


Biological Assessment of

**Bonifay Wastewater Treatment Facility**

Holmes County, Florida

NPDES #FL0027731

Sampled April 2002

January 2003

**Biology Section Bureau of Laboratories**
**Division of Resource Assessment & Management**

Comprehensive Quality Assurance Plan #870346G

## Florida Department of Environmental Protection

## Fifth Year Inspection Summary

| | |
|---|---|
| Discharger: | Bonifay Waste Water Treatment Facility |
| County: | Holmes |
| NPDES Number: | FL0027731 |
| Permit Expiration: | 31 July 2002 |
| Date Sampled: | 15 and 16 April 2002 |

Toxics Sampling Inspection **(XSI)**

**Date Sampled:** 15 April 2002

**Results:** Aluminum, cadmium, copper, iron, lead and zinc were found in the effluent at levels that complied with Class III Water Quality Standards. Silver was found in the effluent (0.25 µg/L) at a level that exceeded Class III Water Quality Standards (0.07 µg/L) (62-302.530(60) FAC). Diazinon (0.067 µg/L) was detected in the effluent. Total residual chlorine measured in the bioassay sample in the laboratory (0.54 mg/L) exceeded permit limits and Class III Water Quality Standards (FAC 62-302.530(19)) by a factor of more than 50.

Compliance Biomonitoring Inspection **(CBI)**

**Date Sampled:** 15 April 2002

**Results:** The effluent sample was toxic to both the fish, *Cyprinella leedsi,* and the water flea, *Ceriodaphnia dubia*, a violation of Class III Water Quality Standards (FAC 62-302.530 (62)). A dechlorinated aliquot of the effluent sample was not toxic to the fish, *Cyprinella leedsi,* or to the water flea, *Ceriodaphnia dubia,* during 48-hour acute screening bioassays.

Water Quality Inspection **(WQI)**

**Date Sampled:** 15 April 2002

**Results:** Effluent concentrations of ortho-phosphate (0.68 mg/L), total phosphorus (0.87 mg/L), ammonia (0.53 mg/L), nitrate+nitrite (0.28 mg/L), and total Kjeldahl nitrogen (1.5 mg/L) contributed to enrichment of nitrogen and phosphorus at the Test Site. The Test Site values were found to be greater than 40-80% of other Florida waters. In contrast, the nutrients at the Control Site were only greater than 20-30% of typical of Florida streams, except ammonia (0.072 mg/L), which was greater than about 40% of typical Florida streams. The Control Site AGP value (6.0 mg dry weight/L) was just over the "problem threshold" of 5.0 mg dry weight/L, while the Test Site value (18.5 mg dry weight/L) was more than three times the problem threshold. The effluent AGP was 30.8 mg dry weight/L. These results are a further indication of enrichment downstream of the facility due to the effluent.

Impact Bioassessment Inspection **(IBI)**

**Date Sampled:** 15 and 16 April 2002

**Results:** Macroinvertebrate community data suggest degradation at the Test Site related to the facility's effluent. The Shannon-Weaver Diversity Index was 63% lower at the Test Site (0.9) compared to the Control Site (2.4), a violation of the Class III Biological Integrity Criterion (62-302.530 (11) FAC). Quantitative macroinvertebrate data showed 95.6% of the total community consisted of dipterans and the number of individuals rose from 87 at the Control Site to 1,811 at the Test Site. These results may indicate an increase in productivity in response to nutrient enrichment from the facility. In qualitative dipnet data, the dominant taxon comprised 81.6% of the community compared with 25.5%, and taxa richness was 68% lower at the Test Site compared to the Control Site. The Control Site received a SCI score of 21, which placed it in the "Good" category, while the Test Site received the lowest possible score of 7, placing it in the "Very Poor" category. Periphyton cell density was twice as high at the Test Site compared to the Control Site, reflecting a ten-fold increase in percentage of green algae at the Test Site. This change in algal community structure may also be related to the facility's effluent. The SCI and algal community composition data indicate an imbalance of flora or fauna, a violation of FAC 62-302.530 (48)(b).

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 Bonifay Wastewater Treatment Facility (WWTF) is a domestic wastewater treatment plant in Holmes County, Florida (Appendix 1). Wastewater treatment at this plant includes influent grit removal, screening, dual sequential batch reactors, post equalization, chlorine disinfection, post-aeration, and dechlorination. Residuals are acrobically digested and land applied (Appendix 2). The effluent is discharged into the Class III freshwaters of an unnamed tributary of Camp Branch Creek. The design flow of the wastewater system is 1.4 million gallons per day (MGD). The actual flow during this survey was 0.878 MGD (Appendix 2).

State permit limits for the facility are listed in Table 1. Water Quality Criteria follow Florida Administrative Code (FAC) 62-302. According to the facility's monthly operating reports, the plant has had several previous nitrogen and total suspended solids violations as the result of a total plant kill in 1999, but has had no recent violations (Appendix 2).

## Methods

The purpose of this investigation was to determine the effects of the Bonifay WWTF on the biota in an unnamed tributary of Camp Branch Creek. Chemical and biological comparisons were made between an upstream control site (located in an unnamed tributary of Camp Branch Creek, approximately 50 meters upstream of the discharge) and a downstream test site (located in the same unnamed tributary of Camp Branch Creek, approximately 100 meters downstream of the discharge). A habitat assessment was performed *in situ* to compare upstream and downstream sites. The resulting scores were based upon examinations of the physical structure and extent of disturbance at the study sites and aid in the interpretation of biological community data. Supplemental physical and chemical data were collected on the effluent and at both study sites. Data for this report were collected on April 15 and 16, 2002.

The effluent was analyzed for nutrients, metals, organic constituents (base, neutral, and acid extractables), herbicides, and pesticides. A list of the analytes tested for, minimum detection limits, and practical quantitation levels are found in Appendix 3. Levels of chemical constituents were compared with Water Quality Criteria (FAC 62-302) and facility permit limits (Table 1, Appendix 2). Methods used for all chemical analyses are on file at the DEP Central Chemistry Laboratory in Tallahassee and may be viewed on the web at http://www.floridadep.org/labs/sop/index.htm.

