WATER AND EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS – Continued**

A. Surface Water Discharge – Continued

| | | | Effluent Limitations | | | | Monitoring Requirements | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Units | Max/Min | Annual Average | Monthly Average | Weekly Average | Single Sample | Monitoring Frequency | Sample Type | Monitoring Location Site Number | Notes |
| Copper, Total Recoverable | UG/L | Maximum | - | - | - | Report | Every two months | Grab | EFF-01 | See Cond.I.A.8. |
| Zinc, Total Recoverable | UG/L | Report | - | - | - | Report | Every two months | Grab | EFF-01 | See Cond.I.A.9. |
| Hardness | MG/L | Report | - | - | - | Report | Every two months | Grab | EFF-01 | See Cond.I.A.8. & 9 |
| Total Kjeldahl Nitrogen | MG/L | Report | - | - | - | Report | 5 Days/Week | Grab | EFF-01 | |
| Nitrite ($NO2_2$) | MG/L | Report | - | - | - | Report | 5 Days/Week | Grab | EFF-01 | |
| Nitrate ($N0_3$) | MG/L | Report | - | - | - | Report | 5 Days/Week | Grab | EFF-01 | |
| Whole Effluent Toxicity | See Permit Condition I.A.13 | | | | | | | | EFF-01 | |

## I. FINAL – RECLAIMED WATER AND EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

A. Surface Water Discharge – Continued

1. During the period beginning twelve months after the issuance date and lasting through the expiration date of this permit, the permittee is authorized to discharge effluent from Outfall D-001 to an unnamed tributary to the Peace Creek Drainage Canal to the Peace River. Such discharge shall be limited and monitored by the permittee as specified below:

| | | | Effluent Limitations | | | | Monitoring Requirements | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Units | Max/Min | Annual Average | Monthly Average | Weekly Average | Single Sample | Monitoring Frequency | Sample Type | Monitoring Location Site Number | Notes |
| Flow (post re-rating) | MGD | Maximum | 7.5 | Report | - | - | Continuous | Recording flow meters and totalizers | FLW-02 | See Cond.I.A.3&5 |
| Temperature | °C | Report | - | Report | Report | - | 5 Days/Week | Grab | EFF-01 | See Cond.I.A.10 |
| BOD, Carbonaceous 5 day, 20C | MG/L | Maximum | See Permit Condition I.A.11. | | | | 5 Days/Week | 24-hour FPC | EFF-01 | |
| Solids, Total Suspended | MG/L | Maximum | 20.0 | 30.0 | 45.0 | 60.0 | 5 Days/Week | 24-hour FPC | EFF-01 | |
| pH | SU | Range | - | - | - | 6.0 to 8.5 | Continuous | Meter | EFF-01 | See Cond.I.A.4 |
| Coliform, Fecal | #/100ML | Maximum | See Permit Condition I.A.6. | | | | 5 Days/Week | Grab | EFA-01 | |
| Total Residual Chlorine (For Disinfection) | MG/L | Minimum | - | - | - | 0.5 | Continuous | Meter | EFA-01 | See Cond.I.A.4,7 |
| Total Residual Chlorine (For Dechlorination) | MG/L | Maximum | - | - | - | 0.01 | 5 Days/Week | Grab | EFF-01 | |
| Un-ionized Ammonia (as N) | MG/L | Maximum | - | - | - | 0.02 | 5 Days/Week | Calculated | EFF-01 | See Cond.I.A.10. |
| Total Ammonia Nitrogen (as N) | MG/L | Maximum | See Permit Condition I.A.11. | | | | 5 Days/Week | 24-hour FPC | EFF-01 | |
| Total Ammonia Nitrogen (as N) | MG/L | Maximum | - | - | - | - | 5 Days/Week | Grab | EFF-01 | See Cond.I.A.10. |
| Total Nitrogen | MG/L | Maximum | 3.0 | 3.75 | 4.5 | 6.0 | 5 Days/Week | 24-hour FPC | EFF-01 | |
| Dissolved Oxygen | MG/L | Minimum | - | - | - | 5.0 | 7 Days/Week | Grab | EFF-01 | |
| Phosphorus, Total | MG/L | Maximum | 1.0 | 1.25 | 1.5 | 2.0 | 5 Days/Week | 24-hour FPC | EFF-01 | |
| Ortho-phosphate | MG/L | Report | - | - | - | Report | 5 Days/Week | Grab | EFF-01 | |

**II. FINAL – RECLAIMED WATER AND EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS – Continued**

A. Surface Water Discharge – Continued

1. During the period beginning twelve months after the issuance date and lasting through the expiration date of this permit, the permittee is authorized to discharge effluent from Outfall D-001 to an unnamed tributary to the Peace Creek Drainage Canal to Peace Creek. For the parameters identified included the limits in this table will apply tweve months after the issue date of this permit. Such discharge shall be limited and monitored by the permittee as specified below:

| | | | Effluent Limitations | | | | Monitoring Requirements | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Units | Max/Min | Annual Average | Monthly Average | Weekly Average | Single Sample | Monitoring Frequency | Sample Type | Monitoring Location Site Number | Notes |
| Copper, Total Recoverable | UG/L | Maximum | - | - | - | Footnote[1] | Every two months | Grab | EFF-01 | See Cond.I.A.8. |
| Zinc, Total Recoverable | UG/L | Report | - | - | - | Footnote[2] | Every two months | Grab | EFF-01 | See Cond.I.A.9. |
| Hardness | MG/L | Report | - | - | - | Report | Every two months | Grab | EFF-01 | See Cond.I.A.8. & 9 |
| Total Kjeldahl Nitrogen | MG/L | Report | - | - | - | Report | 5 Days/Week | Grab | EFF-01 | |
| Nitrite ($NO2_3$) | MG/L | Report | - | - | - | Report | 5 Days/Week | Grab | EFF-01 | |
| Nitrate ($NO_3$) | MG/L | Report | - | - | - | Report | 5 Days/Week | Grab | EFF-01 | |
| Whole Effluent Toxicity | See Permit Condition .A.13 | | | | | | | | EFF-01 | |

1 The Class III – Fresh Water calculated limit for Copper is: less than or equal to $e^{(0.8545[\ln h]-1.702)}$
2 The Class III – Fresh Water calculated limit for Zinc is: less than or equal to $e^{(0.8473[\ln H]+0.884)}$

## PART I: Continued

| **Receiving Waters:** Concrete mattress lined on-site ditch to unnamed ditch to Peace River Discharge Canal and ultimately to the Peace River. | **Classification (indicate whether fresh or marine):** Class III Fresh |
|---|---|

**Toxicity Test Requirements (routine and/or additional test language, test species, salinity adjustment, etc.):**

13. Chronic Whole Effluent Toxicity Testing : The permittee shall comply with the following whole effluent toxicity testing requirements and initiate the series of tests described below within six months following permit issuance, unless otherwise directed by the Department in writing, to evaluate chronic whole effluent toxicity of the discharge from outfall D-001 into the Peace Creek Drainage Canal. If there is no discharge from outfall D-001 during this test period, a bioassay will not be required; a value of NODI = 9 should be reported on the DMR.

    a. Effluent Limitation

    1. A No Observed Effect Concentration (NOEC) of greater than or equal to 100% effluent in any routine test or any additional test shall constitute compliance with these permit conditions and Rule 62-302.530(62), F.A.C.

    2. A NOEC of less than 100% effluent in any routine test or additional test shall constitute non-compliance with these permit conditions and Rule 62-302.530(62), F.A.C. The permittee shall notify the Department via telephone or e-mail within 24 hours of notification that a routine or additional test failed.

    b. Monitoring Frequency

    The "routine" toxicity tests specified shall be conducted once every six months.

**Administrative or Consent Orders (date executed, specific requirements, interim limit dates-if applicable, etc.):**

**Facility Mixing Zone Details (if applicable):** N/A

**List Permit Violations (DMR data) and plant upsets that occurred at the plant within the last year:**

| Date | Parameter and Units | Limit | Result |
|---|---|---|---|
| | | | |

**Describe previous FYI and WQBEL study:** Refer to attached 2004 FYI Report

**Describe previous or current Enforcement Actions (including WLs):**
Administrative Order No. AO-099-SW; See attached AO.

**Describe any violations or problems noted in previous inspection:**

**Discuss whether DMR trends within previous five years are improving or declining:**

## PART II: Sampling Event Information

| | |
|---|---|
| **Date(s) sample collected:**<br>**Composite Start (11/15/09)**<br>**Composite End (11/16/09)** | **Sampler(s):**<br>**Pete Wenner**<br>**Jason Cohen** |
| **Temperature (Deg C):**<br>**26.68** | **pH (SU):**<br>**7.41** |
| **Dissolved Oxygen (mg/L):**<br>**8.32** | **Conductivity (umhos/cm):**<br>**764** |
| **Total Residual Chlorine (mg/L):**<br>**0.7** | **Total Residual Chlorine - after Disinfection (mg/L):** |
| **Method of Chlorination:bleach** | **Method of De-chlorination:sodium bisulfate** |

**Flow During Sample Collection for each outfall(MGD):**

**D-001: 3.590 MGD**

**Mean Flow for each outfall for previous 12 months based on sampling date (If samples are taken on more than one day, indicate Mean Flow for each day):**

**D-001: 3.710 MGD**

**Describe Discharge during Sampling Event:**
**☒ Continuous ☐ Intermittent ☐ Seasonal ☐ Rainfall Dependent ☐ Other, please specify**

**Describe any conditions, difficulties or abnormal events that occurred during the sample collection and any other additional comments here:**

**HD at test site was buried under silt upon arrival. No benthic samples collected.**

# Appendix C

## 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. The results from these analyses were compared with Water Quality Criteria (62-302 F.A.C.) and facility permit limits. Exceedances of Water Quality Criteria may constitute violations of specific provisions of Chapter 62-302 (F.A.C.) and/ or facility permit limits.

### (3) Toxicity Bioassays

Greater than 50% mortality in an acute toxicity test may constitute an exceedence of 62-302.500(1)a and/or a violation of facility permit limits. An inhibition concentration greater than 25% in a chronic test may constitute exceedences of 62-302.530(20), 62-302.530(61) and/or a violation of facility permit limits. Standard reference toxicant (SRT) tests are conducted monthly to ensure quality in toxicity testing.

### (4) Bacteriological Testing

High levels of fecal coliform bacteria may constitute an exceedence of 62-302.530(6) and/or a violation of 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 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 exceedences of 62-302.530(46) F.A.C., 62-302.530(47)(a) F.A.C. and/or 62-302.530(47)(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 constitute an exceedence of 62-302.530(61) F.A.C.

**(7) Algal Phytoplankton and Periphyton Assemblages**

Qualitative periphyton are sampled by taking subsamples of algae from natural substrates throughout the sample reach. Phytoplankton were sampled from the water column using a 1 L grab sample. Periphyton were subsampled and identified to the lowest practical level, usually species. Wet taxa and diatoms are identified separately. In the wet taxa analysis, soft algae are identified to the lowest practical level, and diatoms are identified only to order level (diatom). In the diatom analysis, diatoms are identified to the lowest practical level.

**Chlorophyll *a* Content:** Chlorophyll *a* content is an estimate of algal biomass . High algal biomass implies nutrient stress (Stevenson and Bahls 1999) and may be constitute exceedences of 62-302.530(46) F.A.C., 62-302.530(47)(a) F.A.C. and/or 62-302.530(47)(b) F.A.C..

**Algal Density**: Algal density is estimated as number of natural units/ml for phytoplankton 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 exceedences of 62-302.530(46) F.A.C., 62-302.530(47)(a) F.A.C., 62-302.530(47)(b) F.A.C. and/or 62-302.530(61) F.A.C.

**(8) Benthic Macroinvertebrate Assemblages**

Benthic macroinvertebrates were collected using two methods. Quantitative samples were collected from Hester-Dendy multi-plate samplers incubated for 28 days. 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.

**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 exceedences of 62-302.530(46) F.A.C., 62-302.530(47)(a) F.A.C., 62-302.530(47)(b) F.A.C. and/or 62-302.530(61) 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 exceedences of 62-302.530(46) F.A.C., 62-302.530(47)(a) F.A.C. and/or 62-302.530(47)(b) 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 (Fore et. al. 2007, Karr and Chu 1998). Shifts in community composition related to a facility's effluent may constitute exceedences of 62-302.530(46) F.A.C., 62-302.530(47)(a) F.A.C., 62-302.530(47)(b) F.A.C. and/or 62-302.530(61) 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 and shredders (Fore et. al. 2007). Changes in the proportions of functional feeding groups related to a facility's effluent may constitute exceedences of 62-302.530(46) F.A.C., 62-302.530(47)(a) F.A.C., 62-302.530(47)(b) F.A.C. and/or 62-302.530(61) 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 constitute exceedences of 62-302.530(10) F.A.C..

**The Stream Condition Index (SCI)**: The SCI is a composite macroinvertebrate metric developed for Florida (Fore et. al. 2007). This Index was revised in 2007 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 according to in which bioregion (Panhandle, Northeast, or Peninsula) the sampling location exists -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. As human disturbance increases, it is expected that taxa richness, the number of Ephemeroptera taxa, Trichoptera taxa, sensitive taxa, clinger taxa, long-lived taxa, and the percent contribution of Tanytarsini and suspension and filter feeders will decrease while percent contribution of dominant taxon, and percent contribution of very tolerant taxa will increase.

Scores are broken into three categories (1, 2, and 3). Sites in Category 1 are described as having higher diversity than Category 2 sites, particularly for Ephemeroptera and Trichoptera. A Category 1 site may have several more clinger and sensitive taxa, a higher proportion of Tanytarsini, and a lower percent of a dominant taxon than a site in Category 2. The site will also have a very small percentage of very tolerant individuals, if any.

Sites in Category 2 are described as having an average of 30 species with several different taxa of Ephemeroptera and Trichoptera. A Category 2 site also has several different long-lived taxa and, on average, 5 clinger and 6 sensitive taxa. There is a slight increase in dominance by a single taxon relative to sites in Category 1. Very tolerant taxa represent a small percentage of individuals but are noticeably increased as compared to sites in Category 1.

Sites in Category 3 are described as having a notable loss in taxonomic diversity, and Ephemeroptera, Trichoptera, long-lived, clinger and sensitive taxa are uncommon or rare. Filter feeders are reduced by at least 50%. The site is dominated by a tolerant taxon, and very tolerant individuals represent a large proportion of the individuals collected.

SCI 2007 categories are from Table LT 7200-2 of DEP-SOP-002/01 as referenced in Draft Quality Assurance Rule (62-160 F.A.C.), December 3, 2008. 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 in Category 3, if it is shown to be related to a facility's effluent, may constitute exceedences of 62-302.530(46) F.A.C., 62-302.530(47)(a) F.A.C., 62-302.530(47)(b) F.A.C. and/or a violation of 62-302.530(61).

# Florida Department of Environmental Protection

## Central Laboratory Sample Submittal Form

Event ID *

**Request Number: RQ-2009-11-16-31**
Winter Haven #3 (Wahneta)

Requester: Jennifer Paris
Field Report Prepared By:

**Customer: SW-DIST**
Collected By: P. Wenner, J. Cohen, J. Squitieri, P Morgan
Send Final Report To Tom Gucciardo

**Project ID: FYI5**
Sampling Agency: FDEP SWD

**PMAS: 1143**

| Lab ID * | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Location D-001 | 38206 | | | ☑ Comp ☑ Grab | Collection (begin) Date 11/16/09 Time 920 (Eastern) Central | Collection (end) Date 11/16/09 Time 920 (Eastern) Central | | Bottle Group(s)** A |
| | Field ID | | | | Tot Res Chlorine (mg/L) <0.01 | Diss Oxygen (mg/L) 8.32 | Storet Station Number | | |
| | Matrix (Include type e.g. Salt, Fresh, etc) FRESH water | Temp (C) 26.68 | pH 7.41 | | Sample Depth ☑ m ☐ ft 0.2 | 0.37 / 764 | ☑ Salinity (PPTh) ☑ Sp Conductance (umho/cm) | NPDES Number | |
| | Latitude 27 ° 57 ' 04.1 " | Longitude 81 ° 42 ' 31.7 " | | | Comments COLLECTION TIME/DATE ABOVE = COMP SAMPLES GRAB DATE: 11/16/09 TIME: 9:55 (E) | | | | |
| Lab ID * | Location BLANKS | 38207 | | | ☐ Comp ☑ Grab | Collection (begin) Date 11/16/09 Time 1010 (Eastern) Central | Collection (end) Date Time Eastern Central | | Bottle Group(s)** D |
| | Field ID | | | | Tot Res Chlorine (mg/L) | Diss Oxygen (mg/L) | Storet Station Number | | |
| | Matrix (Include type e.g. Salt, Fresh, etc) LAB DI | Temp (C) | pH | | Sample Depth ☐ m ☐ ft | | ☐ Salinity (PPTh) ☐ Sp Conductance (umho/cm) | NPDES Number | |
| | Latitude ° ' " | Longitude ° ' " | | | Comments | | | | |
| Lab ID * | Location SCI TEST SITE | 38209 | | | ☐ Comp ☑ Grab | Collection (begin) Date 11/16/09 Time 1155 (Eastern) Central | Collection (end) Date Time Eastern Central | | Bottle Group(s)** B, C |
| | Field ID | | | | Tot Res Chlorine (mg/L) | Diss Oxygen (mg/L) 8.01 | Storet Station Number | | |
| | Matrix (Include type e.g. Salt, Fresh, etc) FRESH BIOLOGY | Temp (C) 18.7 | pH 7.46 | | Sample Depth ☑ m ☐ ft 0.2 | 0.10 / 210 | ☐ Salinity (PPTh) ☐ Sp Conductance (umho/cm) | NPDES Number | |
| | Latitude 27 ° 54 ' 48.9 " | Longitude 81 ° 41 ' 52.7 " | | | Comments | | | | |
| Lab ID * | Location SCI CONTROL SITE | 38208 | | | ☐ Comp ☑ Grab | Collection (begin) Date 11/16/09 Time 1110 (Eastern) Central | Collection (end) Date Time Eastern Central | | Bottle Group(s)** B, C |
| | Field ID | | | | Tot Res Chlorine (mg/L) | Diss Oxygen (mg/L) 10.70 | Storet Station Number | | |
| | Matrix (Include type e.g. Salt, Fresh, etc) FRESH BIOLOGY | Temp (C) 21.11 | pH 7.66 | | Sample Depth ☑ m ☐ ft 0.2 | 0.07 / 158 | ☑ Salinity (PPTh) ☑ Sp Conductance (umho/cm) | NPDES Number | |
| | Latitude 27 ° 54 ' 43.3 " | Longitude 81 ° 41 ' 46.9 " | | | Comments 2 Blanks Rec'd in tray by SD, 11/17/09 10:12 | | | | |

| Relinquished By: | Date/Time | Shipping Method: | Received By: | Date/Time | Relinquished By: | Date/Time | Received By: | Date/Time |
|---|---|---|---|---|---|---|---|---|
| | | | ABB | 11-17-09 09:35 | | | | |

* Shaded Areas for Lab use only.