Acute screening toxicity bioassays were performed on the effluent sample using the water flea, *Ceriodaphnia dubia,* and the fish, *Cyprinella leedsi* (Weber 1993). The effluent and water from control and test sites were analyzed for the presence and concentration of total and fecal coliform bacteria (APHA 1992, methods 9222B, 9222D).

An effluent sample and water samples from the control and test Sites were autoclaved, filtered (0.45 mm), and incubated with the unicellular green alga, *Rhapidocelis subcapitata* (formerly *Selenastrum capricornutum)*, as a measure of algal growth potential (Miller *et al.* 1978). To measure possible inhibition of algal growth based on toxicants in effluent or site water, AGP results were compared to expected levels of dry weight production based on the nutrient content of site water (Miller et al. 1978, Appendix 4).

Periphyton were sampled at both control and test sites by incubating glass microscope slides in a standard periphytometer for 28 days (APHA 1992, method 1033). Periphyton were subsampled and identified to the lowest practicable level, usually species. No periphyton samples were collected for chlorophyll *a* determination. Periphyton assemblages were examined for (1) cell density, (2) community composition, (3) taxa richness, and (4) Shannon-Weaver Diversity Index.

Benthic macroinvertebrates were collected from multiple substrates (*e.g.* snags, leaf packs, vegetation) using discrete dipnet sweeps (qualitative samples, method modified from Plafkin *et al.* 1989). Collections were also made with Hester-Dendy multiplate samplers incubated for 28 days (quantitative samples, method modified from APHA 1992, method 10500.5). Benthic macroinvertebrates were sorted and identified to the lowest practical taxonomic level, usually species. Eight measures were calculated from benthic macroinvertebrate data to determine the effects of the discharge on receiving waters. These measures included: (1) taxa richness, (2) community composition, (3) functional feeding groups,

(4) percent dominant taxon, (5) Shannon-Weaver Diversity Index, (6) the Florida Index, (7) the number of Ephemeroptera, Plecoptera and Trichoptera (EPT) taxa, and (8) the Stream Condition Index (SCI). For a discussion of each biological measure and its possible relation to Florida Administrative Code, see Appendix 4.

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

The following personnel were involved in this investigation: Glenn Butts and Frank Butera (DEP Northwest District), and DEP Central Laboratory staff in Tallahassee. The report was reviewed by District representatives and the Point Source Studies Review Committee (Wayne Magley, Chuck Ziegmont and Michael Tanski).

## Results and Discussion

Chemical results are reported in Table 1. Aluminum, cadmium, copper, iron, lead and zinc were found in the effluent sample at levels that complied with Class III Freshwater Water Quality Criteria (FAC 62-302). Silver was detected in the effluent at 0.25 mg/L, a violation of Class III Water Quality Criteria (62-302.530(60) FAC). Diazinon, a pesticide and an organic pollutant, was detected in the effluent (0.067 mg/L). Effluent total residual chlorine measured in the bioassay sample in the laboratory (0.54 mg/L) exceeded permit limits and Class III Water Quality Criteria (≤0.01 mg/L, FAC 62-302.530(19)) by a factor of more than 50.

Habitat assessment scores were 45 at the upstream Control Site and 49 at the downstream Test Site, placing both in the "marginal" category (Table 1, Appendix 7). The Test Site received a slightly higher score due to a slightly greater riparian zone width and substrate diversity and availability. There was low quality vegetation in the riparian zone, habitat smothering, low bank stability, slow water velocity and artificial channelization at both the Control and Test Sites. Physical and chemical measurements were similar between study sites and complied with Class III Water Quality Standards (Table 1, FAC 62-302). Dissolved oxygen, water temperature, and pH at the Test and Control Sites were within normal ranges and were typical of Florida waters (Table 1). Color was high (160 Pt-Co) above the outfall, dropping to 80 Pt-Co below the outfall; effluent from Bonifay WWTF was of relatively low color (30 Pt-Co). Turbidity at the Control Site was high (26 NTU), possibly due to muck and silt on the stream bottom at the Control Site. The Test Site's turbidity was 11 NTU. The lower turbidity at the Test Site could be attributed to the higher fraction of sand in the test-site substrate compared to the control-site substrate or to dilution by lower turbidity effluent (7 NTU). Both sites were more turbid than 90% of typical Florida streams (Appendix 5). Total suspended solids (TSS, mg/L) followed the same pattern, with higher TSS above the outfall and dilution by the effluent. Although high upstream turbidity and TSS appear due to upstream disturbance and stormwater inputs, we note that effluent total suspended solids were 13 mg/L, 3mg/L below the permit single maximum reading and above the maximum monthly and annual averages (Appendix 2).

The effluent sample was toxic to the fish, *Cyprinella leedsi,* and the water flea, *Ceriodaphnia dubia*, a violation of Class III Water Quality Criteria (Table 1, (62-302.530 (62) FAC), Appendix 6). When the effluent sample was dechlorinated in the laboratory, it was not toxic to the fish, *Cyprinella leedsi,* or to the water flea, *Ceriodaphnia dubia,* during 48-hour acute screening bioassays.

Effluent concentrations of total nitrogen (1.78 mg/L), total phosphorus (0.87 mg/L), ortho-phosphate (0.68 mg/L), and nitrate+nitrite concentrations (0.28 mg/L) contributed to nutrient enrichment in the Test Site samples. Test Site concentrations were much higher than corresponding levels at the Control Site (Table 1). For example, ortho-phosphate in the test-site sample was 0.43 mg/L, was an order of magnitude higher than the Control Site sample (0.034 mg/L). The same was true for total phosphorus (0.60 mg/L at the Test Site vs. 0.094 mg/L at the Control Site). Ammonia, total Kjeldahl nitrogen, and nitrate+nitrite levels were also higher in the Test Site samples than in the Control Site samples (Table 1). Levels of these nutrients in the receiving waters at the Test Site were greater than 40-50% of typical Florida streams, with total phosphorus and ortho-phosphate being greater than 80% of typical Florida waters. In contrast, the nutrients at the Control Site were only greater than 20-30% of typical of Florida streams, except ammonia (0.072 mg/L), which was greater than about 40% of typical Florida streams (Appendix 5).

Algal growth potential (AGP) is a measure of nutrients available for algal growth (Miller *et al.* 1978).

***Table 1. Effluent limits and summary of chemical, microbiological and toxicological data.***

| Bonifay WWTF | Effluent Limits | Effluent Samples | Control Site | Test Site |
|---|---|---|---|---|
| **Organic Constituents (ug/L)** | | | | |
| Diazinon | - | 0.067 I | - | - |
| **Metals (ug/L, unless otherwise noted)** | | | | |
| Aluminum | 1500 ** | 190 I | - | - |
| Arsenic | 50 ** | 3.0 U | - | - |
| Cadmium | 0.9* b | 0.032 I | - | - |
| Calcium (mg/L) | - | 24.1 A | - | - |
| Chromium | 159.1 *b | 2.0 U | - | - |
| Copper | 9.0 *b | 4.7 A | - | - |
| Iron | 1000 ** | 296 A | - | - |
| Lead | 2.1 *b | 0.57 I | - | - |
| Magnesium (mg/L) | - | 3.0 A | - | - |
| Nickel | 120.2 *b | 2.0 U | - | - |
| Selenium | 5.0 ** | 0.50 U | - | - |
| Silver | 0.07 ** | **0.25 A** | - | - |
| Zinc | 80.7 *b | 28 A | - | - |
| **Nutrients (mg/L)** | | | | |
| Ortho-phosphate | - | 0.68 | 0.034 | 0.43 |
| Total Phosphorus | 6.0 *s | 0.87 | 0.094 | 0.60 |
| Ammonia | - | 0.53 | 0.072 | 0.13 |
| Unionized Ammonia | ≤0.02 ** | ≤0.017 | ≤0.017 | ≤0.017 |
| Nitrate+Nitrite | - | 0.28 J | 0.038 J | 0.097 J |
| Total Kjeldahl Nitrogen | - | 1.5 | 0.45 | 1.1 |
| Organic Nitrogen | - | 0.97 c | 0.38 c | 0.97 c |
| Total Nitrogen | 10.0 *s | 1.78 c | 0.49 c | 1.2 c |
| **General Physical and Chemical Parameters** | | | | |
| Habitat Assessment | - | - | 45 | 49 |
| Dissolved Oxygen (mg/L) | 6.0 *s | 8.7 | 7.1 | 7.6 |
| pH (SU) | 6.0-8.5 *s | 6.6 | 6.5 | 6.9 |
| Conductivity (mmhos/cm) | 1275 ** | 218 | 170 | 209 |
| Temperature (°C) | - | 22.3 | 21.7 | 22.1 |
| Total Suspended Solids (mg/L) | 16.0 *s | 13.0 A | 26 | 13 |
| Turbidity (NTU) | 55 c | 7 | 26 | 11 A |
| Residual chlorine (mg/L) | 0.01 ** | **0.54** | - | - |
| Color (Pt-Co) | - | 30 | 160 | 80 A |
| BOD, 5 day (mg/L) | 16.0 *s | 2 U | 1.7 A | 1.8 |
| Flow (MGD) | 1.4 | 0.878 | - | - |
| Hardness (mg $CaCO_3$) | - | 73 | 70 | 72 |
| **Toxicity (48-hour static, screening bioassay, percent mortality in 100% effluent)** | | | | |
| Bioassay - Water flea | NOEC | **100%** | - | - |
| Bioassay - Water flea dechlorinated | - | 0% | - | - |
| Bioassay - Fish | NOEC | **100%** | - | - |
| Bioassay - Fish dechlorinated | - | 0% | - | - |
| **Microbiology (Number of counts/100ml)** | | | | |
| Fecal Coliforms | 800 *s | 10 U | 610 B | 295 A |
| Total Coliforms | 2400 ** | 220 | 660 | 785 A |

* Permit limit.

** Class III Water Quality Standard.

a - Annual average.

b - Value is calculated based on hardness.

c - Value is calculated.

s - Single sample.

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

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

I - Value reported is < the MQL, and ? the MDL.

J - Estimated value.

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

NOEC - No observed effect concentration in 100% effluent.

**Bold face type is used to indicate permit or standards violations.**

***Table 2. Measured and predicted algal growth potential (AGP) in mg dry weight/L for total soluble inorganic nitrogen (TSIN) limitation***

| Location | AGP (measured) | Predicted AGP (TSIN) ± 20% | N:P ratio |
|---|---|---|---|
| Control | 6.0 | 4.2 ± 0.8 | 3.2 |
| Test | 18.5 | 8.6 ± 1.7 | 0.5 |
| Effluent | 30.8 | 30.8 ± 6.2 | 1.2 |

Raschke and Shultz (1987) found that AGP values above 5.0 mg dry weight/L indicate a "problem" threshold for fresh receiving waters, implying nutrient enrichment. The AGP value for the Control Site sample was 6.0 mg dry wt/L, which is slightly above this threshold. This suggests that some nutrient enrichment was already present upstream of the outfall that is not attributed to the discharge (Table 2). The AGP value for the Test Site sample was 18.5 mg dry wt/L, and the effluent sample value was 30.8 mg dry wt/L, more than three and six times the "problem" threshold, respectively. The Test Site and the effluent AGP values indicate nutrient enrichment related to the Bonifay WWTF discharge. There was no evidence of growth inhibition in AGP results (Table 2).

There were differences between periphyton communities at the Control and Test Sites, suggesting nutrient enrichment downstream of the Bonifay discharge is affecting the algal community (Table 3, Appendix 8). Periphyton community composition at the Control Site was 87.7% diatoms, 9.4% blue-green algae and 2.9% green algae. Periphyton community composition at the Test Site was 63.3% diatoms, 5.7% blue-green algae, and 31.0% green algae. Periphyton density in the Test Site sample (94,728 organisms/$cm^2$) was almost twice that of the Control Site sample (48,920 organisms/$cm^2$). The greater algal density and the higher percentage of green algae at the Test Site may be related to the elevated nutrient levels downstream of the discharge, and suggest an imbalance of flora, a violation of FAC 62-302.530(48)(b).