** Please see reverse side for Bottle Group information.

last revised October 1, 2003

## Appendix E

## Chemical analysis of effluent and receiving water

| Date_Sampled | UDL | SCH_Group | Component | Result | | Units | MDL | PQL | |
|---|---|---|---|---|---|---|---|---|---|
| 11/16/2009 9:20 | Effluent | Toxicology | Bioassay-Chronic-Scrn-FW-Fish, NOEC | 100 | K | NOEC | | | |
| 11/16/2009 9:20 | Effluent | Toxicology | Bioassay-Chronic-Scrn-FW-C.dubia, NOEC | 100 | | NOEC | | | |
| 11/16/2009 9:20 | Effluent | Metals | Nickel | 1.57 | | ug/L | 0.25 | 1 | |
| 11/16/2009 9:20 | Effluent | Metals | Magnesium | 7.84 | | mg/L | 0.04 | 0.16 | |
| 11/16/2009 9:20 | Effluent | Metals | Calcium | 41.9 | | mg/L | 0.075 | 0.3 | |
| 11/16/2009 9:20 | Effluent | Metals | Lead | 0.44 | I | ug/L | 0.2 | 0.8 | |
| 11/16/2009 9:20 | Effluent | Metals | Aluminum | 190 | I | ug/L | 60 | 240 | |
| 11/16/2009 9:20 | Effluent | Metals | Arsenic | 0.26 | I | ug/L | 0.25 | 1 | |
| 11/16/2009 9:20 | Effluent | Metals | Sodium | 120 | | mg/L | 0.5 | 2 | |
| 11/16/2009 9:20 | Effluent | Metals | Silver | 0.025 | U | ug/L | 0.025 | 0.1 | |
| 11/16/2009 9:20 | Effluent | Metals | Cadmium | 0.055 | I | ug/L | 0.03 | 0.12 | |
| 11/16/2009 9:20 | Effluent | Metals | Iron | 50 | I | ug/L | 30 | 120 | |
| 11/16/2009 9:20 | Effluent | Metals | Chromium | 0.35 | I | ug/L | 0.3 | 1.2 | |
| 11/16/2009 9:20 | Effluent | Metals | Copper | 2.57 | | ug/L | 0.5 | 0.5 | |
| 11/16/2009 9:20 | Effluent | Metals | Selenium | 0.2 | U | ug/L | 0.2 | 0.8 | |
| 11/16/2009 9:20 | Effluent | Metals | Zinc | 79 | | ug/L | 5 | 20 | |
| 11/16/2009 9:20 | Effluent | Nutrients | NO2NO3-N | 1.2 | | mg N/L | 0.04 | 0.1 | |
| 11/16/2009 9:20 | Effluent | Nutrients | Total-P | 0.18 | | mg P/L | 0.02 | 0.05 | |
| 11/16/2009 9:20 | Effluent | Nutrients | Organic Carbon | 6.4 | | mg C/L | 1 | 5 | |
| 11/16/2009 9:20 | Effluent | Nutrients | TSS | 4 | U | mg/L | 4 | 16 | |
| 11/16/2009 9:20 | Effluent | Nutrients | Ammonia-N | 0.068 | | mg N/L | 0.01 | 0.02 | |
| 11/16/2009 9:20 | Effluent | Nutrients | Kjeldahl Nitrogen | 0.84 | | mg N/L | 0.08 | 0.2 | |
| 11/16/2009 9:20 | Effluent | Nutrients | pH | 7.41 | | | | | |
| 11/16/2009 9:20 | Effluent | Nutrients | Temperature | 26.68 | | C | | | |
| 11/16/2009 9:20 | Effluent | Nutrients | Sample Depth | 0.2 | | m | | | |
| 11/16/2009 9:20 | Effluent | Nutrients | Dissolved Oxygen | 8.32 | | mg/L | | | |
| 11/16/2009 9:20 | Effluent | Nutrients | Specific Conductance | 764 | | umhos/cm | | | |
| 11/16/2009 9:20 | Effluent | Nutrients | Dissolved Oxygen | 8.32 | | mg/L | | | |
| 11/16/2009 9:20 | Effluent | Nutrients | Temperature | 26.68 | | C | | | |
| 11/16/2009 9:20 | Effluent | Nutrients | Sample Depth | 0.2 | | m | | | |
| 11/16/2009 9:20 | Effluent | Nutrients | Specific Conductance | 764 | | umhos/cm | | | |
| 11/16/2009 9:20 | Effluent | Nutrients | pH | 7.41 | | | | | |
| 11/16/2009 9:55 | Effluent | AGP/LN | Algal Growth Potential | 171 | | mg DryWt/L | 0.3 | 0.9 | |

| Date Sampled | UDL | SCH Group | Component | Result | | Units | MDL | PQL | |
|---|---|---|---|---|---|---|---|---|---|
| 11/16/2009 9:55 | Effluent | Chlorophyll/Grain Size/BOD | Chlorophyll-a, Corrected | 0.55 | U | ug/L | 0.55 | 1.7 | |
| 11/16/2009 9:55 | Effluent | Chlorophyll/Grain Size/BOD | Phaeophytin-a | 0.4 | U | ug/L | 0.4 | 1.2 | |
| 11/16/2009 9:55 | Effluent | Chlorophyll/Grain Size/BOD | Biochemical Oxygen Demand-5 Day,N-Inhib | 1.9 | I | mg/L | 0.2 | 2 | |
| 11/16/2009 9:55 | Effluent | Overflow | Fecal Coliforms-Membrane Filter | 5 | B | #/100 mL | | | |
| 11/16/2009 9:55 | Effluent | Toxicology | Bioassay-Chronic-Scrn-FW-C.dubia, NOEC | | | NOEC | | | |
| 11/16/2009 9:55 | Effluent | Toxicology | Bioassay-Chronic-Scrn-FW-Fish, NOEC | | | NOEC | | | |
| 11/16/2009 9:55 | Effluent | Metals | Arsenic | 0.25 | U | ug/L | 0.25 | 1 | |
| 11/16/2009 9:55 | Effluent | Metals | Selenium | 0.2 | U | ug/L | 0.2 | 0.8 | |
| 11/16/2009 9:55 | Effluent | Metals | Silver | 0.025 | U | ug/L | 0.025 | 0.1 | |
| 11/16/2009 9:55 | Effluent | Metals | Lead | 0.37 | I | ug/L | 0.2 | 0.8 | |
| 11/16/2009 9:55 | Effluent | Metals | Chromium | 0.41 | I | ug/L | 0.3 | 1.2 | |
| 11/16/2009 9:55 | Effluent | Metals | Copper | 2.76 | | ug/L | 0.5 | 0.5 | |
| 11/16/2009 9:55 | Effluent | Metals | Cadmium | 0.064 | I | ug/L | 0.03 | 0.12 | |
| 11/16/2009 9:55 | Effluent | Metals | Nickel | 1.48 | | ug/L | 0.25 | 1 | |
| 11/16/2009 9:55 | Effluent | Metals | Zinc | 75 | | ug/L | 5 | 20 | |
| 11/16/2009 9:55 | Effluent | Metals | Calcium | 42 | | mg/L | 0.075 | 0.3 | |
| 11/16/2009 9:55 | Effluent | Metals | Aluminum | 200 | I | ug/L | 60 | 240 | |
| 11/16/2009 9:55 | Effluent | Metals | Iron | 53 | I | ug/L | 30 | 120 | |
| 11/16/2009 9:55 | Effluent | Metals | Sodium | 117 | | mg/L | 0.5 | 2 | |
| 11/16/2009 9:55 | Effluent | Metals | Magnesium | 7.78 | | mg/L | 0.04 | 0.16 | |
| 11/16/2009 9:55 | Effluent | Nutrients | Kjeldahl Nitrogen | 0.82 | | mg N/L | 0.08 | 0.2 | |
| 11/16/2009 9:55 | Effluent | Nutrients | Total-P | 0.21 | | mg P/L | 0.02 | 0.05 | |
| 11/16/2009 9:55 | Effluent | Nutrients | Chloride | 110 | | mg Cl/L | 0.4 | 1 | |
| 11/16/2009 9:55 | Effluent | Nutrients | O-Phosphate-P | 0.14 | | mg P/L | 0.004 | 0.01 | |
| 11/16/2009 9:55 | Effluent | Nutrients | Sulfate | 66 | | mg SO4/L | 0.4 | 1 | |
| 11/16/2009 9:55 | Effluent | Nutrients | NO2NO3-N | 2.7 | | mg N/L | 0.04 | 0.1 | |
| 11/16/2009 9:55 | Effluent | Nutrients | Ammonia-N | 0.058 | | mg N/L | 0.01 | 0.02 | |
| 11/16/2009 9:55 | Effluent | Nutrients | Alkalinity | 178 | | mg CaCO3/L | | 0.65 | 2.5 |
| 11/16/2009 9:55 | Effluent | Nutrients | Organic Carbon | 6.3 | | mg C/L | 1 | 5 | |
| 11/16/2009 9:55 | Effluent | Nutrients | Fluoride | 0.57 | | mg F/L | 0.05 | 0.1 | |
| 11/16/2009 9:55 | Effluent | Nutrients | TSS | 4 | U | mg/L | 4 | 16 | |
| 11/16/2009 9:55 | Effluent | Nutrients | Color (true) | 15 | A | PCU | 5 | 5 | |
| 11/16/2009 9:55 | Effluent | Pesticides | Metribuzin | 0.1 | U | ug/L | 0.1 | 0.4 | |
| 11/16/2009 9:55 | Effluent | Pesticides | Simazine | 0.05 | U | ug/L | 0.05 | 0.2 | |
| 11/16/2009 9:55 | Effluent | Pesticides | DDT-p,p' | 0.03 | U | ug/L | 0.03 | 0.12 | |
| 11/16/2009 9:55 | Effluent | Pesticides | Dieldrin | 0.02 | U | ug/L | 0.02 | 0.08 | |

| Date Sampled | UDL | SCH Group | Component | Result | | Units | MDL | PQL |
|---|---|---|---|---|---|---|---|---|
| 11/16/2009 9:55 | Effluent | Pesticides | Endrin Aldehyde | 0.02 | U | ug/L | 0.02 | 0.08 |
| 11/16/2009 9:55 | Effluent | Pesticides | Bromacil | 0.2 | UJ | ug/L | 0.2 | 0.8 |
| 11/16/2009 9:55 | Effluent | Pesticides | Metalaxyl | 0.25 | U | ug/L | 0.25 | 1 |
| 11/16/2009 9:55 | Effluent | Pesticides | Beta-BHC | 0.01 | U | ug/L | 0.01 | 0.04 |
| 11/16/2009 9:55 | Effluent | Pesticides | Endosulfan I | 0.02 | U | ug/L | 0.02 | 0.08 |
| 11/16/2009 9:55 | Effluent | Pesticides | Endosulfan II | 0.02 | U | ug/L | 0.02 | 0.08 |
| 11/16/2009 9:55 | Effluent | Pesticides | Heptachlor | 0.01 | U | ug/L | 0.01 | 0.04 |
| 11/16/2009 9:55 | Effluent | Pesticides | Methoxychlor | 0.05 | U | ug/L | 0.05 | 0.2 |
| 11/16/2009 9:55 | Effluent | Pesticides | Alachlor | 0.6 | UJ | ug/L | 0.6 | 2.4 |
| 11/16/2009 9:55 | Effluent | Pesticides | Chlorpyrifos Methyl | 0.1 | U | ug/L | 0.1 | 0.4 |
| 11/16/2009 9:55 | Effluent | Pesticides | Fenamiphos | 0.2 | U | ug/L | 0.2 | 0.8 |
| 11/16/2009 9:55 | Effluent | Pesticides | Fonofos | 0.1 | U | ug/L | 0.1 | 0.4 |
| 11/16/2009 9:55 | Effluent | Pesticides | Prometryn | 0.15 | U | ug/L | 0.15 | 0.6 |
| 11/16/2009 9:55 | Effluent | Pesticides | Delta-BHC | 0.01 | U | ug/L | 0.01 | 0.04 |
| 11/16/2009 9:55 | Effluent | Pesticides | Atrazine | 0.05 | UJ | ug/L | 0.05 | 0.2 |
| 11/16/2009 9:55 | Effluent | Pesticides | Ethion | 0.05 | U | ug/L | 0.05 | 0.2 |
| 11/16/2009 9:55 | Effluent | Pesticides | Metolachlor | 0.5 | UJ | ug/L | 0.5 | 2 |
| 11/16/2009 9:55 | Effluent | Pesticides | Phorate | 0.05 | UJ | ug/L | 0.05 | 0.2 |
| 11/16/2009 9:55 | Effluent | Pesticides | Aldrin | 0.01 | U | ug/L | 0.01 | 0.04 |
| 11/16/2009 9:55 | Effluent | Pesticides | DDD-p,p' | 0.02 | U | ug/L | 0.02 | 0.08 |
| 11/16/2009 9:55 | Effluent | Pesticides | DDE-p,p' | 0.02 | U | ug/L | 0.02 | 0.08 |
| 11/16/2009 9:55 | Effluent | Pesticides | Gamma-BHC | 0.01 | U | ug/L | 0.01 | 0.04 |
| 11/16/2009 9:55 | Effluent | Pesticides | Azinphos Methyl | 0.2 | U | ug/L | 0.2 | 0.8 |
| 11/16/2009 9:55 | Effluent | Pesticides | Chlorpyrifos Ethyl | 0.05 | U | ug/L | 0.05 | 0.2 |
| 11/16/2009 9:55 | Effluent | Pesticides | Ethoprop | 0.1 | U | ug/L | 0.1 | 0.4 |
| 11/16/2009 9:55 | Effluent | Pesticides | Malathion | 0.15 | U | ug/L | 0.15 | 0.6 |
| 11/16/2009 9:55 | Effluent | Pesticides | Parathion Ethyl | 0.15 | U | ug/L | 0.15 | 0.6 |
| 11/16/2009 9:55 | Effluent | Pesticides | Parathion Methyl | 0.1 | U | ug/L | 0.1 | 0.4 |
| 11/16/2009 9:55 | Effluent | Pesticides | Heptachlor Epoxide | 0.02 | U | ug/L | 0.02 | 0.08 |
| 11/16/2009 9:55 | Effluent | Pesticides | Ametryn | 0.05 | U | ug/L | 0.05 | 0.2 |
| 11/16/2009 9:55 | Effluent | Pesticides | Butylate | 0.2 | UJ | ug/L | 0.2 | 0.8 |
| 11/16/2009 9:55 | Effluent | Pesticides | Diazinon | 0.05 | U | ug/L | 0.05 | 0.2 |
| 11/16/2009 9:55 | Effluent | Pesticides | Mevinphos | 0.2 | U | ug/L | 0.2 | 0.8 |
| 11/16/2009 9:55 | Effluent | Pesticides | Endosulfan Sulfate | 0.02 | U | ug/L | 0.02 | 0.08 |
| 11/16/2009 9:55 | Effluent | Pesticides | Toxaphene | 0.75 | U | ug/L | 0.75 | 3 |
| 11/16/2009 9:55 | Effluent | Pesticides | Hexazinone | 0.1 | U | ug/L | 0.1 | 0.4 |

| Date Sampled | UDL | SCH Group | Component | Result | | Units | MDL | PQL |
|---|---|---|---|---|---|---|---|---|
| 11/16/2009 9:55 | Effluent | Pesticides | Naled | 0.8 | UJ | ug/L | 0.8 | 3.2 |
| 11/16/2009 9:55 | Effluent | Pesticides | Norflurazon | 0.15 | U | ug/L | 0.15 | 0.6 |
| 11/16/2009 9:55 | Effluent | Pesticides | Alpha-BHC | 0.01 | U | ug/L | 0.01 | 0.04 |
| 11/16/2009 9:55 | Effluent | Pesticides | Chlordane | 0.2 | U | ug/L | 0.2 | 0.8 |
| 11/16/2009 9:55 | Effluent | Pesticides | Endrin | 0.05 | U | ug/L | 0.05 | 0.2 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | 4-Bromophenyl phenyl ether | 0.95 | U | ug/L | 0.95 | 3.8 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Acenaphthylene | 0.95 | U | ug/L | 0.95 | 3.8 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Pentachlorophenol | 2.8 | U | ug/L | 2.8 | 11 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Hexachlorobenzene | 0.95 | U | ug/L | 0.95 | 3.8 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Benzo(g,h,i)perylene | 0.95 | U | ug/L | 0.95 | 3.8 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | 2-Nitrophenol | 0.95 | U | ug/L | 0.95 | 3.8 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Phenanthrene | 0.95 | U | ug/L | 0.95 | 3.8 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Fluoranthene | 0.95 | U | ug/L | 0.95 | 3.8 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Dibenzo(a,h)anthracene | 0.95 | U | ug/L | 0.95 | 3.8 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Indeno(1,2,3-cd)pyrene | 0.95 | U | ug/L | 0.95 | 3.8 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Pyrene | 0.95 | U | ug/L | 0.95 | 3.8 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Benzo(b)fluoranthene | 0.95 | U | ug/L | 0.95 | 3.8 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Butyl benzyl phthalate | 4.7 | U | ug/L | 4.7 | 19 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | N-Nitrosodimethylamine | 1.9 | U | ug/L | 1.9 | 7.6 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | 2,4-Dinitrotoluene | 0.95 | U | ug/L | 0.95 | 3.8 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | 4-Chlorophenyl phenyl ether | 1.9 | U | ug/L | 1.9 | 7.6 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Di-n-butyl phthalate | 4.7 | U | ug/L | 4.7 | 19 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Di-n-octyl phthalate | 0.95 | U | ug/L | 0.95 | 3.8 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Dimethyl phthalate | 9.5 | U | ug/L | 9.5 | 38 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Hexachloroethane | 2.8 | U | ug/L | 2.8 | 11 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Nitrobenzene | 1.9 | U | ug/L | 1.9 | 7.6 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | 2,4-Dichlorophenol | 0.95 | U | ug/L | 0.95 | 3.8 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | 4-Nitrophenol | 14 | U | ug/L | 14 | 57 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Acenaphthene | 0.95 | U | ug/L | 0.95 | 3.8 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Benzidine | 95 | U | ug/L | 95 | 380 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Fluorene | 0.95 | U | ug/L | 0.95 | 3.8 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Hexachlorocyclopentadiene | 2.8 | UJ | ug/L | 2.8 | 11 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Isophorone | 0.95 | U | ug/L | 0.95 | 3.8 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | N-Nitrosodi-n-propylamine | 1.9 | U | ug/L | 1.9 | 7.6 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | 3,3'-Dichlorobenzidine | 38 | U | ug/L | 38 | 150 |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Benzo(a)pyrene | 0.95 | U | ug/L | 0.95 | 3.8 |

| Date Sampled | UDL | SCH Group | Component | Result | | Units | MDL | PQL | |
|---|---|---|---|---|---|---|---|---|---|
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Benzo(k)fluoranthene | 0.95 | U | ug/L | 0.95 | 3.8 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Bis(2-chloroethoxy)methane | 0.95 | U | ug/L | 0.95 | 3.8 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Diethyl phthalate | 0.95 | U | ug/L | 0.95 | 3.8 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Hexachlorobutadiene | 2.8 | U | ug/L | 2.8 | 11 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | N-Nitrosodiphenylamine/ Diphenylamine | 2.8 | U | ug/L | 2.8 | 11 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Phenol | 0.95 | U | ug/L | 0.95 | 3.8 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | 2,4-Dinitrophenol | 14 | U | ug/L | 14 | 57 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Anthracene | 0.95 | U | ug/L | 0.95 | 3.8 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Benzo(a)anthracene | 0.95 | U | ug/L | 0.95 | 3.8 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Bis(2-chloroethyl)ether | 0.95 | U | ug/L | 0.95 | 3.8 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Naphthalene | 0.95 | U | ug/L | 0.95 | 3.8 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | 1,2,4-Trichlorobenzene | 0.95 | U | ug/L | 0.95 | 3.8 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | 2,4,6-Trichlorophenol | 0.95 | U | ug/L | 0.95 | 3.8 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | 2,4-Dimethylphenol | 9.5 | U | ug/L | 9.5 | 38 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | 2,6-Dinitrotoluene | 0.95 | U | ug/L | 0.95 | 3.8 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | 2-Chloronaphthalene | 0.95 | U | ug/L | 0.95 | 3.8 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | 2-Chlorophenol | 0.95 | U | ug/L | 0.95 | 3.8 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | 2-Methyl-4,6-dinitrophenol | 2.8 | U | ug/L | 2.8 | 11 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | 4-Chloro-3-methylphenol | 0.95 | U | ug/L | 0.95 | 3.8 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Bis(2-chloroisopropyl)ether | 2.8 | U | ug/L | 2.8 | 11 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Bis(2-ethylhexyl)phthalate | 14 | U | ug/L | 14 | 57 | |
| 11/16/2009 9:55 | Effluent | Priority Organic Pollutants | Chrysene | 0.95 | U | ug/L | 0.95 | 3.8 | |
| 11/16/2009 9:55 | Effluent | Nutrients | pH | 7.41 | | | | | |
| 11/16/2009 9:55 | Effluent | Nutrients | Temperature | 26.68 | | C | | | |
| 11/16/2009 9:55 | Effluent | Nutrients | Dissolved Oxygen | 8.32 | | mg/L | | | |
| 11/16/2009 9:55 | Effluent | Nutrients | Specific Conductance | 764 | | umhos/cm | | | |
| 11/16/2009 9:55 | Effluent | Nutrients | Sample Depth | 0.2 | | m | | | |
| 11/16/2009 11:10 | Control Site | AGP/LN | Algal Growth Potential | 10.7 | A | mg DryWt/L | 0.3 | 0.9 | |
| 11/16/2009 11:10 | Control Site | Chlorophyll/Grain Size/BOD | Phaeophytin-a | 6.8 | | ug/L | 1 | 3 | |
| 11/16/2009 11:10 | Control Site | Chlorophyll/Grain Size/BOD | Chlorophyll-a, Corrected | 33 | | ug/L | 1.4 | 4.2 | |
| 11/16/2009 11:10 | Control Site | Chlorophyll/Grain Size/BOD | Biochemical Oxygen Demand-5 Day,N-Inhib | 2.4 | | mg/L | 0.2 | 2 | |
| 11/16/2009 11:10 | Control Site | Metals | Cadmium | 0.03 | U | ug/L | 0.03 | 0.12 | |
| 11/16/2009 11:10 | Control Site | Metals | Magnesium | 4.83 | | mg/L | 0.04 | 0.16 | |
| 11/16/2009 11:10 | Control Site | Metals | Aluminum | 970 | | ug/L | 60 | 240 | |
| 11/16/2009 11:10 | Control Site | Metals | Calcium | 7.65 | | mg/L | 0.075 | 0.3 | |
| 11/16/2009 11:10 | Control Site | Metals | Lead | 1.65 | | ug/L | 0.2 | 0.8 | |

| Date Sampled | UDL | SCH Group | Component | Result | Units | MDL | PQL | |
|---|---|---|---|---|---|---|---|---|
| 11/16/2009 11:10 | Control Site | Metals | Sodium | 14.3 | mg/L | 0.5 | 2 | |
| 11/16/2009 11:10 | Control Site | Metals | Silver | 0.025 U | ug/L | 0.025 | 0.1 | |
| 11/16/2009 11:10 | Control Site | Metals | Zinc | 5 U | ug/L | 5 | 20 | |
| 11/16/2009 11:10 | Control Site | Metals | Iron | 980 | ug/L | 30 | 120 | |
| 11/16/2009 11:10 | Control Site | Metals | Chromium | 1.7 | ug/L | 0.3 | 1.2 | |
| 11/16/2009 11:10 | Control Site | Metals | Copper | 1.98 | ug/L | 0.5 | 0.5 | |
| 11/16/2009 11:10 | Control Site | Metals | Nickel | 0.83 I | ug/L | 0.25 | 1 | |
| 11/16/2009 11:10 | Control Site | Metals | Arsenic | 1.44 | ug/L | 0.25 | 1 | |
| 11/16/2009 11:10 | Control Site | Metals | Selenium | 0.6 I | ug/L | 0.2 | 0.8 | |
| 11/16/2009 11:10 | Control Site | Nutrients | Color (true) | 200 | PCU | 20 | 20 | |
| 11/16/2009 11:10 | Control Site | Nutrients | NO2NO3-N | 0.026 | mg N/L | 0.004 | 0.01 | |
| 11/16/2009 11:10 | Control Site | Nutrients | Fluoride | 0.1 | mg F/L | 0.05 | 0.1 | |
| 11/16/2009 11:10 | Control Site | Nutrients | Organic Carbon | 20 | mg C/L | 1 | 5 | |
| 11/16/2009 11:10 | Control Site | Nutrients | Ammonia-N | 0.024 | mg N/L | 0.01 | 0.02 | |
| 11/16/2009 11:10 | Control Site | Nutrients | Alkalinity | 22 | mg CaCO3/L | 0.65 | 2.5 | |
| 11/16/2009 11:10 | Control Site | Nutrients | Total-P | 0.2 | mg P/L | 0.02 | 0.05 | |
| 11/16/2009 11:10 | Control Site | Nutrients | Kjeldahl Nitrogen | 1.7 | mg N/L | 0.08 | 0.2 | |
| 11/16/2009 11:10 | Control Site | Nutrients | Chloride | 22 | mg Cl/L | 0.2 | 0.5 | |
| 11/16/2009 11:10 | Control Site | Nutrients | Sulfate | 19 | mg SO4/L | 0.2 | 0.5 | |
| 11/16/2009 11:10 | Control Site | Nutrients | O-Phosphate-P | 0.053 | mg P/L | 0.004 | 0.01 | |
| 11/16/2009 11:10 | Control Site | Nutrients | TSS | 18 | mg/L | 4 | 16 | |
| 11/16/2009 11:10 | Control Site | Nutrients | Sample Depth | 0.2 | m | | | |
| 11/16/2009 11:10 | Control Site | Nutrients | Temperature | 21.11 | C | | | |
| 11/16/2009 11:10 | Control Site | Nutrients | pH | 7.66 | | | | |
| 11/16/2009 11:10 | Control Site | Nutrients | Specific Conductance | 158 | umhos/cm | | | |
| 11/16/2009 11:10 | Control Site | Nutrients | pH | 7.66 | | | | |
| 11/16/2009 11:10 | Control Site | Nutrients | Specific Conductance | 158 | umhos/cm | | | |
| 11/16/2009 11:10 | Control Site | Nutrients | Dissolved Oxygen | 10.7 | mg/L | | | |
| 11/16/2009 11:10 | Control Site | Nutrients | Dissolved Oxygen | 10.7 | mg/L | | | |
| 11/16/2009 11:10 | Control Site | Nutrients | Temperature | 21.11 | C | | | |
| 11/16/2009 11:10 | Control Site | Nutrients | Sample Depth | 0.2 | m | | | |
| 11/16/2009 11:55 | Test Site | AGP/LN | Algal Growth Potential | 11.3 | mg DryWt/L | 0.3 | 0.9 | |
| 11/16/2009 11:55 | Test Site | Chlorophyll/Grain Size/BOD | Biochemical Oxygen Demand-5 Day,N-Inhib | 2.2 | mg/L | 0.2 | 2 | |
| 11/16/2009 11:55 | Test Site | Chlorophyll/Grain Size/BOD | Phaeophytin-a | 7.5 | ug/L | 1 | 3 | |
| 11/16/2009 11:55 | Test Site | Chlorophyll/Grain Size/BOD | Chlorophyll-a, Corrected | 44 | ug/L | 1.4 | 4.2 | |
| 11/16/2009 11:55 | Test Site | Metals | Silver | 0.025 U | ug/L | 0.025 | 0.1 | |

| Date Sampled | UDL | SCH Group | Component | Result | | Units | MDL | PQL | |
|---|---|---|---|---|---|---|---|---|---|
| 11/16/2009 11:55 | Test Site | Metals | Selenium | 0.46 | I | ug/L | 0.2 | 0.8 | |
| 11/16/2009 11:55 | Test Site | Metals | Sodium | 14.3 | | mg/L | 0.5 | 2 | |
| 11/16/2009 11:55 | Test Site | Metals | Nickel | 0.79 | I | ug/L | 0.25 | 1 | |
| 11/16/2009 11:55 | Test Site | Metals | Cadmium | 0.03 | U | ug/L | 0.03 | 0.12 | |
| 11/16/2009 11:55 | Test Site | Metals | Zinc | 5 | U | ug/L | 5 | 20 | |
| 11/16/2009 11:55 | Test Site | Metals | Aluminum | 1.44E+03 | | | ug/L | 60 | 240 |
| 11/16/2009 11:55 | Test Site | Metals | Arsenic | 1.39 | | ug/L | 0.25 | 1 | |
| 11/16/2009 11:55 | Test Site | Metals | Iron | 1.02E+03 | | | ug/L | 30 | 120 |
| 11/16/2009 11:55 | Test Site | Metals | Calcium | 8.39 | | mg/L | 0.075 | 0.3 | |
| 11/16/2009 11:55 | Test Site | Metals | Lead | 1.59 | | ug/L | 0.2 | 0.8 | |
| 11/16/2009 11:55 | Test Site | Metals | Copper | 1.89 | | ug/L | 0.5 | 0.5 | |
| 11/16/2009 11:55 | Test Site | Metals | Chromium | 1.7 | | ug/L | 0.3 | 1.2 | |
| 11/16/2009 11:55 | Test Site | Metals | Magnesium | 5.14 | | mg/L | 0.04 | 0.16 | |
| 11/16/2009 11:55 | Test Site | Nutrients | Kjeldahl Nitrogen | 1.8 | | mg N/L | 0.08 | 0.2 | |
| 11/16/2009 11:55 | Test Site | Nutrients | Color (true) | 200 | | PCU | 20 | 20 | |
| 11/16/2009 11:55 | Test Site | Nutrients | O-Phosphate-P | 0.045 | | mg P/L | 0.004 | 0.01 | |
| 11/16/2009 11:55 | Test Site | Nutrients | Ammonia-N | 0.056 | | mg N/L | 0.01 | 0.02 | |
| 11/16/2009 11:55 | Test Site | Nutrients | Organic Carbon | 20 | | mg C/L | 1 | 5 | |
| 11/16/2009 11:55 | Test Site | Nutrients | Fluoride | 0.098 | I | mg F/L | 0.05 | 0.1 | |
| 11/16/2009 11:55 | Test Site | Nutrients | TSS | 22 | | mg/L | 4 | 16 | |
| 11/16/2009 11:55 | Test Site | Nutrients | Sulfate | 19 | | mg SO4/L | 0.2 | 0.5 | |
| 11/16/2009 11:55 | Test Site | Nutrients | Total-P | 0.19 | | mg P/L | 0.02 | 0.05 | |
| 11/16/2009 11:55 | Test Site | Nutrients | NO2NO3-N | 0.06 | | mg N/L | 0.004 | 0.01 | |
| 11/16/2009 11:55 | Test Site | Nutrients | Alkalinity | 25 | | mg CaCO3/L | | 0.65 | 2.5 |
| 11/16/2009 11:55 | Test Site | Nutrients | Chloride | 22 | | mg Cl/L | 0.2 | 0.5 | |
| 11/16/2009 11:55 | Test Site | Nutrients | pH | 7.46 | | | | | |
| 11/16/2009 11:55 | Test Site | Nutrients | Dissolved Oxygen | 8.01 | | mg/L | | | |
| 11/16/2009 11:55 | Test Site | Nutrients | Specific Conductance | 210 | | umhos/cm | | | |
| 11/16/2009 11:55 | Test Site | Nutrients | Temperature | 18.9 | | C | | | |
| 11/16/2009 11:55 | Test Site | Nutrients | Sample Depth | 0.2 | | m | | | |
| 11/16/2009 11:55 | Test Site | Nutrients | Specific Conductance | 210 | | umhos/cm | | | |
| 11/16/2009 11:55 | Test Site | Nutrients | Temperature | 18.9 | | C | | | |
| 11/16/2009 11:55 | Test Site | Nutrients | Dissolved Oxygen | 8.01 | | mg/L | | | |
| 11/16/2009 11:55 | Test Site | Nutrients | pH | 7.46 | | | | | |
| 11/16/2009 11:55 | Test Site | Nutrients | Sample Depth | 0.2 | | m | | | |

## Appendix F

## Toxicological results

### FDEP Biology Laboratory - Chronic Screen Bench Sheet

*Ceriodaphnia dubia*

City of Winter Haven

Facility: Winter Haven #3 WWTP
Address: 4400 Pollard Road Winter Haven
County: Polk Zip code 33884
NPDES Permit #: FL 0036048
Contact/District: Peter Wanner / Southwest

LIMS entry: 12-4-09 MF verified: 12.4.09 - J.D.