**Quantitative** measures of benthic macroinvertebrate assemblages from Hester-Dendy multiplate samplers showed evidence of degradation at the Test Site compared to the Control Site (Table 4, Appendix 9). The Shannon-Weaver Diversity Index was 63% lower at the Test Site (0.9) compared to the Control Site (2.4), a violation of the Class III Biological Integrity Criterion (62-302.530(11) FAC). Surface deposit feeders were the dominant feeding group and totaled 87.4 % of the Test Site community. At the Control Site, an algal scraper, *Physella* sp. was the most abundant macroinvertebrate (51.4%). The total number of individuals on Hester-Dendy samplers at the Control Site was 87, but the Test Site had more than 20 times as many macroinvertebrates (1,811 individuals), 95% of which were *Chironomus* sp., a pollution-tolerant dipteran. This extreme shift in the macroinvertebrate community also suggests an imbalance of fauna related to the facility, a violation of FAC 62-302.530(48)(b).

**Qualitative** measures of benthic macroinvertebrate assemblages from dipnet samples are summarized in Tables 5 and 6 and in Appendix 10. The control-site SCI score of 21 placed the site in the "Good" category and the test-site SCI score of 7 (the lowest possible SCI score) placed it in the "Very Poor" category. The Test Site had a reduced number of taxa (7) compared to the Control Site (22), and neither site had any pollution-sensitive EPT taxa. The Florida Index values (2 at the Control Site and 1 at the Test Site) were also low at both sites. Similar to the Hester-Dendy data, the identity and relative abundance of the dominant taxon differed above and below the discharge. The dominant taxon at the Control Site was *Physella* sp. (25.5% of the total) while at the Test Site it was *Chironomus* sp. (81.6% of the total). The qualitative data also suggests an imbalance of fauna related to the facility, a violation of FAC 62-

***Table 3. Periphyton composition at control and test sites.***

| Bonifay WWTF | Control Site | Test Site |
|---|---|---|
| Number of Taxa | 25 | 35 |
| Shannon-Weaver Diversity | 3.4 | 3.3 |
| Algal Density (number/$cm^2$) | 48,920 | 94,728 |
| Number of Algal Units Identified | 244 | 403 |
| Percentage Composition: | | |
| Blue-green algae | 9.4 | 5.7 |
| Green algae | 2.9 | 31.0 |
| Diatoms | 87.7 | 63.3 |

*Table 4. Macroinvertebrate Hester-Dendy Samples*

| Bonifay WWTF | Control Site | Test Site |
|---|---|---|
| **Macroinvertebrate Quantitative Hester-Dendy** | | |
| Shannon-Weaver Diversity | 2.4 | 0.9 |
| Number of Taxa | 14 | 15 |
| Florida Index | 3 | 2 |
| Number of EPT Taxa | 0 | 0 |
| Total Number of Individuals | 87 | 1811 |
| **Community Composition: Percent of total** | | |
| Oligochaeta | 31.0 | 4.3 |
| Diptera | 12.7 | 95.6 |
| Gastropoda | 54.0 | 0.1 |
| **Functional Feeding Groups: Percent of total** | | |
| Burrowing Deposit Feeders | 17.2 | 0.2 |
| Predators | 1.7 | 6.8 |
| Surface Deposit Feeders | 7.5 | 87.4 |
| Suspension Feeders | 2.3 | 0.1 |
| Scrapers | 54.0 | 0.1 |
| Shredders | 0.6 | 1.4 |
| Unknown | 16.1 | 4.1 |

**Bold face indicates violation of the Biological Integrity Criterion.**

302.530(48)(b). We note that the dominant taxon (>80% of the total) at the Test Site in both quantitative and qualitative macroinvertebrate samples was the pollution-tolerant dipteran, *Chironimus* sp.

## Summary

In summary, the effluent from the Bonifay WWTF was acutely toxic, a violation of 62-302.530 (62) FAC, and had silver and total residual chlorine concentrations that exceeded Class III Water Quality Standards, a violation of FAC 62-302.530(60) and 62-302.530(19). The effluent nutrient concentrations contributed to the enrichment of the receiving waters. Macroinvertebrate and algal communities were stressed at both the Control and Test Sites in the receiving waters. However, both quantitative and qualitative measures of macroinvertebrate health declined downstream of the outfall at the Test Site compared to the upstream Control Site. Decreases in Shannon Weaver diversity from Hester-Dendy multiplate samplers violated the Class III Water Quality Biological Integrity Criterion (62-302.530 (11) FAC). The degradation at the Test Site is attributed to the facility's effluent. The lines of evidence for this degradation are a toxic effluent, high effluent and Test Site AGP values, SCI ranking of "very poor" downstream of the outfall, high numbers of pollution tolerant organisms at the Test Site, lower species diversity at the Test Site when compared to the control, lower number of macroinvertebrate taxa at the Test Site compared to the Control Site, and an increase in green algae at the Test Site compared with the Control Site. These lines of evidence suggest an imbalance of the flora and fauna at the Test Site, a violation FAC 62-302.530(48)(b).

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***Table 5. Macroinvertebrate Dipnet Samples***

| Bonifay WWTF | Control Site | Test Site |
|---|---|---|
| Stream Condition Index (value) | 21 | 7 |
| Stream Condition Index (word) | Good | Very Poor |
| **Stream Condition Index Metrics** | | |
| Florida Index | 2 | 1 |
| Number of EPT Taxa | 0 | 0 |
| Number of Taxa | 22 | 7 |
| Number of Chironomid Taxa | 9 | 4 |
| Percent Dominant Taxon | 25.5 | 81.6 |
| Percent Dipterans | 16.4 | 88.6 |
| Percent Suspension Feeders and Filterers | 23.2 | 0.9 |
| Total Number of Individuals | 110 | 114 |
| **Community Composition: Percent of total** | | |
| Amphipoda | 0.9 | 0.0 |
| Pelecypoda | 22.7 | 0.9 |
| Diptera | 16.4 | 88.6 |
| Gastropoda | 31.8 | 0.0 |
| Oligochaeta | 28.2 | 10.5 |
| **Functional Feeding Groups: Percent of total** | | |
| Burrowing Deposit Feeders | 17.3 | 9.7 |
| Predators | 12.7 | 5.3 |
| Surface Deposit Feeders | 5.5 | 82.5 |
| Suspension Feeders and Filterers | 23.2 | 0.9 |
| Scrapers | 31.8 | 0.0 |
| Shredders | 2.3 | 0.9 |
| Unknown | 7.3 | 0.9 |