Diluent/ Batch: 20% DMW / 11-1609 Test Days Used: 0-5 (6 J.D.)
20% DMW /_____ Test Days Used: _____

SOP#: TA07_05 EPA 821-R-02-013 Method 1002.0

Organism: *Ceriodaphnia dubia*
Organism Batch #: 40-09
Organism age : <24hr hours
Feeding: Prior to Test and Daily
Food: YCT *P. subcapitata*
Food Batch: 7.15.09 7.23.09
Chamber size : 30 ml
Sample volume : 20 ml

| Sample Received | Lab Sample # | LIMS Job # | LIMS Sample # | Collection Date/Time | Received Date/Time |
|---|---|---|---|---|---|
| Test Day 0 | 1 | TLH-2009-11-17-115 | 1230408 | 11-16-09 0920 | 11-17-09 0935 |
| Test Day 2 | 2 | TLH-2009-11-19-76 | 1231366 | 11-18-09 0910 | 11-19-09 0935 |
| Test Day 4 | 3 | TLH-2009-11-23-01 | 1231801 | 11-20-09 0930 | 11-21-09 0910 |

| Water Quality Parameters | Field Chlorine (mg/L) | | | Lab Chlorine (mg/L) | | | Alkalinity (mg/L as $CaCO_3$) | | |
|---|---|---|---|---|---|---|---|---|---|
| Lab Sample #: | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| Sample: | <0.01 | Not measured | Not measured | <0.03 | <0.03 | <0.03 | 235 | 216 | 200 |
| Diluent/Control: | | | | <0.03 | <0.03 | <0.03 | 90 | 90 | 90 |
| Method: | Hach | — | — | Hach | Hach | Hach | Hach | Hach | Hach |
| Measured by: | SW Dist. Personnel | — | — | AR | JD | AR | BA | AR/BA | AR/BA |
| Verified by: | MF | MF | MF | MF | ~~JD~~ MF | ~~AR~~ MF | MF | MF | MF |
| | Conductivity (circle one) (µmhos-cm) (mmhos-cm) | | | Ammonia (mg/L) | | | Hardness (mg/L as $CaCO_3$) | | |
| Lab Sample #: | 1 | 2 | 3 | 1 (A) | 2 (A) | 3 (A) | MF 1 148 (B) MF 1 | 2 | 3 |
| Sample: | 874 | 889 | 895 | MF ~~1.79~~ | MF ~~1.87~~ | MF ~~1.8~~ | ~~235~~ | ~~216~~ 136/142 | |
| Diluent/Control: | 179 | 181 | 182 | <0.017 <0.017 | <0.017 <0.017 | <0.017 <0.017 | 88 | 88 | 88 |
| Method: | Mettler | Mettler | Mettler | Denver | Denver | Denver | Hach | Hach | Hach |
| Measured by: | JD | JD | AR | MF | MF | MF | BA | AR/BA | AR/BA |
| Verified by: | MF | MF | MF | ~~JD~~ | ~~JD~~ | ~~JD~~ | MF | MF | MF |

Temperature Shipped = 6° C (all samples) (yes) no
Holding Time = 36 hours (yes) no
Light Intensity : 50 - 100 ft. candles
Photoperiod : 16 light 8 dark
Temperature Range °C:
Incubator # 2 min. 26.2 max. 27.6 mean 26.9
Room B246 min. 24.4 max. 25.8 mean 25.1

Investigators' signatures
Marshall Faircloth
Amelia Rankin
Jana Daniel
Bruce Alexander

Loretta C. Wolfe
REVIEWER

| Test Replicate | Loaded from culture vial |
|---|---|
| 1 | A13 |
| 2 | A15 |
| 3 | A28 |
| 4 | B2 |
| 5 | B15 |
| 6 | B26 |
| 7 | A2 |
| 8 | A18 |
| 9 | B9 |
| 10 | B18 |

Homoscedastic MF 11-23-09

| Statistics | |
|---|---|
| Control % CV: | 9.126% |
| ~~Dunnetts~~ PMSD: | 10.7% |
| Reproduction NOEC: | 100% |
| Survival NOEC: | 100% |
| T-test value | -281386 |
| T- table value: | 1.734 |
| df: | 18 |

Comments: (A) Wrote conductivity in Ammonia space. Ammonia <0.017 mg/L in each sample. MF 11-23-09
(B) Wrote alkalinity in Hardness space. MF 11-23-09
all samples were aerated to reduce DO below 9.0 mg/L.

Test Page 1 of 3

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revised 08/24/06 MF/SP

## FDEP Biology Laboratory - Chronic Screen Bench Sheet

*Ceriodaphnia dubia* Survival and Reproduction

SOP TA07_05

Facility: Winterhaven #3 WWTP

LIMS Sample # 1230408 for lab sample 1

Start Date: 11-17-09 Time: 1300

End Date: 11-23-09 Time: 1255

| Conc. | Day | Replicate Number 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total Neonates | Surviving adults | Neonates per adult |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Control | 0* | | | | | | | | | | | | 10 | |
| | 1 | | | | | | | | | | | | 10 | |
| | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 |
| | 3 | 3 | 2 | 0 | 2 | 0 | 4 | 4 | 0 | 3 | 2 | 20 | 10 | 2.0 |
| | 4 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | MF 24 | 10 | 0.4 |
| | 5 | 6 | 6 | 8 | 5 | 8 | 7 | 7 | 8 | 7 | 8 | 70 | 10 | 7.0 |
| | 6 | 12 | 11 | 12 | 10 | 6 | 8 | 10 | 11 | 10 | 11 | 101 | 10 | 10.1 |
| | 7 | | | | | | | | | | | | | |
| | 8 | | | | | | | | | | | | | |
| | Total | 21 | 19 | 20 | 17 | 16 | 19 | 21 | 21 | 20 | 21 | 195 | 10 | 19.5 |

| Conc. | Day | Replicate Number 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total Neonates | Surviving adults | Neonates per adult |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % sample | 0* | | | | | | | | | | | | 10 | |
| | 1 | | | | | | | | | | | | 10 | |
| | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 |
| | 3 | 0 | 3 | 0 | 3 | 0 | 4 | 0 | 3 | 4 | 3 | 20 | 10 | 2.0 |
| | 4 | 6 | 0 | 4 | 0 | 4 | 0 | MF 24 | 0 | 0 | 0 | 18 | 10 | 1.8 |
| | 5 | 0 | 10 | 8 | 8 | 8 | 9 | 10 | 9 | 10 | 8 | 80 | 10 | 8.0 |
| | 6 | 10 | 9 | 7 | 10 | 12 | 12 | 12 | 12 | 12 | 15 | 111 | 10 | 11.1 |
| | 7 | | | | | | | | | | | | | |
| | 8 | | | | | | | | | | | | | |
| | Total | 16 | 22 | 19 | 21 | 24 | 25 | 26 | 24 | 26 | 26 | 229 | 10 | 22.9 |

Organisms loaded by: MF

| Day | Counted/ verified by: |
|---|---|
| 0 | BA |
| 1 | BA |
| 2 | BA |
| 3 | MF |
| 4 | MF |
| 5 | MF |
| 6 | MF |
| 7 | |
| 8 | |

| Concentration | Mean neonates /adult | % survival |
|---|---|---|
| Control | 19.5 | 100% |
| 100% | 22.9 | 100% |

| Test acceptability | |
|---|---|
| Mean control reproduction 15/female | (yes) no |
| 3rd brood in 60% of surviving females | (yes) no |
| Control survival = 80%: | (yes) no |

revised 7/15/2008 MF

**Comments:** (A) Day 4 Rep 7 and 8 10x's switched counts, MF 11-21-09 Rep 7 = 4 neonates Rep 8 = 0 neonates, MF 11-21-09



*Day 0 is test initiation day

X = Dead (original organism)

## FDEP Biology Laboratory - Chronic Screen Bench Sheet

*Ceriodaphnia dubia* Parameters

SOP TA07_05

Facility: Winterhaven

LIMS Sample # : 1230408 for lab sample 1

Circle µmhos-cm or mmhos-cm

| Test Day ↓ | | Concentration | New Sample: Test Replicate | pH (su) | Temp (°C) | DO (mg/L) | Conductivity (µmhos/cm) (mmhos/cm) | Old Sample: Test Replicate | pH (su) | Temp (°C) | DO (mg/L) | Conductivity (µmhos/cm) (mmhos/cm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Day 0 | sample: | Control | M | 8.0 | 24.0 | 7.8 | 178.8 | | | | | |
| | 1 | 100% | M | 8.4 | 24.0 | 7.7 | 868 | | | | | |
| | Measured by: | | | BA | BA | BA | BA | | | | | |
| | Recorded by: | | | BA | BA | BA | BA | | | | | |
| Day 1 | sample: | Control | M | 7.7 | 24.0 | 7.8 | 178 | M | 7.8 | 24.0 | 7.4 | 185 |
| | 1 | 100% | M | 8.2 | 24.0 | 8.1 | 878 | M | 8.4 | 24.0 | 7.2 | 897 |
| | Measured by: | | | BA | BA | BA | BA | | BA | BA | BA | BA |
| | Recorded by: | | | BA | BA | BA | BA | | BA | BA | BA | BA |
| Day 2 | sample: | Control | M | 7.9 | 24.0 | 7.2 | 181 | M | 7.9 | 24.0 | 7.3 | 199 |
| | 2 | 100% | M | 8.5 | 24.0 | 7.3 | 822 | M | 8.5 | 24.0 | 7.5 | 806 |
| | Measured by: | | | BA | BA | BA | BA | | BA | BA | BA | BA |
| | Recorded by: | | | BA | BA | BA | BA | | BA | BA | BA | BA |
| Day 3 | sample: | Control | M | 8.1 | 24.6 | 7.5 | 182 | M | 8.3 | 24.1 | 7.4 | 187 |
| | 2 | 100% | M | 8.2 | 25.7 | 8.1 | 836 | M | 8.3 | 24.3 | 7.4 | 845 |
| | Measured by: | | | MF | MF | MF | MF | | MF | MF | MF | MF |
| | Recorded by: | | | MF | MF | MF | MF | | MF | MF | MF | MF |
| Day 4 | sample: | Control | M | 8.0 | 24.1 | 7.3 | 182 | M | 8.0 | 24.3 | 7.1 | 194 |
| | 3 | 100% | M | 8.4 | 24.5 | 7.0 | 876 | M | 8.5 | 24.7 | 7.0 | 817 |
| | Measured by: | | | MF | MF | MF | MF | | MF | MF | MF | MF |
| | Recorded by: | | | MF | MF | MF | MF | | MF | MF | MF | MF |
| Day 5 | sample: | Control | M | 8.2 | 24.4 | 7.6 | 176 | M | 8.1 | 24.7 | 7.6 | 186 |
| | 3 | | M | 8.3 | 24.2 | 7.8 | 873 | M | 8.4 | 24.7 | 7.6 | 886 |
| | Measured by: | | | MF | MF | MF | MF | | MF | MF | MF | MF |
| | Recorded by: | | | MF | MF | MF | MF | | MF | MF | MF | MF |
| Day 6 | sample: | Control | M | | | | | M | 8.2 | 24.8 | 7.5 | 200 |
| | 3 | | M | | | | | M | 8.4 | 25.0 | 7.6 | 885 |
| | Measured by: | | | not renewed MF 11-23-09 | | | | | MF | MF | MF | MF |
| | Recorded by: | | | | | | | | MF | MF | MF | MF |
| Day 7 | sample: | Control | M | | | | | M | | 24.8 | 7.- | |
| | 3 | | M | | | | | M | | | | |
| | Measured by: | | | | | | | | | | | |
| | Recorded by: | | | | | | | | | | | |
| Day 8 | sample: | Control | | | | | | M | | | | |
| | 3 | | | | | | | M | | | | |
| | Measured by: | | | | | | | | | | | |
| | Recorded by: | | | | | | | | | | | |

**Comments:**

Replicate M= "Metered" vial, a surrogate vial for parameters

## FDEP Biology Laboratory - Chronic Bioassay Bench Sheet

*Pimphales promelas or Menidia beryllina*

Facility: Winter Haven WWTP #3
Address: 4400 Pollard Drive, Winter Haven FL 33880
County: Polk
NPDES Permit #: FL 0036048
Contact/District: Pete Werner / SWD

Test Species (circle one)
(*P. promelas*) SOP#: TA07_09 EPA-821-R-02-013 Method 1000.0
*M. beryllina* SOP#: TA07_14 EPA-821-R-02-014 Method 1006.0

Start Date: 11-17-09 Time: 1300
End Date: 11.23.09 Time: 1100

Diluent/ Batch:
MHW / 11.16.09 Test Days Used: 0-7
MHW / _____ Test Days Used: _____
ASW / _____ Test Days Used: _____
ASW / _____ Test Days Used: _____

Organism Batch # : 11.1709
Organism age : <24 hr ~~days~~ 0
Feeding Prior to Test and Daily
Artemia Lot # : 23613
Chamber size : 1000 ml
Test volume : 500 ml

| Artemia Batch # | |
|---|---|
| Day 0 146-09 | Day 3 149-09 |
| Day 1 147-09 | Day 4 150-09 |
| Day 2 148-09 | Day 5 151-09 |
| | Day 6 152-09 |

| LIMS: | Date | Initials |
|---|---|---|
| Entry: | 12-4-09 | MF |
| Verification: | 12.4.09 | JD |

| Sample Received | Lab Sample # | LIMS Job # | LIMS Sample # | Collection Date/Time | Received Date/Time |
|---|---|---|---|---|---|
| Test Day 0 | 1 | TLH-2009-11-17 | 1230408 | 11.16.09 / 0920 | 11.17.09 / 10:12 |
| Test Day 2 | 2 | TLH-2009-11-19 | 1231366 | 11.18.09 / 0910 | 11.19.09 / 09:35 |
| Test Day 4 | 3 | TLH-2009-11-23-01 | 1231801 | 11.20.09 / 0930 | 11.21.09 / 09:10 |

| Water Quality Parameters | Batch # 11.1609 ☒ MHW ☐ ASW | ☐ MHW ☐ ASW | NA Sample 1 | NA Sample 2 | NA Sample 3 | Other: | Measured by: | Verified by: |
|---|---|---|---|---|---|---|---|---|
| Field Total Residual $Cl_2$ (mg/L): | NA | NA | <0.01 | Not Measured | Not Measured | | SWD District Personnel | MF |
| Lab Total Residual $Cl_2$ (mg/L): | 0.06 | | 0.03 | <0.03 | <0.03 | | MK | JD |
| Alkalinity (mg/L as $CaCO_3$): | 77 | | 235 | 216 | 200 | | BA/AR | JD |
| Hardness (mg/L as $CaCO_3$): | 98 | | 148 | 136 | 142 | | BA/AR | JD |
| Total Ammonia (mg/L as N): | <0.017 | | <0.017 | <0.017 | <0.017 | | MF | JD |
| Conductivity: (umhos) mmhos: | 355 | | 860 | 838 | 863 | | JD | BA |
| Salinity (ppth): | — | | — | — | — | | — | — |

Temperature Shipped ≤6° C (all samples) (yes) no
Holding Time ≤36 hours (yes) no
Light Intensity : 50 - 100 ft. candles
Photoperiod : 16 light 8 dark

Temperature Range °C: (if used)
Incubator # 2 min. 26.2 max. 27.6 mean 26.9
Water bath # ____ min. _____ max. _____ mean _____
Room B246 min. 24.4 max. 25.8 mean 25.1

Test Incubated in: ☑ Incubator #: 2 ☐ Waterbath #: ____

Investigators' signatures
James Daniel
Amelia Rankin
Bruce Alexander
Marshall Faircloth

REVIEWER Britta Wolfe

| Statistics | |
|---|---|
| Control %cv: | 7.93 |
| Dunnetts PMSD: | 10.8% |
| Survival NOEC: | 100% |
| Survival LOEC: | Not applicable |
| Growth NOEC: | <100% |
| Growth LOEC: | 100% |

Comments:



revised 7/15/08 MF

## FDEP Biology Laboratory - Chronic Screen Bench Sheet

*Pimphales promelas or Menidia beryllina* Survival

Facility: Winter Haven

Organism: (*P. promelas*) *M.beryllina* (circle one)

LIMS Sample Number: 1230408 for lab sample #1

Start Date: 11-17-09 Time: 1300

End Date: 11.23-09 Time: 11.00

| | | TEST DAY | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Concentration | Replicate | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Control | A | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | B | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | C | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | D | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 100 % sample concentration | A | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | B | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | C | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | D | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Control | A | 10 | | | | | | | |
| | B | 10 | | | | | | | |
| | C | 10 | | | | | | | |
| | D | 10 | | | | | | | |
| % sample concentration | A | 10 | | | | | | | |
| | B | 10 | | | | | | | |
| | C | 10 | | | | | | | |
| | D | 10 | | | | | | | |
| Loaded by: [illegible] | Checked by: | | [illegible] | [illegible] | [illegible] | MF | [illegible] | [illegible] | [illegible] |
| Verified by: MF | | | | | | | | | |

Comments:

## Biology Laboratory Chronic Screening Bioassay Benchsheet

Parameters

*P. promelas* SOP TA-07_09 *M. beryllina* SOP TA-07_14

Sample Source: Winter Haven

LIMS Sample #: 1230408 (for Lab sample #1)

| Test Day ↓ | | Conc. | Old Sample: Test Rep. | pH (su) | Temp (°C) | DO (mg/L) | Cond (µmhos/cm) (mmhos/cm) | Salinity ppth | New Sample: Test Rep. | pH (su) | Temp (°C) | DO (mg/L) | Cond (µmhos/cm) (mmhos/cm) | Salinity ppth |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Day 0 | sample: | Control | | | | | | | A | 8.0 | 24.5 | 7.9 | 355 | |
| | 1 | 100% | | | | | | | A | 8.4 | 25.9 | 8.0 | 860 | |
| | Measured by: | | | | | | | | | JS | JS | JS | JD | |
| | Recorded by: | | | | | | | | | JS | JS | JS | JD | |
| Day 1 | sample: | Control | B | 7.8 | 25.2 | 7.0 | 350 | | B | 7.9 | 24.0 | 6.9 | 333 | |
| | 1 | 100% | B | 8.4 | 25.5 | 7.0 | 876 | | B | 8.3 | 24.3 | 8.3 | 871 | |
| | Measured by: | | | ADR | ADR | ADR | ADR | ADR | | ADR | ADR | ADR | ADR | |
| | Recorded by: | | | ADR | ADR | ADR | ADR | — | | ADR | ADR | ADR | ADR | |
| Day 2 | sample: | Control | C | 7.9 | 24.5 | 7.4 | 341 | | C | 7.8 | 24.0 | 7.4 | 340 | |
| | 2 | 100% | C | 8.3 | 24.6 | 7.3 | 888 | | C | 8.4 | 25.4 | 7.4 | 838 | |
| | Measured by: | | | ADR | ADR | ADR | ADR | | | ADR | ADR | ADR | ADR | |
| | Recorded by: | | | ADR | ADR | ADR | ADR | | | ADR | ADR | ADR | ADR | |
| Day 3 | sample: | Control | D | 7.7 | 25.9 | 6.5 | 342 | | D | 7.9 | 24.7 | 6.9 | 336 | |
| | 2 | 100% | D | 8.2 | 25.9 | 6.1 | 852 | | D | 8.2 | 25.0 | 7.2 | 830 | |
| | Measured by: | | | ADR | ADR | ADR | ADR | | | ADR | ADR | ADR | ADR | |
| | Recorded by: | | | ADR | ADR | ADR | ADR | | | ADR | ADR | ADR | ADR | |
| Day 4 | sample: | Control | A | 7.6 | 24.4 | 5.8 | 336 | | A | 7.7 | 24.6 | 6.8 | 344 | |
| | 3 | 100% | A | 8.1 | 24.4 | 5.8 | 829 | | A | 8.3 | 24.8 | 6.5 | 863 | |
| | Measured by: | | | ADR | MF | ADR | ADR | | | ADR | MF | ADR | ADR | |
| | Recorded by: | | | ADR | MF | ADR | ADR | | | ADR | ADR | ADR | ADR | |
| Day 5 | sample: | Control | B | 7.3 | 24.8 | 7.1 | 351 | | B | 8.1 | 24.4 | 7.7 | 353 | |
| | 3 | 100% | B | 8.2 | 24.8 | 7.0 | 884 | | B | 8.2 | 24.5 | 7.8 | 884 | |
| | Measured by: | | | JS | JS | JS | JS | | | JS | JS | JS | JS | |
| | Recorded by: | | | JS | JS | JS | JS | | | JS | JS | JS | JS | |
| Day 6 | sample: | Control | C | 7.8 | 25.0 | 5.7 | 362 | | C | 7.8 | 24.0 | 7.3 | 350 | |
| | 3 | 100% | C | 8.0 | 25.2 | 5.7 | 903 | | C | 8.3 | 24.5 | 7.4 | 890 | |
| | Measured by: | | | JS | JS | JS | JS | | | ADR | JD | ADR | ADR | ADR |
| | Recorded by: | | | JS | JS | JS | JS | | | ADR | ADR | ADR | ADR | ADR |
| Day 7 | sample: | Control | D | 7.6 | 24.5 | 5.6 | 357 | | | | | | | |
| | 3 | 100% | D | 8.2 | 24.6 | 5.7 | 909 | | | | | | | |
| | Measured by: | | | JS | JS | JS | JD | | | | | | | |
| | Recorded by: | | | JS | JS | JS | JD | | | | | | | |

Test Rep. = Replicate  Record Salinity < 1 if freshwater  Circle µmhos-cm or mmhos-cm

Comments:

revised 7/15/08 mf

## FDEP Biology Laboratory - Chronic Screen Bench Sheet

Facility: Winter Haven

LIMS Sample Number: 1230902 for lab sample #1

| Concentration | Replicate | Pan # | Pan wt. (g) | Pan + Fish (g) | Fish wt. (g) | Original # Fish | Mean wt. (mg) |
|---|---|---|---|---|---|---|---|
| | | | mean wt = fish wt divided by 10<br>convert g to mg: move decimal 3 places to right | | | | |
| Control | A | 1 | 0.02212 | 0.02967 | 0.00755 | 10 | .755 |
| | B | 2 | 0.02193 | 0.02831 | 0.00638 | 10 | .638 |
| | C | 3 | 0.02071 | 0.02764 | 0.00693 | 10 | .693 |
| | D | 4 | 0.02188 | 0.02943 | 0.00755 | 10 | .755 |
| 100 % sample | A | 5 | 0.02096 | 0.02761 | 0.00665 | 10 | .665 |
| | B | 6 | 0.02228 | 0.02763 | 0.00535 | 10 | .535 |
| | C | 7 | 0.02190 | 0.02781 | 0.00591 | 10 | .591 |
| | D | 8 | 0.02153 | 0.02722 | 0.00569 | 10 | .569 |
| Control | A | | | | | 10 | |
| | B | | | | | 10 | |
| | C | | | | | 10 | |
| | D | | | | | 10 | |
| % sample | A | | | | | 10 | |
| | B | | | | | 10 | |
| | C | | | | | 10 | |
| | D | | | | | 10 | |
| | Weighed by initials: | | JD | JS | | | |

| Growth | %CV | PMSD |
|---|---|---|
| Control | 7.93% | 10.8% (10.8 MF) |

| Growth | Table | Calculated | dF |
|---|---|---|---|
| T-test | 1.943 | 3.053 | 6 (six) |

| Drying | |
|---|---|
| Temperature °C: | 100 |
| Hours: | 6 |

**S-weight ID: BIO-S-WEIGHTS-01**

**Balance ID: OHAUS 250D SER. 1125481084**

| | | | | | Measured Value (g) | | S-weight Value (g) |
|---|---|---|---|---|---|---|---|
| Tare Weighing Date: | 11.23.09 | Final Weighing Date: | 11.24.09 | | | | |
| Tare Pan 1 after Pan 5 (g) | 0.02213 | @ | 0.02212 | S-weights | 0.00998 | @ | 0.01 |
| Tare Pan 1 after Pan 8 (g) | 0.02213 | @ | 0.02212 | at tare | 0.03001 | @ | 0.03 |
| Final Pan 1 after Pan 5 (g) | 0.02967 | @ | 0.02967 | S-weights | 0.00998 | @ | 0.01 |
| Final Pan 1 after Pan 8 (g) | 0.02968 | @ | 0.02967 | at final | 0.05003 | @ | 0.05 |

**Comments:**

**Bioassay Instrument ID**

Test ID: Winter Haven Dates: 11/17/09 – 11/24/09

| METER / DEVICE | ID | SOP | Parameter | Method | √used |
|---|---|---|---|---|---|
| YSI Model 58 Dissolved Oxygen Meter | 90H018262 | TA06_04 | Dissolved Oxygen | SM 4500 O G | ✓ |
| Accumet AR-10 pH Meter | 93312105 | TA06_23 | pH | SM 4500 H+ | ✓ |
| Mettler-Toledo SevenMulti Conductivity Meter | SN 1225117049 Probe H04257 | TA06_25 | Conductivity | SM 2510 B | ✓ |
| | | | Salinity | SM 2520 B | ✓ |
| Denver Model 225 ISE with ammonia probe | SN K01377 | TA06_17 | Ammonia | SM 4500 NH3 F | ✓ |
| Thermometer (DO probe) | YSI 5750 SN 05J1720 | TA06_05 | Temperature | SM-2530B modified DEP SOP-001/01 FT1400 | ✓ |
| Hach Pocket Colorimeter II | 05050C026378 | TA06_22 | Total Residual Chlorine | EPA 330.5 SM 4500 CL G | ✓ |
| Alkalinity (Hach Kit) | No SN | TA06_08 | Alkalinity | SM 2320 B | ✓ |
| Hardness (Hach Kit) | No SN | TA06_09 | Hardness | SM 2340 C | ✓ |
| OHAUS Balance 250D | 1125481084 | TA06_21 TA06_27 | Weight | - | ✓ |
| S-Weights | BIO-S-WEIGHTS-01 | NA | Balance check | - | ✓ |
| | | | | | ✓ |

SM-2530B modified to allow use of electronic and non-mercury filled thermometers.

Insert other device information in blank spaces(if used). Test ID = Facility or SRTs (acute SRT–Chronic SRT)

entered by BL on 12.1.09

V 1.1 6/12/08 MF

## Appendix G

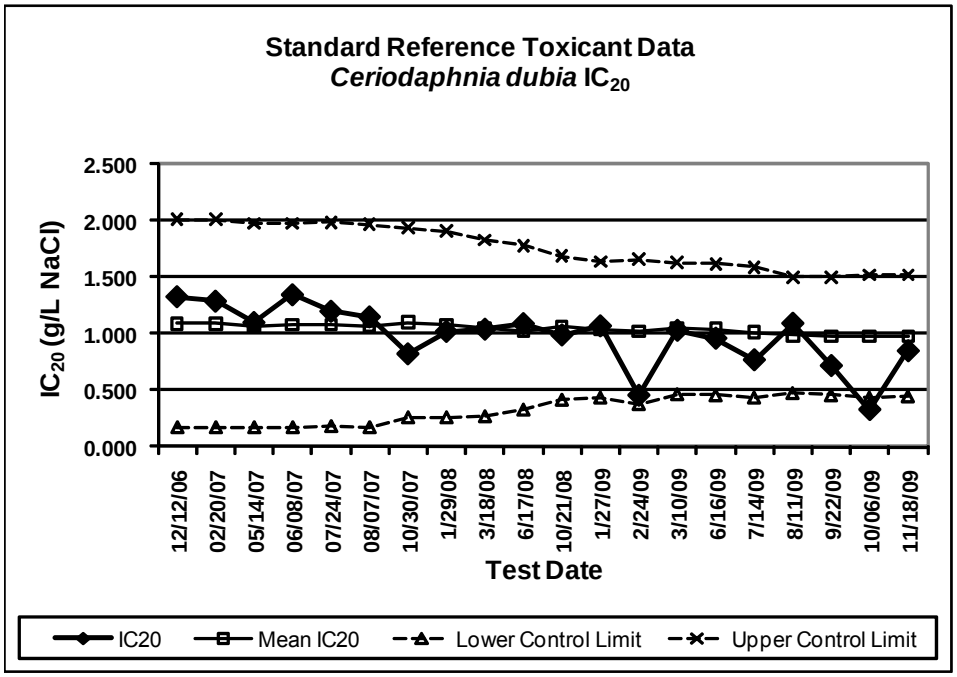
## Standard Reference Toxicant Data

Florida Department of Environmental Protection
Bureau of Laboratories

Standard Reference Toxicant (SRT) Test Data - 7-Day Chronic Toxicity
*Ceriodaphnia dubia* (water flea) - Sodium Chloride (NaCl)

| Date | IC20 | Mean IC20 | Std Dev | Lower Control Limit | Upper Control Limit | Date |
|---|---|---|---|---|---|---|
| 12/12/06 | 1.330 | 1.09 | 0.46 | 0.17 | 2.01 | 12/12/06 |
| 02/20/07 | 1.290 | 1.09 | 0.46 | 0.17 | 2.01 | 02/20/07 |
| 05/14/07 | 1.100 | 1.07 | 0.45 | 0.17 | 1.98 | 05/14/07 |
| 06/08/07 | 1.347 | 1.08 | 0.45 | 0.17 | 1.98 | 06/08/07 |
| 07/24/07 | 1.200 | 1.08 | 0.45 | 0.18 | 1.99 | 07/24/07 |
| 08/07/07 | 1.150 | 1.07 | 0.45 | 0.17 | 1.97 | 08/07/07 |
| 10/30/07 | 0.821 | 1.10 | 0.42 | 0.26 | 1.94 | 10/30/07 |
| 1/29/08 | 1.020 | 1.08 | 0.41 | 0.26 | 1.91 | 1/29/08 |
| 3/18/08 | 1.040 | 1.05 | 0.39 | 0.27 | 1.83 | 3/18/08 |
| 6/17/08 | 1.090 | 1.02 | 0.36 | 0.33 | 1.78 | 6/17/08 |
| 10/21/08 | 0.989 | 1.06 | 0.32 | 0.42 | 1.69 | 10/21/08 |
| 1/27/09 | 1.070 | 1.04 | 0.30 | 0.44 | 1.64 | 1/27/09 |
| 2/24/09 | 0.452 | 1.02 | 0.32 | 0.38 | 1.66 | 2/24/09 |
| 3/10/09 | 1.030 | 1.05 | 0.29 | 0.47 | 1.63 | 3/10/09 |
| 6/16/09 | 0.960 | 1.04 | 0.29 | 0.46 | 1.62 | 6/16/09 |
| 7/14/09 | 0.768 | 1.01 | 0.29 | 0.44 | 1.59 | 7/14/09 |
| 8/11/09 | 1.093 | 0.99 | 0.26 | 0.48 | 1.50 | 8/11/09 |
| 9/22/09 | 0.716 | 0.98 | 0.26 | 0.46 | 1.50 | 9/22/09 |
| 10/06/09 | 0.325 | 0.98 | 0.27 | 0.44 | 1.52 | 10/06/09 |
| 11/18/09 | 0.848 | 0.98 | 0.27 | 0.45 | 1.52 | 11/18/09 |

Means are of the last 20 SRT tests.
Lower Confidence Limit = mean - 2 * Std Dev
Upper Confidence Limit = mean + 2 * Std Dev

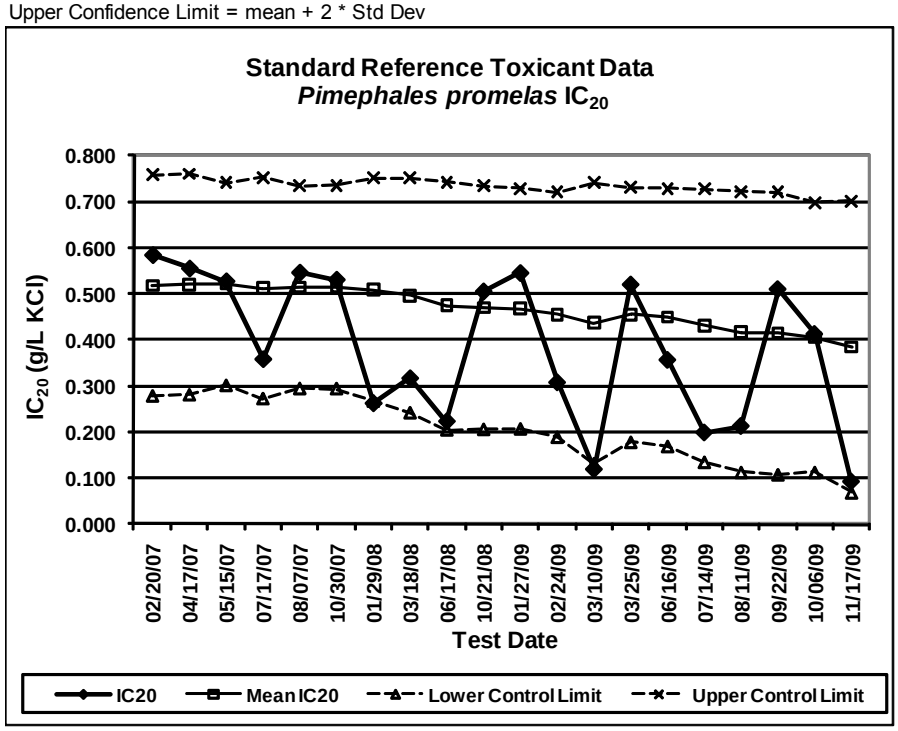


Florida Department of Environmental Protection
Bureau of Laboratories

Standard Reference Toxicant (SRT) Test Data - 7-Day Chronic Toxicity
*Pimephales promelas* (fathead minnow) - Potassium Chloride (KCl)

| Date | IC20 | Mean IC20 | Std Dev | Lower Control Limit | Upper Control Limit | Date |
|---|---|---|---|---|---|---|
| 02/20/07 | 0.585 | 0.518 | 0.12 | 0.278 | 0.758 | 02/20/07 |
| 04/17/07 | 0.556 | 0.521 | 0.12 | 0.281 | 0.761 | 04/17/07 |
| 05/15/07 | 0.528 | 0.521 | 0.11 | 0.301 | 0.741 | 05/15/07 |
| 07/17/07 | 0.358 | 0.513 | 0.12 | 0.273 | 0.753 | 07/17/07 |
| 08/07/07 | 0.547 | 0.514 | 0.11 | 0.294 | 0.734 | 08/07/07 |
| 10/30/07 | 0.531 | 0.515 | 0.11 | 0.294 | 0.736 | 10/30/07 |
| 01/29/08 | 0.263 | 0.509 | 0.12 | 0.267 | 0.752 | 01/29/08 |
| 03/18/08 | 0.317 | 0.497 | 0.13 | 0.242 | 0.752 | 03/18/08 |
| 06/17/08 | 0.223 | 0.474 | 0.13 | 0.205 | 0.743 | 06/17/08 |
| 10/21/08 | 0.506 | 0.470 | 0.13 | 0.206 | 0.734 | 10/21/08 |
| 01/27/09 | 0.546 | 0.468 | 0.13 | 0.207 | 0.729 | 01/27/09 |
| 02/24/09 | 0.308 | 0.455 | 0.13 | 0.189 | 0.721 | 02/24/09 |
| 03/10/09 | 0.119 | 0.437 | 0.15 | 0.132 | 0.741 | 03/10/09 |
| 03/25/09 | 0.521 | 0.455 | 0.14 | 0.178 | 0.731 | 03/25/09 |
| 06/16/09 | 0.357 | 0.449 | 0.14 | 0.169 | 0.729 | 06/16/09 |
| 07/14/09 | 0.199 | 0.432 | 0.15 | 0.135 | 0.728 | 07/14/09 |
| 08/11/09 | 0.213 | 0.417 | 0.15 | 0.113 | 0.722 | 08/11/09 |
| 09/22/09 | 0.511 | 0.415 | 0.15 | 0.108 | 0.721 | 09/22/09 |
| 10/06/09 | 0.413 | 0.405 | 0.15 | 0.113 | 0.698 | 10/06/09 |
| 11/17/09 | 0.092 | 0.385 | 0.16 | 0.069 | 0.701 | 11/17/09 |

Means are from all SRT tests, up to 20 tests..
Lower Confidence Limit = mean - 2 * Std Dev
Upper Confidence Limit = mean + 2 * Std Dev