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**Table 6.** ***Stream Condition Index***

| Bonifay WWTF Control Site | Value | 5 | 3 | 1 | Score |
|---|---|---|---|---|---|
| Total Number of Taxa | 22 | ≥31 | 30-16 | <16 | 3 |
| Number of EPT Taxa | 0 | ≥7 | 6-4 | <4 | 1 |
| Number of Chironomid Taxa | 9 | ≥9 | 8-5 | <5 | 5 |
| Percent Contribution of Dominant Taxon | 25.5 | ≤22 | 23-61 | >61 | 3 |
| Percent Diptera | 16.4 | - | ≤50 | >50 | 3 |
| Florida Index | 2 | ≥16 | 15-8 | <8 | 1 |
| Percent Suspension Feeders and Filterers | 23.2 | ≥12 | 11-6 | <6 | 5 |
| **Total Score** | | **Panhandle** | | | **21** |
| Interpretation of Scores by Region | | **Excellent** | | | 27-33 |
| | | **Good** | | | 21-26 |
| | | **Poor** | | | 14-20 |
| | | **Very Poor** | | | 7-13 |

Summer Index Period: April 1-October 31. Stream Condition Index (SCI) for Florida Panhandle. Values calculated from benthic macroinvertebrates collected with 20 standardized dipnet sweeps (Barbour *et al.* 1996a, b).

| Bonifay WWTF Test Site | Value | 5 | 3 | 1 | Score |
|---|---|---|---|---|---|
| Total Number of Taxa | 7 | ≥31 | 30-16 | <16 | 1 |
| Number of EPT Taxa | 0 | ≥7 | 6-4 | <4 | 1 |
| Number of Chironomid Taxa | 4 | ≥9 | 8-5 | <5 | 1 |
| Percent Contribution of Dominant Taxon | 81.6 | ≤22 | 23-61 | >61 | 1 |
| Percent Diptera | 88.6 | - | ≤50 | >50 | 1 |
| Florida Index | 1 | ≥16 | 15-8 | <8 | 1 |
| Percent Suspension Feeders and Filterers | 0.9 | ≥12 | 11-6 | <6 | 1 |
| **Total Score** | | **Panhandle** | | | **7** |
| Interpretation of Scores by Region | | **Excellent** | | | 27-33 |
| | | **Good** | | | 21-26 |
| | | **Poor** | | | 14-20 |
| | | **Very Poor** | | | 7-13 |

Summer Index Period: April 1-October 31. Stream Condition Index (SCI) for Florida Panhandle. Values calculated from benthic macroinvertebrates collected with 20 standardized dipnet sweeps (Barbour *et al.* 1996a, b).

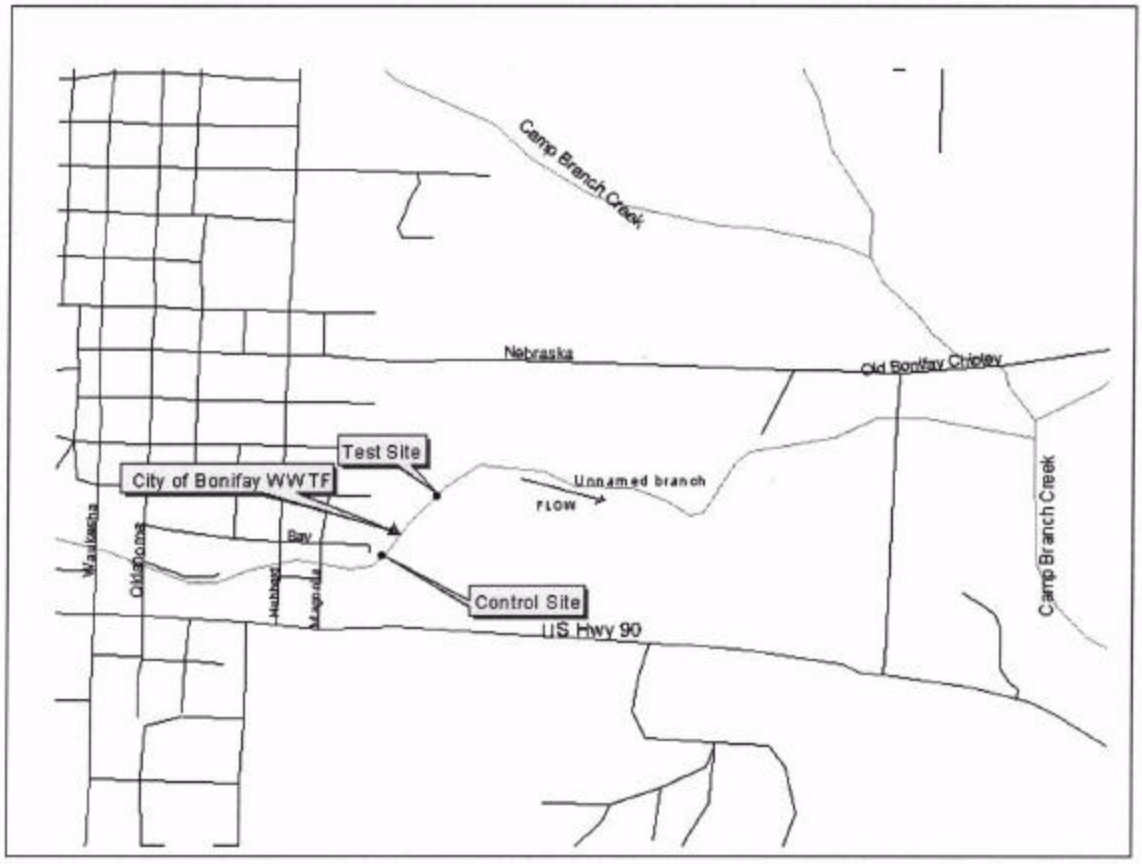
## Appendices

- Appendix 1. Map of facility
- Appendix 2. Facility summary
- Appendix 3. Chemical analyses of effluent and receiving water
- Appendix 4. Explanation of biological measurements
- Appendix 5. Typical values for selected parameters in Florida waters
- Appendix 6. Additional physical, chemical, microbiological and toxicological results
- Appendix 7. Habitat assessment field sheets
- Appendix 8. Periphyton: unit counts and taxa lists
- Appendix 9. Hester-Dendy multi-plate samplers: macroinvertebrate density and taxa lists
- Appendix 10. Dipnet samples: macroinvertebrate proportional abundance and taxa lists