MARINCO BIOASSAY LABORATORY
The Aquatic Toxicology Specialists

NELAP Certification # E84191

## Shipment Record

**State of Florida Aquaculture Certificate Number AQ0668007**

Date: 11/16/09

Shipped to: FDEP

P.O. No: _____

| Species | Quantity | Age | Brood/Lot Number | Temp. (°C) | pH (S.U.) | Salinity (‰) |
|---|---|---|---|---|---|---|
| *Mysidopsis bahia* | | | | | | |
| | | | | | | |
| *Menidia beryllina* | | | | | | |
| | | | | | | |
| | | | | | | Hardness (mg/L) |
| *Cyprinella leedsi* | 100 | 12 DAYS | CL091104 | 25 | 7.8 | 80 |
| | | | | | | |
| *Pimephales promelas* | 350 | <24HRS | FM091115-1615 | 25 | 7.8 | 80 |
| | | | | | | |
| *Ceriodaphnia dubia* | | | | | | |
| | | | | | | |
| YCT | | | | | | |
| *P. subcapitata* | | | | | | |

Packed by: _____

Shipped Via: FedEx

Notes: _____

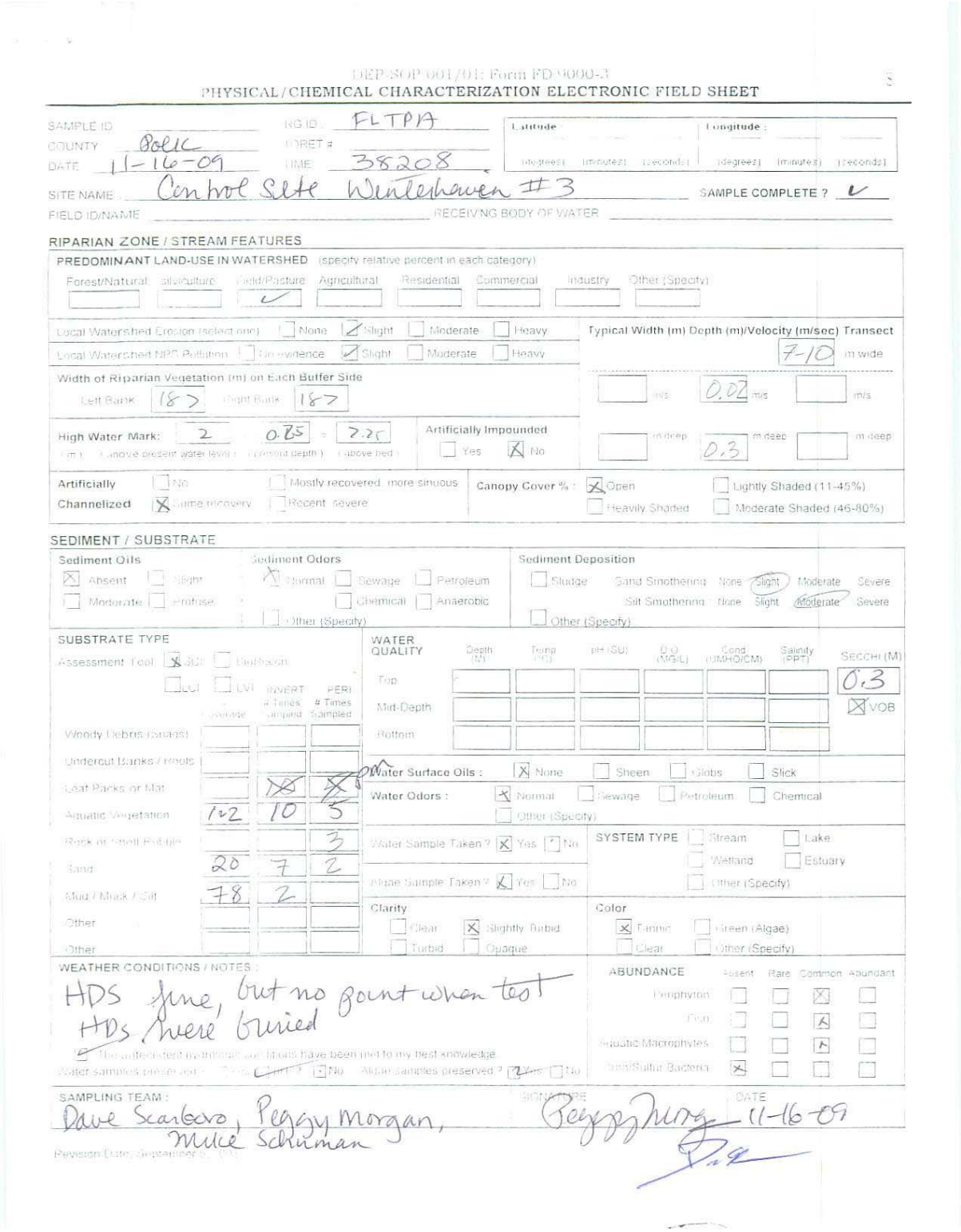
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BIOLOGY SECTION

Thank you for your order.

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## Appendix H

## Physical/Chemical and Habitat Assessment field sheets



DEP-SOP-001/01: Form FD-9000-3

PHYSICAL / CHEMICAL CHARACTERIZATION ELECTRONIC FIELD SHEET

SAMPLE ID: BG ID: FLTPA
COUNTY: Polk DORET #:
DATE: 11-16-09 TIME: 38208
Latitude: (degrees) (minutes) (seconds) Longitude: (degrees) (minutes) (seconds)
SITE NAME: Control Site Winterhaven #3 SAMPLE COMPLETE ? ✓
FIELD ID/NAME: RECEIVING BODY OF WATER:

RIPARIAN ZONE / STREAM FEATURES

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

| Forest/Natural | Silviculture | Field/Pasture | Agricultural | Residential | Commercial | Industry | Other (Specify) |
|---|---|---|---|---|---|---|---|
| | | ✓ | | | | | |

Local Watershed Erosion (select one): ☐ None ☒ Slight ☐ Moderate ☐ Heavy
Local Watershed NPS Pollution: ☐ No evidence ☒ Slight ☐ Moderate ☐ Heavy

Width of Riparian Vegetation (m) on Each Buffer Side: Left Bank: 187 Right Bank: 187

High Water Mark: 2 (m) 0.85 (above present water level) = 2.25 (current depth) (above bed)

Artificially Impounded: ☐ Yes ☒ No

Typical Width (m) Depth (m)/Velocity (m/sec) Transect: 7-10 m wide

| | | |
|---|---|---|
| m/s | 0.02 m/s | m/s |
| m deep | 0.3 m deep | m deep |

Artificially Channelized: ☐ No ☒ Some recovery ☐ Mostly recovered, more sinuous ☐ Recent, severe

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

SEDIMENT / SUBSTRATE

Sediment Oils: ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse

Sediment Odors: ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ Other (Specify)

Sediment Deposition: ☐ Sludge; Sand Smothering: None (Slight) Moderate Severe; Silt Smothering: None Slight (Moderate) Severe ☐ Other (Specify)

SUBSTRATE TYPE

Assessment Tool: ☒ SCI ☐ Habitat ☐ LLI ☐ LVI

| | Coverage | INVERT # Times Sampled | PERI # Times Sampled |
|---|---|---|---|
| Woody Debris (Snags) | | | |
| Undercut Banks / Roots | | | |
| Leaf Packs or Mat | | ~~10~~ | ~~5~~ |
| Aquatic Vegetation | 1-2 | 10 | 5 |
| Rock or Shell Rubble | | | 3 |
| Sand | 20 | 7 | 2 |
| Mud / Muck / Silt | 78 | 2 | |
| Other | | | |
| Other | | | |

WATER QUALITY

| | Depth (M) | Temp (°C) | pH (SU) | D.O. (MG/L) | Cond. (UMHO/CM) | Salinity (PPT) | SECCHI (M) |
|---|---|---|---|---|---|---|---|
| Top | | | | | | | 0.3 |
| Mid-Depth | | | | | | | ☒ VOB |
| Bottom | | | | | | | |

Water Surface Oils: ☒ None ☐ Sheen ☐ Globs ☐ Slick

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

Water Sample Taken ? ☒ Yes ☐ No

Algae Sample Taken ? ☒ Yes ☐ No

SYSTEM TYPE: ☐ Stream ☐ Lake ☐ Wetland ☐ Estuary ☐ Other (Specify)

Clarity: ☐ Clear ☒ Slightly Turbid ☐ Turbid ☐ Opaque

Color: ☒ Tannic ☐ Green (Algae) ☐ Clear ☐ Other (Specify)

WEATHER CONDITIONS / NOTES:

HDS June, but no point when test HDs were buried

ABUNDANCE

| | Absent | Rare | Common | Abundant |
|---|---|---|---|---|
| Periphyton | ☐ | ☐ | ☒ | ☐ |
| Fish | ☐ | ☐ | ☒ | ☐ |
| Aquatic Macrophytes | ☐ | ☐ | ☒ | ☐ |
| Iron/Sulfur Bacteria | ☒ | ☐ | ☐ | ☐ |

☒ The collected organisms and labels have been read to my best knowledge.
Water samples preserved ? ☐ Yes ☐ No Algae samples preserved ? ☐ Yes ☐ No

SAMPLING TEAM: Dave Scarboro, Peggy Morgan, Mike Schuman SIGNATURE: Peggy Morg DATE: 11-16-09

Revision Date: September 8, 2006

DEP-SOP-001/01: Form FD 9000-5
STATE OF FLORIDA, DEPARTMENT OF ENVIRONMENTAL PROTECTION
STREAM/RIVER HABITAT ASSESSMENT FIELD SHEET

| SUBMITTING AGENCY CODE / SUBMITTING AGENCY NAME | STORET STATION NUMBER | DATE | RECEIVING BODY OF WATER |
|---|---|---|---|
| | | 11/10/09 | Peace river - charlotte Harbor |
| REMARKS: pick | LOCATION | FIELD ID/NAME | |

| Habitat Parameter | Optimal | Suboptimal | Marginal | Poor |
|---|---|---|---|---|
| Primary Habitat Components | Greater than 70% productive habitat present (snags, logs, undercut banks, live vegetation, well developed riffle and run, naturally occurring rock) | Three productive habitats present. Adequate habitat. Some substrates may be new (fresh leaves or snags) | Two productive habitats present. Less than desirable habitat; frequently disturbed or removed | One or less productive habitat. Lack of habitat is obvious; substrates unstable or smothered |
| Substrate Diversity 2 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 (2) 1 |
| Substrate Availability 3 | Greater than 30% productive habitat present at site | 16% to 30% productive habitat, by areal extent | 6% to 15% productive habitat | Less than 5% productive habitat |
| | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 (3) 2 1 |
| Water Velocity 2 | Max. observed at typical transect >0.25 m/sec. Base 1 value | Max. observed at typical transect >0.1 to 0.25 m/sec | Max. observed at typical transect >0.05 to 0.1 m/sec | Max. observed at typical transect <0.05 m/sec; or state occurring > 1 m/sec |
| | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 (2) 1 |
| Habitat Smothering 3 | Adequate number of pools (1-2 per 12 times width) and <25% of habitats affected by sand or silt accumulation | Adequate number of pools (1-2 per 12 times width) and >25% of habitats affected by sand or silt accumulation | Does not have required number of pools (1-2 per 12 times width) and/or has shallow pools (<2 times prevailing depth) | Pools are absent. Most habitats affected by sand or silt accumulation |
| Primary Score 10 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 (3) 2 1 |
| Secondary Habitat Components | Good sinuosity. No evidence of channelization or artificial straight-ening. Box-cut banks. Diversity of pools | Good sinuosity within old channelized area and a diversity of depths. Evidence of dredging in the past (>10 yrs) but mostly recovered | Some sinuosity developed within channelized area or some diversity of depth, but typically no pools (>2 times prevailing depth) present | Straightened with spoil banks. Box-cut, monotypic depth. |
| Artificial Channelization 7 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 (7) 6 | 5 4 3 2 1 |
| Bank Stability | >80% of bank firm, not subject to slumping, sloughing, or caving in. Little or no bank with raw, eroded areas | Only meets 2 of the 3 requirements for optimal bank stability | Only meets 1 of the 3 requirements for optimal bank stability | Bankfull <60% of bank height. Slope of bank >60°. Bankfull is below the root zone with raw, eroded areas |
| Right Bank 6 | 10 9 | 8 7 (6) | (5) 4 | 3 2 1 |
| Left Bank 5 | ++ | ++- | +-- | --- |
| Riparian Buffer Zone Width | Width of vegetation greater than 18m | Width of vegetation >12 to 18m | Width of vegetation 6 to 12 m. Human activities still close to system | Less than 6 m of buffer zone due to intensive human activities |
| Right Bank 2 | 10 9 | 8 7 6 | 5 4 | 3 (2) 1 |
| Left Bank 2 | | | | |
| Riparian Zone Vegetation Quality | Undisturbed riparian surfaces (normal, expected plant community for given sunlight & habitat conditions; native plants: trees, vines, shrubs, or non-woody macrophytes). Natural structure | 50% to 80% of riparian zone undisturbed (normal, expected plant community for given sunlight & habitat conditions). Some disruption in community observed | 20% to 50% of riparian zone is undisturbed (normal, expected plant community for given sunlight & habitat conditions). Disruption obvious | Less than 25% of riparian zone is undisturbed (normal, expected plant community for given sunlight & habitat conditions) |
| Right Bank 2 | | | | |
| Left Bank 2 | | | | |
| Secondary Score 7x | 10 9 | 8 7 6 | 5 4 | 3 (2) 1 |

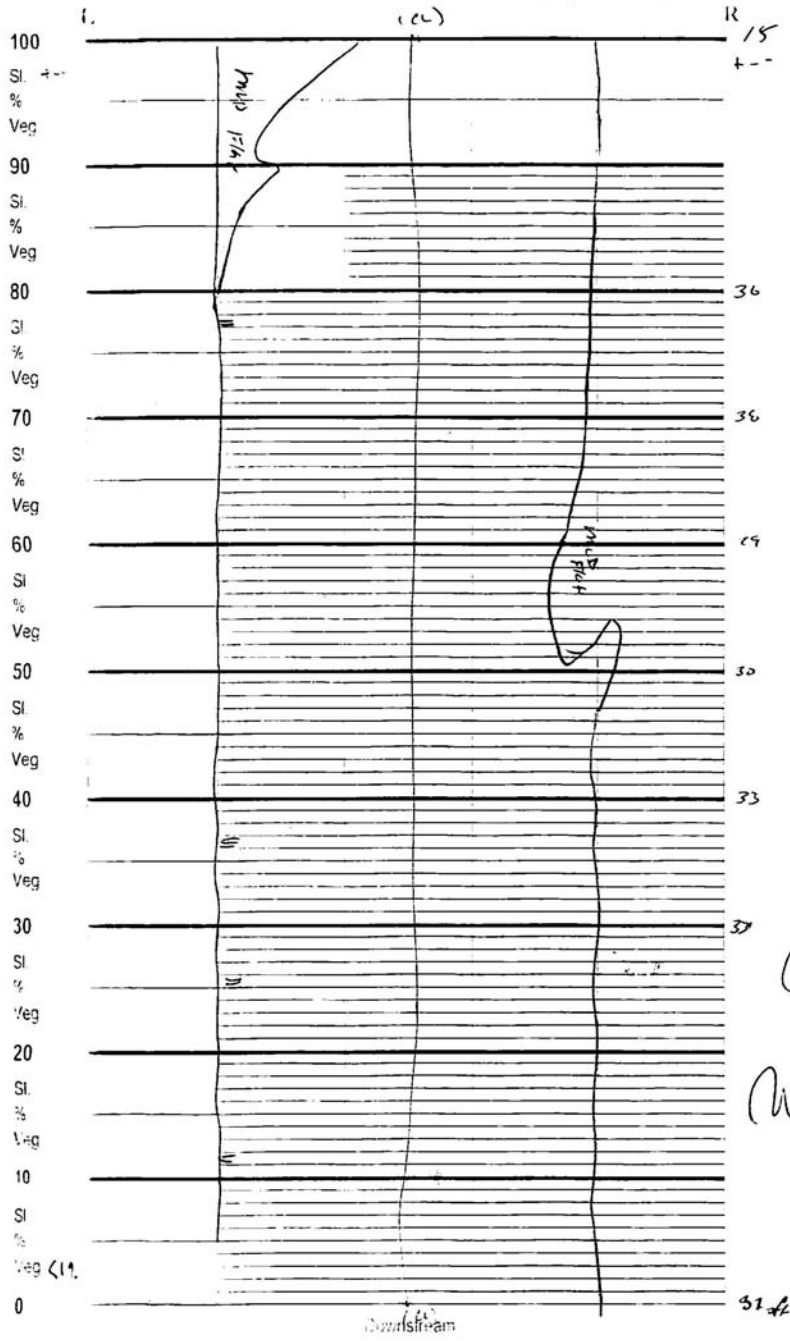
36 TOTAL SCORE

Observers: Dave Scarboro, Peggy Morgan (training)

Signature: Peggy Morgan

Form FD 9000-5 Revision Date: June 6, 2008

Stream/River Habitat Sketch Sheet, Form FD 9000-4 (December 11, 2001)
Length of grid represents 100 m of stream (not linear meters)
(Horizontal scale is double vertical scale, draw proportionately)




Substrates: Code key, draw proportionate habitat abundance.

- Snags
- Roots/undercut banks
- Leaf Packs (or mats)
- Macrophytes
- Muck
- Sand
-

Velocity
Note where velocity measures were taken.

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

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

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

Plants observed/other notes:
Cut channel in cow pasture.
Water letter. Algae mat.
Some sea lettuce during low tide. Fine silt smothering and some sand, fine...