**Appendix 1**

**Map of Facility**

# Bonifay WWTF




600 0 600 Meters




FDEP - Bureau of Labs
Fifth Year Inspection
Created by: Julie Riley
Created on: November 6, 2002

## Appendix 2

## Facility Summary

| | | |
|---|---|---|
| **Facility Name:** Bonifay WWTF | | **Prepared By:** Angela Schrift |
| **Location:** 911 East Bay Avenue Bonifay, FL 32425 | **County:** Holmes | **District:** NWD |
| **Federal Permit No.:** FL0027731-01 **Expiration Date:** July 31,2002 | **State Permit No.:** FL0027731-01 **Expiration Date:** | **Facility Type:** Domestic Wastewater Treatment Plant |
| **Function of Facility:** 1.4 MGD wastewater treatment facility to an unnamed ditch to Camp Branch to Holmes Creek | | |
| **Description of treatment process:** A 1.4 MGD maximum monthly average daily flow advanced wastewater treatment system which consists of influent grit removal, screening, dual sequential batch reactors, post equalization, dual sand filters, chlorine disinfection, postaeration, and dechlorination. Residuals are aerobically digested and are land applied. | | |
| **Receiving Waters:** Discharge to an unnamed ditch to Camp Branch to Holmes Creek (Class III fresh waters) | | **Classification:** Class III Water Body |
| **Design Flow:** 1.4MGD | **Mean Flow:** .523MGD | **Flow During Survey:** .878MGD |
| **Discharge is:** √**Continuous** **Intermittent** **Seasonal** **Rainfall Dependent** **Other** | | |
| **Facility Mixing Zone Details:** no mixing zone | | |

**List Effluent Limits:**

| Parameter and Units | Limit | Describe special permit conditions and permit modifications: |
|---|---|---|
| **Flow (MGD)** | **1.4 (max monthly avg.)** | |
| **Carbonaceous Biochemical Oxygen Demand (5 Day) (mg/L)** | **8.0 (max annual avg.)**<br>**10.0 (max monthly avg.)**<br>**12.0 (max weekly avg.)**<br>**16.0 (max single sample)** | |
| **Total Suspended Solids (mg/L)** | **8.0 (max annual avg.)**<br>**10.0 (max monthly avg.)**<br>**Report (weekly avg.)**<br>**16.0 (max single sample)** | |
| **pH (std units)** | **6.0 – 8.5 (single sample)** | |
| **Fecal Coliform Bacteria** | **200/100mL (max monthly avg.)**<br>**200/100mL (max geometric mean of any ten samples in a 30 day period)**<br>**400/100mL (max value for 10% of samples collected in 30 days)**<br>**800/100mL (max single sample)** | **Fecal Coliform Bacteria-Report monthly Geometric mean 800 max.** |
| **Total Residual Chlorine (For disinfection) (mg/L)** | **0.5 (minimum single sample)** | |
| **Total Residual Chlorine (For dechlorination) (mg/L)** | **0.01 (single sample max)** | |

| | | |
|---|---|---|
| **Nitrogen, Total as N (mg/L)** | **5.0 (max annual avg.)**<br>**6.25 (max monthly avg.)**<br>**7.5 (max weekly avg.)**<br>**10.0 (single sample max)** | **N-no weekly average** |
| **Phosphorus, Total as P (mg/L as P)** | **3.0 (max annual avg.)**<br>**3.75 (max monthly avg.)**<br>**4.5 (max weekly avg.)**<br>**6.0 (single sample max)** | **P-no max weekly avg.** |
| **Dissolved Oxygen (mg/L)** | **6.0(single sample minimum)** | |
| **Whole Effluent Toxicity** | **100% (single sample minimum)** | |

**Description of permitted outfall:** A 1.4 MGD maximum monthly average daily flow is permitted to discharge into to an unnamed ditch to Camp Branch to Holmes Creek at Discharge Location (D001) which is approximately 1 foot in length and discharges just below the water surface. The discharge is located approximately at latitude 30°48'56", longitude 85°36'55".

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

Incident #SWP011015-6661 It is estimated that 1500 to 2000 gallons of raw sewage backed up and escaped from a manhole at the Correctional Facility because a pump or lift station operated by the City of Bonifay failed.
Upsets: A total plant kill occurred in 1999 that caused the TSS and Nitrogen violations below:

12/01/00 thru 12/31/00 Permit Effluent Violation – TSS, Nitrogen
11/01/00 thru 11/31/00 Permit Effluent Violation – TSS, Nitrogen
10/01/00 thru 10/31/00 Permit Effluent Violation – TSS, Nitrogen
9/1/00 thru 9/31/00 Permit Effluent Violation – TSS, Nitrogen
8/1/00 thru 8/31/00 Permit Effluent Violation – TSS, Nitrogen
7/1/00 thru 7/31/00 Permit Effluent Violation – TSS, Nitrogen
6/1/00 thru 6/31/00 Permit Effluent Violation – TSS, Nitrogen
5/1/00 thru 5/31/00 Permit Effluent Violation – TSS, Nitrogen
4/1/00 thru 4/31/00 Permit Effluent Violation – TSS, Nitrogen,CBOD5
3/1/00 thru 3/31/00 Permit Effluent Violation - .Noel Statre 7 day chr. Pimephales, TSS, Nitrogen, CBOD5
2/1/00 thru 2/31/00 Permit Effluent Violation – TSS, Nitrogen, .noel statre 7 day chr. Pimephales
1/1/00 thru 1/31/00 Permit Effluent Violation – TSS, Nitrogen

**Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:**

Consent Order #00-2004 was executed on 1/29/01 for the above TSS and Nitrogen violations. The Order required corrective actions, included penalties for the violations, and gave the facility interim limits for TSS and Nitrogen.
The Consent Order was closed on November 2, 2001.
Fifth year bioassments were completed in 1990, 1993, and 1995.