Control Site
11-16-09
Winters Haven #3

| | | | | | |
|---|---|---|---|---|---|
| Prod. hab | (1) | 2 | 3 | 4 | 5 |
| Sweeps (Maj) | (10) | 7 | 5 | 4 | 3 |
| Sweeps (Min) | (10) | 6 | 5 | 4 | 5 |

A bit more veg at upstream site - mainly Pisha - expect terrestrials, Hyalella, baetis, hemoptera. Cow pasture w/ no buffer at all. A little more velocity here (not much)

More evidence of stream trying to meander. Bottom harder sand than downstream

DEP SOP-001/01: Form FD 9000-3

# PHYSICAL/CHEMICAL CHARACTERIZATION ELECTRONIC FIELD SHEET

SAMPLE ID _____ RG ID FLTPA

COUNTY Polk STORET # _____

DATE 11-16-09 TIME 1000-1200

Latitude: _____ (degrees) (minutes) (seconds) Longitude: _____ (degrees) (minutes) (seconds)

SITE NAME SCI Test Site Winterhaven #3 SAMPLE COMPLETE ? ✓

FIELD ID/NAME 38209 RECEIVING BODY OF WATER _____

## RIPARIAN ZONE / STREAM FEATURES

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

| Forest/Natural | Silviculture | Pasture | Agricultural | Residential | Commercial | Industry | Other (Specify) |
|---|---|---|---|---|---|---|---|
| | | cattle 100 | | | | | Roads/transp ✓ |

Local Watershed Erosion (select one): ☐ None ☐ Slight ☒ Moderate ☐ Heavy

Local Watershed NPS Pollution: ☐ No evidence ☐ Slight ☒ Moderate ☐ Heavy

Typical Width (m) Depth (m)/Velocity (m/sec) Transect: 12 m wide

Width of Riparian Vegetation (m) on Each Buffer Side: Left Bank 2 Right Bank 2 — just some over

| | | |
|---|---|---|
| 0 m/s | 0 m/s | 0 m/s |
| .4 m deep | .4 m deep | .4 m deep |

High Water Mark: 2 m above present water level 0.4 m (bankfull depth) 2.4 m above bed

Artificially Impounded: ☐ Yes ☒ No

Artificially Channelized: ☐ No ☐ Some recovery ☐ Mostly recovered, more sinuous ☒ Recent, severe

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

## SEDIMENT / SUBSTRATE

Sediment Oils: ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse

Sediment Odors: ☐ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☒ Anaerobic ☐ Other (Specify)

Sediment Deposition: ☐ Sludge Sand Smothering: None Slight Moderate Severe Silt Smothering: None Slight Moderate Severe ☐ Other (Specify) PM

### SUBSTRATE TYPE

Assessment Tool: ☒ SCI ☐ Habicom ☐ LCI ☐ LVI

| | Coverage | # Times Sampled (WVRT) | # Times Sampled (VERI) |
|---|---|---|---|
| Woody Debris (Snags) | 4 | 1 | |
| Undercut Banks / Roots | | | |
| Leaf Packs or Mat | | | 5 |
| Aquatic Vegetation | 190 | 10 | 5 |
| Rock or Hard Marl | | | |
| Sand | 15 | 7 | |
| Mud / Muck / Silt | 84 | 2 | |
| Other | | | |
| Other | | | |

### WATER QUALITY

Sample Depth @ 2

| | Depth (M) | Temp (°C) | pH (SU) | D.O. (MG/L) | Cond. (MMHO/CM) | Salinity (PPT) | SECCHI (M) |
|---|---|---|---|---|---|---|---|
| Top | 0.8 | 18.9 | 7.48 | 8.01 | 210 | 0.10 | 0.1 |
| Mid-Depth | | | | 86.4% | | | ☐ VOB |
| Bottom | 0.4 | | | | | | |

Water Surface Oils: ☒ None ☐ Sheen ☐ Globs ☐ Slick

Water Odors: ☐ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Other (Specify)

Water Sample Taken ? ☒ Yes ☐ No

Algae Sample Taken ? ☐ Yes ☒ No

SYSTEM TYPE: ☒ Stream ☐ Lake ☐ Wetland ☐ Estuary ☐ Other (Specify)

Clarity: ☐ Clear ☐ Slightly Turbid ☐ Turbid ☒ Opaque

Color: ☒ Tannic ☐ Green (Algae) ☐ Clear ☐ Other (Specify)

WEATHER CONDITIONS / NOTES:

HDS BURIED

| ABUNDANCE | Absent | Rare | Common | Abundant |
|---|---|---|---|---|
| Periphyton | ☐ | ☐ | ☒ | ☐ |
| Fish | ☐ | ☐ | ☒ | ☐ |
| Aquatic Macrophytes | ☐ | ☒ | ☐ | ☐ |
| Iron Sulfur Bacteria | ☒ | ☐ | ☐ | ☐ |

☒ The undersigned hereby certify that the above data have been collected to the best of my knowledge

Water Samples Preserved ✓ ☐ Yes ☐ No Algae Samples preserved ? ☒ Yes ☐ No

SAMPLING TEAM: Dave Scarboro, Peggy Morgan

SIGNATURE Peggy Morgan Peggy Morgan

DATE 11-16-09

Revision Date: Supervisor's Initials

NOTES OVER

DEP-SOP-001/01: Form FD 9000-5
STATE OF FLORIDA, DEPARTMENT OF ENVIRONMENTAL PROTECTION
STREAM/RIVER HABITAT ASSESSMENT FIELD SHEET

| | | | |
|---|---|---|---|
| SUBMITTING AGENCY CODE | STORET STATION NUMBER | DATE | RECEIVING BODY OF WATER |
| SUBMITTING AGENCY NAME | | 11/16/09 | PEACE RIVER - Charlotte Harbor |
| REMARKS | LOCATION | | FIELD ID NAME |
| POLK | SCI Test Site down Stream WH#3 | | |

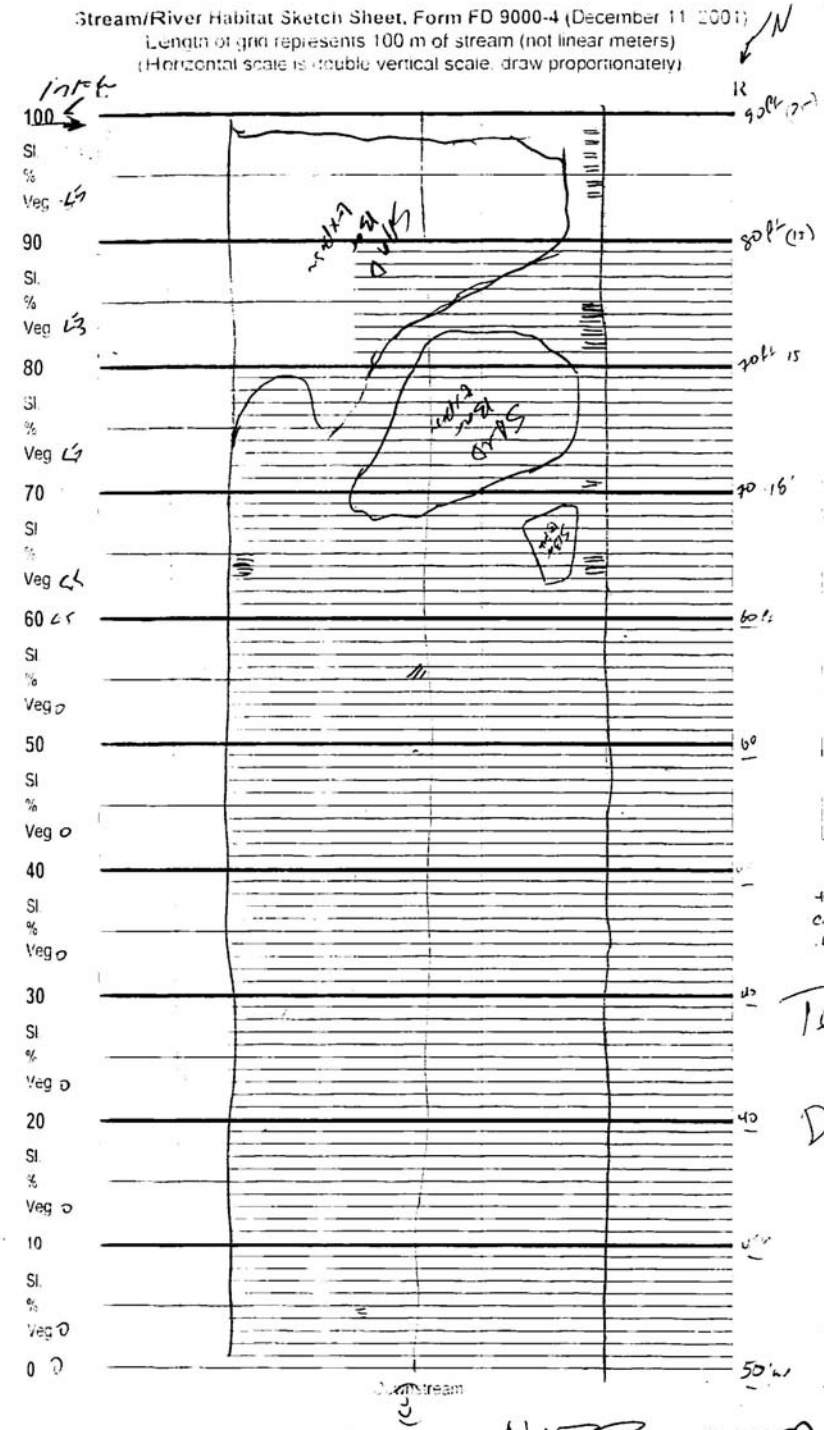
| Habitat Parameter | Optimal | Suboptimal | Marginal | Poor |
|---|---|---|---|---|
| Epifaunal Substrate/ Available Cover | Greater than 50% productive habitat present (stable habitat; well suited for full colonization potential; adequate vegetation; adequate habitat for maintenance of populations; presence of root wads, undercut banks, cobble or other stable habitat) | Between 30% and 50% productive habitat present (adequate habitat; adequate habitat for maintenance of populations, but habitat availability less than desirable; substrate frequently disturbed or removed) | Between 15% and 30% productive habitat present (habitat availability less than desirable; substrate frequently disturbed or removed) | 15% or less productive habitat. Lack of habitat is obvious; substrates unstable or smothered |
| Substrate Diversity 5 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | (5) 4 3 2 1 |
| Substrate Availability 2 | Greater than 30% productive habitat present at site | 15% to 30% productive habitat by aerial extent | 6% to 15% productive habitat | Less than 5% productive habitat |
| | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 (2) 1 |
| Water Velocity 1 | Typically 4 or more types present (slow [<0.25 m/sec], but not [illegible]) | Max. observed at typical transect >0.1 to 0.25 m/sec | Max. observed at typical transect 0.05 to 0.1 m/sec | Max. observed at typical transect <0.05 m/sec; or stagnant occurring > 1 m/sec |
| | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 2 (1) |
| Habitat Smothering 5 | Adequate number of pools (1-2 per 12 times width) and <25% of habitats affected by sand or silt accumulation | Adequate number of pools (1-2 per 12 times width) and >25% of habitats affected by sand or silt accumulation | Does not have required number of pools (1-2 per 12 times width) and/or has shallow pools (<2 times prevailing depth) | Pools are absent. Most habitats affected by sand or silt accumulation |
| Primary Score 13 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | (5) 4 3 2 1 |
| Secondary Habitat Components | Good sinuosity. No evidence of dredging or artificial straightening. Developed banks. Diversity of habitat | Good sinuosity within old channelized area and a diversity of depths. Evidence of dredging in the past (>10 yrs) but mostly recovered | Some sinuosity developed within channelized area or some diversity of depth, but typically no pools (<2 times prevailing depth) present | Straightened with spoil banks. Box-cut, monotypic depth. |
| Artificial Channelization 2 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 (2) 1 |
| Bank Stability Right Bank 5 Left Bank 5 | Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. >80% of bank surfaces covered by vegetation or above the normal high water mark with low raw eroded areas. | Only meets 2 of the 3 requirements for optimal bank stability | Only meets 1 of the 3 requirements for optimal bank stability | Bankfull < 50% of bank height. Slope of bank > 60°. Bankfull is below the root zone with raw, eroded areas. |
| | 10 9 +++ | 8 7 6 ++- | (5) 4 +-- | 3 2 1 --- |
| Riparian Buffer Zone Width Right Bank 2 Left Bank 2 | Width of vegetation greater than 18m | Width of vegetation >12 to 18m | Width of vegetation 6 to 12 m; human activities still close to system | Less than 6 m of buffer zone due to intensive human activities |
| | 10 9 | 8 7 6 | 5 4 | 3 (2) 1 |
| Riparian Zone Vegetation Quality Right Bank 2 Left Bank 2 | >90% of riparian surfaces undisturbed (normal, expected plant community for given sunlight & habitat conditions; adequate plants, trees, bushes, herbs, shrubs, or non-woody macrophytes). Minimal disruption. | >60% to 90% of riparian zone undisturbed (normal, expected plant community for given sunlight & habitat conditions). Some disruption in community observed. | >30% to 60% of riparian zone is disturbed (normal, expected plant community for given sunlight & habitat conditions). Disruption obvious. | Less than 30% of riparian zone is undisturbed (normal, expected plant community for given sunlight & habitat conditions) |
| Secondary Score 20 | 10 9 | 8 7 6 | 5 4 | 3 (2) 1 |

33 TOTAL SCORE

Observers: Dave Scarboro, Peggy Morgan  Reviewer: Peggy Morgan

Form FD 9000-5  Revision Date: June 6, 2008

Stream/River Habitat Sketch Sheet, Form FD 9000-4 (December 11, 2001)
Length of grid represents 100 m of stream (not linear meters)
(Horizontal scale is double vertical scale; draw proportionately)




Substrates: Code key, draw proportionate habitat abundance.

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

Velocity:
Note where velocity measures were taken.

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

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

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

Plants observed/other notes:
not much plant life encountered
this area was channelized with ... cattle pasture, much disturbance, erosion ... low flow

Test SCI site
11-16-09
Dave Scanford

| Prod. hab | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Sweeps (Maj) | 10 | 7 | 5 | 4 | 3 |
| Sweeps (Min) | 10 | 6 | 5 | 4 | 5 |

NOTES OVER

HDs buried. Canal mostly mucky bottom - Sand is deposited from trib flowing in. That's the only place where there was any flow. Only habitat was vegetation along edge — very poor quality, mostly hyacinth + Pista, a little water Spathum.

Water lvs. Expect terrestrials, particularly spiders. Also beetles, Hyalella, Lanauta + other semis

oaks don't provide and root habitat

## Appendix I-1

Wet ID taxa list and number of algal units counted to a target of 300 natural units for qualitative natural periphyton collections made from City of Winter Haven #3 WWTP facility on 11/16/09.

| | Control Site | Test Site |
|---|---|---|
| **Bacillariophyta** | | |
| Bacillariophyta | 211 | 278 |
| **Chlorophycota** | | |
| *Chlamydomonas* sp. | - | 1 |
| *Chlorella* sp. | 7 | 2 |
| *Chlorococcum humicola* | 1 | 3 |
| *Cosmarium* sp. | 3 | - |
| *Crucigenia rectangularis* | 1 | - |
| *Crucigenia tetrapedia* | 44 | 4 |
| *Debarya* sp. | 1 | - |
| *Gloeocystis* sp. | - | 1 |
| *Mougeotia* sp. | 1 | - |
| *Pediastrum boryanum* | 1 | - |
| *Scenedesmus* sp. | 1 | - |
| *Scenedesmus bijuga* | 1 | 1 |
| *Scenedesmus quadricauda* | 8 | 3 |
| *Selenastrum* sp. | 1 | - |
| *Staurastrum* sp. | 1 | - |
| *Trochiscia reticularis* | - | 1 |
| **Cyanophycota** | | |
| *Anabaena* sp. | 1 | - |
| *Cyanobium parvum* | 2 | - |
| *Jaaginema* sp. | 6 | 2 |
| *Komvophoron schmidlei* | 1 | - |
| *Merismopedia warmingiana* | - | 1 |
| *Oscillatoria* sp. | - | 1 |
| *Pseudanabaena* sp. | 2 | - |
| *Synechocystis* sp. | 4 | - |
| **Euglenophycota** | | |
| *Euglena* sp. | - | 1 |
| *Phacus* sp. | 2 | 1 |
| *Strombomonas* sp. | - | 1 |
| *Trachelomonas* sp. | 2 | - |

## Appendix I-2

Diatom taxa list and number of valves counted to a target of 500 valves for qualitative periphyton collected from City of Winter Haven #3 WWTP facility on 11/16/09.

| | Control Site | Test Site |
|---|---|---|
| **Bacillariophyceae** | | |
| *Achnanthes fluviatilis* | 4 | 1 |
| *Achnanthes rupestoides* | - | 2 |
| *Achnanthidium exiguum* | 106 | 151 |
| *Bacillaria paxillifer* | - | 2 |
| *Capartogramma crucicula* | 2 | 3 |
| *Catenula* sp. | 5 | 9 |
| *Cocconeis* sp. | 5 | 12 |
| *Cocconeis placentula* | 6 | 31 |
| *Craticula* sp. | 1 | - |
| *Diadesmis confervacea* | 9 | 13 |
| *Encyonema silesiacum* | 1 | - |
| *Eunotia* sp. | 20 | 15 |
| *Eunotia bilunaris* | 1 | - |
| *Eunotia incisa* | 2 | - |
| *Eunotia pectinalis undulata* | - | 3 |
| *Frustulia* sp. | 4 | 1 |
| Gomphonema | 1 | 2 |
| *Gomphonema gracile* | 1 | - |
| *Gomphonema parvulum* | 4 | - |
| *Hippodonta* sp. | 2 | - |
| *Hippodonta capitata* | 12 | 8 |
| *Hippodonta hungarica* | 3 | 8 |
| *Kobayasiella* sp. | 1 | - |
| *Lemnicola hungarica* | 4 | 3 |
| *Luticola mutica* | - | 1 |
| *Mayamaea atomus* | 6 | 7 |
| *Navicula* sp. | 16 | 15 |
| *Navicula bouillantensis* | - | 4 |
| *Navicula longicephala* | 2 | - |
| *Navicula minima* | 10 | 5 |
| *Navicula porifera* | 1 | 2 |
| *Navicula sanctaecrucis* | - | 1 |
| *Neidium* sp. | - | 1 |
| *Nitzschia* sp. | 88 | 19 |
| *Nitzschia amphibia* | - | 1 |
| *Nitzschia capitellata* | 70 | 7 |
| *Nitzschia clausii* | 1 | - |