**Discuss MOR trends to prior data; is trend improving or declining:** The WWTF has completed their obligations under the Consent Order and the trend is improving.

**Additional Information:**

# Appendix 3

## Chemical analyses of effluent and receiving water

Bonifay Wastewater Treatment Facility: Analytes tested for in effluent and receiving water

| Date Sampled | Field ID | Analysis Group | Component | Result | Units | Remark | MDL | PQL |
|---|---|---|---|---|---|---|---|---|
| 04/15/02 | Effluent | BNA-Water | 1,2,4,5-Tetrachlorobenzene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 1,2,4-Trichlorobenzene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 1,2-Dichlorobenzene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 1,3,5-Trinitrobenzene | 3.8 | ug/L | U | 3.8 | 15 |
| 04/15/02 | Effluent | BNA-Water | 1,3-Dichlorobenzene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 1,3-Dinitrobenzene | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | Effluent | BNA-Water | 1,4-Dichlorobenzene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 1,4-Naphthoquinone | 19 | ug/L | U | 19 | 77 |
| 04/15/02 | Effluent | BNA-Water | 1-Naphthylamine | 9.6 | ug/L | U | 9.6 | 38 |
| 04/15/02 | Effluent | BNA-Water | 2,3,4,6-Tetrachlorophenol | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | Effluent | BNA-Water | 2,4,5-Trichlorophenol | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 2,4,6-Trichlorophenol | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 2,4-Dichlorophenol | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 2,4-Dimethylphenol | 48 | ug/L | U | 48 | 190 |
| 04/15/02 | Effluent | BNA-Water | 2,4-Dinitrophenol | 14 | ug/L | U | 14 | 58 |
| 04/15/02 | Effluent | BNA-Water | 2,4-Dinitrotoluene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 2,6-Dichlorophenol | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 2,6-Dinitrotoluene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 2-Acetylaminofluorene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 2-Chloronaphthalene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 2-Chlorophenol | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 2-Methyl-4,6-dinitrophenol | 2.9 | ug/L | U | 2.9 | 12 |
| 04/15/02 | Effluent | BNA-Water | 2-Methylnaphthalene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 2-Naphthylamine | 9.6 | ug/L | U | 9.6 | 38 |
| 04/15/02 | Effluent | BNA-Water | 2-Nitroaniline | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 2-Nitrophenol | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 2-Picoline | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 3,3'-Dichlorobenzidine | 38 | ug/L | U | 38 | 150 |
| 04/15/02 | Effluent | BNA-Water | 3,3'-Dimethylbenzidine | 19 | ug/L | U | 19 | 77 |
| 04/15/02 | Effluent | BNA-Water | 3-Methylcholanthrene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 3-Nitroaniline | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 4,4'-DDD | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | Effluent | BNA-Water | 4,4'-DDE | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | Effluent | BNA-Water | 4,4'-DDT | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | Effluent | BNA-Water | 4-Aminobiphenyl | 3.8 | ug/L | U | 3.8 | 15 |
| 04/15/02 | Effluent | BNA-Water | 4-Bromophenyl phenyl ether | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 4-Chloro-3-methylphenol | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 4-Chloroaniline | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 4-Chlorophenyl phenyl ether | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | Effluent | BNA-Water | 4-Nitroaniline | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 4-Nitrophenol | 14 | ug/L | U | 14 | 58 |
| 04/15/02 | Effluent | BNA-Water | 5-Nitro-o-toluidine | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | 7,12-Dimethylbenz(a)anthracene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Acenaphthene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Acenaphthylene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Acetophenone | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Aldrin | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | Effluent | BNA-Water | Aniline | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Anthracene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Azobenzene/1,2-Diphenylhydrazine | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Benzidine | 96 | ug/L | U | 96 | 380 |
| 04/15/02 | Effluent | BNA-Water | Benzo(a)anthracene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Benzo(a)pyrene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Benzo(b)fluoranthene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Benzo(g,h,i)perylene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Benzo(k)fluoranthene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Benzyl alcohol | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Bis(2-chloroethoxy)methane | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Bis(2-chloroethyl)ether | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Bis(2-chloroisopropyl)ether | 2.9 | ug/L | U | 2.9 | 12 |
| 04/15/02 | Effluent | BNA-Water | Bis(2-ethylhexyl)phthalate | 14 | ug/L | U | 14 | 58 |
| 04/15/02 | Effluent | BNA-Water | Butyl benzyl phthalate | 4.8 | ug/L | U | 4.8 | 19 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 04/15/02 | Effluent | BNA-Water | Chrysene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Di-n-butyl phthalate | 4.8 | ug/L | U | 4.8 | 19 |
| 04/15/02 | Effluent | BNA-Water | Di-n-octyl phthalate | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Dibenzo(a,h)anthracene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Dibenzofuran | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Dieldrin | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | Effluent | BNA-Water | Diethyl phthalate | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Dimethyl phthalate | 48 | ug/L | U | 48 | 190 |
| 04/15/02 | Effluent | BNA-Water | Dimethylaminoazobenzene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Dinoseb | 3.8 | ug/L | U | 3.8 | 15 |