**Appendix I-2** (continued)

| | Control Site | Test Site |
|---|---|---|
| *Nitzschia frustulum bulnheimiana* | 2 | 1 |
| *Nitzschia nana* | - | 1 |
| *Nitzschia palea* | 25 | 20 |
| *Nitzschia reversa* | 2 | - |
| *Pinnularia* sp. | 5 | 3 |
| *Placoneis* sp. | 1 | 1 |
| *Placoneis clementis* | 2 | 2 |
| *Planothidium* sp. | 3 | 7 |
| *Planothidium apiculatum* | - | 1 |
| *Planothidium delicatulum* | 4 | 20 |
| *Planothidium rostratum* | 1 | - |
| *Sellaphora* sp. | 4 | - |
| *Sellaphora pupula* | 4 | 1 |
| *Stauroneis* sp. | 2 | 3 |
| *Surirella* sp. | 1 | - |
| Undetermined Naviculaceae | 10 | 16 |
| **Coscinodiscophyceae** | | |
| *Aulacoseira* sp. | 10 | 7 |
| *Cyclotella* sp. | - | 1 |
| *Cyclotella meneghiniana* | 14 | 13 |
| *Discostella pseudostelligera* | 1 | - |
| *Stephanodiscus* sp. | - | 2 |
| *Thalassiosira* sp. | 1 | - |
| Undetermined Coscinodiscophyceae | 2 | - |
| **Fragilariophyceae** | | |
| *Asterionella* sp. | - | 2 |
| *Fragilaria* sp. | - | 1 |
| *Fragilaria berolinensis* | - | 1 |
| *Fragilaria martyi* | 8 | 48 |
| *Opephora* sp. | 1 | 9 |
| *Staurosira elliptica* | 4 | 2 |
| *Staurosirella pinnata* | 1 | - |
| Undetermined Fragilariaceae | 4 | 11 |

## Appendix J-1

Qualitative benthic macroinvertebrate collapsed taxa list and number of individuals counted from 20-discrete-dipnet sweeps conducted upstream and downstream of City of Winter Haven #3 WWTP facility on 11/16/09. See SOP LT 7100 sect. 4.2.1 for method on collapsing taxa.

| | Control Site | | Test Site | |
|---|---|---|---|---|
| | **Rep 1** | **Rep 2** | **Rep 1** | **Rep 2** |
| **Annelida** | | | | |
| Hirudinea | | | | |
| Undetermined Hirudinea | - | - | 1 | - |
| **Annelida** | | | | |
| Oligochaeta | | | | |
| Haplotaxida | | | | |
| *Aulodrilus pigueti* | - | - | 3 | 1 |
| *Dero flabelliger* | - | - | 1 | - |
| *Haemonais waldvogeli* | - | - | 3 | - |
| *Limnodrilus hoffmeisteri* | 3 | 2 | - | 1 |
| *Pristina* sp. | - | - | 1 | - |
| **Arthropoda** | | | | |
| Crustacea | | | | |
| Amphipoda | | | | |
| *Hyalella azteca* | 63 | 63 | 50 | 59 |
| Decapoda | | | | |
| *Palaemonetes* sp. | 3 | 5 | 2 | 5 |
| **Arthropoda** | | | | |
| Insecta | | | | |
| Coleoptera | | | | |
| *Agasicles hygrophila* | - | 1 | 1 | - |
| *Berosus* sp. | 1 | - | - | - |
| *Dubiraphia vittata* | - | 1 | - | - |
| *Haliplus* sp. | - | - | - | 1 |
| *Hydraena marginicollis* | - | - | 1 | 1 |
| *Hydrocanthus* sp. | - | - | 2 | 4 |
| *Hydrocanthus oblongus* | 2 | - | - | - |
| *Microcylloepus pusillus* | - | - | 1 | - |
| *Peltodytes* sp. | - | 1 | - | 1 |
| *Stenelmis* sp. | - | - | - | 1 |
| *Suphisellus* sp. | 2 | - | - | - |
| Undetermined Scirtidae | - | - | - | 1 |
| Collembola | | | | |
| Undetermined Collembola | - | - | 1 | - |
| Diptera | | | | |
| *Anopheles* sp. | - | - | 1 | - |
| *Apedilum* sp. | - | 1 | - | - |

**Appendix J-1** (continued)

| | Control Site | | Test Site | |
|---|---|---|---|---|
| | **Rep 1** | **Rep 2** | **Rep 1** | **Rep 2** |
| *Cladopelma* sp. | 1 | - | - | - |
| *Dasyhelea* sp. | 2 | 1 | - | - |
| *Dicrotendipes* sp. | - | 1 | - | - |
| *Dicrotendipes simpsoni* | - | - | 1 | - |
| *Glyptotendipes* sp. | - | - | 1 | - |
| *Goeldichironomus* sp. | 1 | 3 | - | - |
| *Goeldichironomus carus* | - | - | - | 1 |
| *Goeldichironomus cf. natans* | - | - | 2 | 1 |
| *Labrundinia* sp. | - | - | - | 1 |
| *Larsia decolorata* | - | - | 1 | 1 |
| *Megistocera* sp. | - | - | 2 | - |
| *Monopelopia* sp. | - | 2 | 1 | - |
| *Odontomyia* sp. | 1 | 2 | 2 | 2 |
| *Palpomyia/bezzia* grp. | - | 1 | - | - |
| *Parachironomus* sp. | - | - | 3 | 1 |
| *Parachironomus carinatus* | - | 1 | - | - |
| *Parachironomus sublettei* | - | 1 | - | - |
| *Paratanytarsus* sp. | - | - | - | 1 |
| *Pentaneura inconspicua* | - | - | 1 | - |
| *Polypedilum flavum* | - | - | 1 | - |
| *Polypedilum halterale* grp. | 1 | 1 | 1 | 1 |
| *Polypedilum illinoense* grp. | 2 | 2 | 10 | 7 |
| *Polypedilum trigonus* | 4 | 1 | - | 2 |
| *Procladius* sp. | 1 | - | - | - |
| *Rheotanytarsus exiguus* grp. | - | - | 3 | - |
| *Tanypus* sp. | - | - | - | 1 |
| *Tanytarsus limneticus* | 1 | 1 | - | - |
| *Tanytarsus* sp. f epler | 2 | - | 1 | - |
| *Tanytarsus* sp. g epler | 5 | 2 | - | - |
| Ephemeroptera | | | | |
| *Caenis* sp. | 20 | 19 | 18 | 35 |
| *Callibaetis floridanus* | - | 1 | - | - |
| *Callibaetis pretiosus* | - | - | 2 | - |
| *Pseudocloeon propinquum* | - | - | 1 | 1 |
| Heteroptera | | | | |
| *Mesovelia mulsanti* | - | - | 1 | - |
| *Paraplea* sp. | - | - | 2 | 1 |
| *Ranatra* sp. | - | 1 | - | - |
| *Ranatra buenoi* | - | - | 1 | - |
| Undetermined Mesoveliidae | 3 | - | - | - |
| Undetermined Pleidae | 3 | 1 | - | - |

**Appendix J-1** (continued)

| | Control Site | | Test Site | |
|---|---|---|---|---|
| | **Rep 1** | **Rep 2** | **Rep 1** | **Rep 2** |
| Lepidoptera | | | | |
| Undetermined Lepidoptera | 5 | 2 | - | 3 |
| Odonata | | | | |
| *Aphylla williamsoni* | - | 1 | - | - |
| *Argia* sp. | - | - | - | 7 |
| *Enallagma* sp. | 7 | 12 | - | - |
| *Miathyria marcella* | - | - | - | 2 |
| *Neurocordulia* sp. | 1 | - | - | - |
| *Neurocordulia alabamensis* | - | 2 | - | - |
| Undetermined Coenagrionidae | - | - | 4 | - |
| Trichoptera | | | | |
| *Cheumatopsyche* sp. | - | - | - | 4 |
| *Nectopsyche* sp. | - | - | 4 | - |
| *Oecetis* sp. | 2 | - | - | - |
| *Oecetis nocturna* | - | 2 | - | - |
| *Oxyethira* sp. | - | - | - | 2 |
| **Mollusca** | | | | |
| Bivalvia | | | | |
| Veneroida | | | | |
| Undetermined Sphaeriidae | 3 | 2 | 2 | - |
| Gastropoda | | | | |
| Basommatophora | | | | |
| Undetermined Ancylidae | 2 | 8 | 10 | 4 |
| Mesogastropoda | | | | |
| *Elimia* sp. | 2 | 2 | - | - |
| *Pyrgophorus platyrachis* | - | 6 | 4 | 3 |
| *Viviparus* sp. | 2 | 1 | - | - |

## Appendix J-2

Qualitative benthic macroinvertebrate taxa list and number of individuals counted from 20-discrete-dipnet sweeps conducted upstream and downstream of City of Winter Haven #3 WWTP facility on 11/16/09.

| | Control Site | | Test Site | |
|---|---|---|---|---|
| | **Rep 1** | **Rep 2** | **Rep 1** | **Rep 2** |
| **Annelida** | | | | |
| Hirudinea | | | | |
| Undetermined Hirudinea | - | - | 1 | - |
| Oligochaeta | | | | |
| Haplotaxida | | | | |
| *Aulodrilus pigueti* | - | - | 1 | 1 |
| *Dero flabelliger* | - | - | 1 | - |
| *Haemonais waldvogeli* | - | - | 3 | - |
| *Limnodrilus hoffmeisteri* | 1 | 1 | - | 1 |
| *Pristina* sp. | - | - | 1 | - |
| Undetermined Tubificidae | 2 | 1 | 2 | - |
| **Arthropoda** | | | | |
| Crustacea | | | | |
| Amphipoda | | | | |
| *Hyalella azteca* | 63 | 63 | 50 | 59 |
| Decapoda | | | | |
| *Palaemonetes* sp. | 3 | 5 | 2 | 5 |
| Insecta | | | | |
| Coleoptera | | | | |
| *Agasicles hygrophila* | - | 1 | 1 | - |
| *Berosus* sp. | 1 | - | - | - |
| *Dubiraphia vittata* | - | 1 | - | - |
| *Haliplus* sp. | - | - | - | 1 |
| *Hydraena marginicollis* | - | - | 1 | 1 |
| *Hydrocanthus* sp. | - | - | 2 | 4 |
| *Hydrocanthus oblongus* | 2 | - | - | - |
| *Microcylloepus pusillus* | - | - | 1 | - |
| *Peltodytes* sp. | - | 1 | - | 1 |
| *Stenelmis* sp. | - | - | - | 1 |
| *Suphisellus* sp. | 2 | - | - | - |
| Undetermined Scirtidae | - | - | - | 1 |
| Collembola | | | | |
| Undetermined Collembola | - | - | 1 | - |
| Diptera | | | | |
| *Anopheles* sp. | - | - | 1 | - |

**Appendix J-2** (continued)

| | Control Site | | Test Site | |
|---|---|---|---|---|
| | **Rep 1** | **Rep 2** | **Rep 1** | **Rep 2** |
| *Apedilum* sp. | - | 1 | - | - |
| *Cladopelma* sp. | 1 | - | - | - |
| *Dasyhelea* sp. | 2 | 1 | - | - |
| *Dicrotendipes* sp. | - | 1 | - | - |
| *Dicrotendipes simpsoni* | - | - | 1 | - |
| *Glyptotendipes* sp. | - | - | 1 | - |
| *Goeldichironomus* sp. | 1 | 2 | - | - |
| *Goeldichironomus carus* | - | - | - | 1 |
| *Goeldichironomus cf. natans* | - | - | 2 | 1 |
| *Labrundinia* sp. | - | - | - | 1 |
| *Larsia decolorata* | - | - | 1 | 1 |
| *Megistocera* sp. | - | - | 2 | - |
| *Monopelopia* sp. | - | 2 | 1 | - |
| *Odontomyia* sp. | 1 | 2 | 2 | 2 |
| *Palpomyia/bezzia* grp. | - | 1 | - | - |
| *Parachironomus* sp. | - | - | 3 | 1 |
| *Parachironomus carinatus* | - | 1 | - | - |
| *Parachironomus sublettei* | - | 1 | - | - |
| *Paratanytarsus* sp. | - | - | - | 1 |
| *Pentaneura inconspicua* | - | - | 1 | - |
| *Polypedilum flavum* | - | - | 1 | - |
| *Polypedilum halterale* grp. | 1 | 1 | 1 | 1 |
| *Polypedilum illinoense* grp. | 2 | 2 | 7 | 5 |
| *Polypedilum trigonus* | 4 | 1 | - | 2 |
| *Procladius* sp. | 1 | - | - | - |
| *Rheotanytarsus exiguus* grp. | - | - | 3 | - |
| *Tanypus* sp. | - | - | - | 1 |
| *Tanytarsus limneticus* | 1 | 1 | - | - |
| *Tanytarsus* sp. f epler | 2 | - | 1 | - |
| *Tanytarsus* sp. g epler | 4 | 2 | - | - |
| Undetermined Chironomidae | 1 | 1 | 3 | 2 |
| Ephemeroptera | | | | |
| *Caenis* sp. | 20 | 19 | 18 | 35 |
| *Callibaetis floridanus* | - | 1 | - | - |
| *Callibaetis pretiosus* | - | - | 1 | - |
| *Pseudocloeon propinquum* | - | - | 1 | 1 |
| Undetermined Baetidae | - | - | 1 | - |
| Heteroptera | | | | |
| *Mesovelia mulsanti* | - | - | 1 | - |
| *Paraplea* sp. | - | - | 2 | 1 |
| *Ranatra* sp. | - | 1 | - | - |

**Appendix J-2** (continued)

| | Control Site | | Test Site | |
|---|---|---|---|---|
| | **Rep 1** | **Rep 2** | **Rep 1** | **Rep 2** |
| *Ranatra buenoi* | - | - | 1 | - |
| Undetermined Mesoveliidae | 3 | - | - | - |
| Undetermined Pleidae | 3 | 1 | - | - |
| Lepidoptera | | | | |
| Undetermined Lepidoptera | 5 | 2 | - | 3 |
| Odonata | | | | |
| *Aphylla williamsoni* | - | 1 | - | - |
| *Argia* sp. | - | - | - | 1 |
| *Enallagma* sp. | 7 | 11 | - | - |
| *Miathyria marcella* | - | - | - | 1 |
| *Neurocordulia* sp. | 1 | - | - | - |
| *Neurocordulia alabamensis* | - | 2 | - | - |
| Undetermined Coenagrionidae | - | 1 | 4 | 6 |
| Undetermined Libellulidae | - | - | - | 1 |
| Trichoptera | | | | |
| *Cheumatopsyche* sp. | - | - | - | 4 |
| *Nectopsyche* sp. | - | - | 4 | - |
| *Oecetis* sp. | 2 | 1 | - | - |
| *Oecetis nocturna* | - | 1 | - | - |
| *Oxyethira* sp. | - | - | - | 1 |
| Undetermined Hydroptilidae | - | - | - | 1 |
| **Mollusca** | | | | |
| Bivalvia | | | | |
| Veneroida | | | | |
| Undetermined Sphaeriidae | 3 | 2 | 2 | - |
| Gastropoda | | | | |
| Basommatophora | | | | |
| Undeteremind Ancylidae | 2 | 8 | 10 | 4 |
| Mesogastropoda | | | | |
| *Elimia* sp. | 2 | 2 | - | - |
| *Pyrgophorus platyrachis* | - | 6 | 3 | 3 |
| *Viviparus* sp. | 2 | 1 | - | - |
| Undetermined Hydrobiidae | - | - | 1 | - |

## The Bioassay of the City of Winter Haven #3 Wastewater Treatment Plant effluent sampled on November 16, 2009, NPDES #FL0036048

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

| Transaction Code | | NPDES NUMBER | | | | | | | | | | | YR/MO/DA | | | | | | Insp Type | Inspector | Fac Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N | 2 | 5 | 3 | F | L | 0 | 0 | 3 | 6 | 0 | 4 | 8 | 11 | 12 | 0 | 9 | 1 | 1 | 1 | 6 | # **B** | # **S** | # 1 |

Remarks

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## The Priority Pollutants Analysis for Bioassay of the City of Winter Haven #3 Wastewater Treatment Plant effluent sampled on November 16, 2009, NPDES #FL0036048

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

| Transaction Code | | NPDES NUMBER | | | | | | | | | | | YR/MO/DA | | | | | | Insp Type | Inspector | Fac Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N | 2 | 5 | 3 | F | L | 0 | 0 | 3 | 6 | 0 | 4 | 8 | 11 | 12 | 0 | 9 | 1 | 1 | 1 | 6 | # **X** | # **S** | # 1 |

Remarks

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## Biological Analyses of the City of Winter Haven #3 Wastewater Treatment Plant effluent sampled on November 16, 2009, NPDES #FL0036048

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

| Transaction Code | | NPDES NUMBER | | | | | | | | | | | YR/MO/DA | | | | | | Insp Type | Inspector | Fac Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N | 2 | 5 | 3 | F | L | 0 | 0 | 3 | 6 | 0 | 4 | 8 | 11 | 12 | 0 | 9 | 1 | 1 | 1 | 6 | # **S** | # **S** | # 1 |

Remarks

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