| 04/15/02 | Effluent | BNA-Water | Diphenylamine | 2.9 | ug/L | U | 2.9 | 12 |
| 04/15/02 | Effluent | BNA-Water | Endosulfan I | 3.8 | ug/L | U | 3.8 | 15 |
| 04/15/02 | Effluent | BNA-Water | Endosulfan II | 3.8 | ug/L | U | 3.8 | 15 |
| 04/15/02 | Effluent | BNA-Water | Endosulfan sulfate | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | Effluent | BNA-Water | Endrin | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | Effluent | BNA-Water | Endrin aldehyde | 3.8 | ug/L | U | 3.8 | 15 |
| 04/15/02 | Effluent | BNA-Water | Ethyl methanesulfonate | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Fluoranthene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Fluorene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Heptachlor | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | Effluent | BNA-Water | Heptachlor epoxide | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | Effluent | BNA-Water | Hexachlorobenzene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Hexachlorobutadiene | 2.9 | ug/L | U | 2.9 | 12 |
| 04/15/02 | Effluent | BNA-Water | Hexachlorocyclopentadiene | 2.9 | ug/L | U | 2.9 | 12 |
| 04/15/02 | Effluent | BNA-Water | Hexachloroethane | 2.9 | ug/L | U | 2.9 | 12 |
| 04/15/02 | Effluent | BNA-Water | Hexachloropropene | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | Effluent | BNA-Water | Indeno(1,2,3-cd)pyrene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Isophorone | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Isosafrole | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Methapyrilene | 3.8 | ug/L | U | 3.8 | 15 |
| 04/15/02 | Effluent | BNA-Water | Methyl methanesulfonate | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | N-Nitrosodi-n-butylamine | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | N-Nitrosodi-n-propylamine | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | Effluent | BNA-Water | N-Nitrosodiethylamine | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | N-Nitrosodimethylamine | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | Effluent | BNA-Water | N-Nitrosodiphenylamine | 2.9 | ug/L | U | 2.9 | 12 |
| 04/15/02 | Effluent | BNA-Water | N-Nitrosomethylethylamine | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | Effluent | BNA-Water | N-Nitrosomorpholine | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | N-Nitrosopiperidine | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | N-Nitrosopyrrolidine | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | Effluent | BNA-Water | Naphthalene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Nitrobenzene | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | Effluent | BNA-Water | Nitroquinoline-1-oxide | 19 | ug/L | U | 19 | 77 |
| 04/15/02 | Effluent | BNA-Water | Pentachlorobenzene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Pentachloroethane | 48 | ug/L | U | 48 | 190 |
| 04/15/02 | Effluent | BNA-Water | Pentachloronitrobenzene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Pentachlorophenol | 2.9 | ug/L | U | 2.9 | 12 |
| 04/15/02 | Effluent | BNA-Water | Phenacetin | 3.8 | ug/L | U | 3.8 | 12 |
| 04/15/02 | Effluent | BNA-Water | Phenanthrene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Phenol | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Pyrene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | Pyridine | 3.8 | ug/L | U | 3.8 | 15 |
| 04/15/02 | Effluent | BNA-Water | Safrole | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | Effluent | BNA-Water | alpha-BHC | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | Effluent | BNA-Water | beta-BHC | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | Effluent | BNA-Water | delta-BHC | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | Effluent | BNA-Water | gamma-BHC | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | Effluent | BNA-Water | m,p-Cresols | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | Effluent | BNA-Water | o-Cresol | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | Effluent | BNA-Water | o-Toluidine | 0.96 | ug/L | U | 0.96 | 3.8 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 04/15/02 | Effluent | Bio-AGP/LimNut | Algal Growth Potential | 30.8 | mg DryWt/L | | 0.1 | 0.3 |
| 04/15/02 | Effluent | Bio-Toxicology | Bioassay-Acute-Screen-FW-C.dubia, LC50 | 100 | LC50 | K | | |
| 04/15/02 | Effluent | Bio-Toxicology | Bioassay-Acute-Screen-FW-Fish, LC50 | 100 | LC50 | K | | |
| 04/15/02 | Effluent | Bio-Toxicology | Bioassay-Acute-Scrn-FW-Fish,LC50-dechlr | 100 | LC50 | L | | |
| 04/15/02 | Effluent | Bio-Toxicology | Bioassy-Acute-Scrn-FW-Cdubia,LC50-dechlr | 100 | LC50 | L | | |
| 04/15/02 | Effluent | GC-Water | Alachlor | 0.58 | ug/L | U | 0.58 | 2.32 |
| 04/15/02 | Effluent | GC-Water | Ametryn | 0.048 | ug/L | U | 0.048 | 0.192 |
| 04/15/02 | Effluent | GC-Water | Atrazine | 0.048 | ug/L | U | 0.048 | 0.192 |
| 04/15/02 | Effluent | GC-Water | Azinphos Methyl | 0.048 | ug/L | U | 0.048 | 0.192 |
| 04/15/02 | Effluent | GC-Water | Bromacil | 0.19 | ug/L | U | 0.19 | 0.76 |
| 04/15/02 | Effluent | GC-Water | Butylate | 0.19 | ug/L | U | 0.19 | 0.76 |
| 04/15/02 | Effluent | GC-Water | Chlorpyrifos Ethyl | 0.048 | ug/L | U | 0.048 | 0.192 |
| 04/15/02 | Effluent | GC-Water | Chlorpyrifos Methyl | 0.096 | ug/L | U | 0.096 | 0.384 |
| 04/15/02 | Effluent | GC-Water | Diazinon | 0.067 | ug/L | I | 0.048 | 0.192 |
| 04/15/02 | Effluent | GC-Water | Ethion | 0.048 | ug/L | U | 0.048 | 0.192 |
| 04/15/02 | Effluent | GC-Water | Ethoprop | 0.096 | ug/L | U | 0.096 | 0.384 |
| 04/15/02 | Effluent | GC-Water | Fenamiphos | 0.19 | ug/L | U | 0.19 | 0.76 |
| 04/15/02 | Effluent | GC-Water | Fonofos | 0.096 | ug/L | U | 0.096 | 0.384 |
| 04/15/02 | Effluent | GC-Water | Hexazinone | 0.096 | ug/L | U | 0.096 | 0.384 |
| 04/15/02 | Effluent | GC-Water | Malathion | 0.14 | ug/L | U | 0.14 | 0.56 |
| 04/15/02 | Effluent | GC-Water | Metalaxyl | 0.24 | ug/L | U | 0.24 | 0.96 |
| 04/15/02 | Effluent | GC-Water | Metolachlor | 0.48 | ug/L | U | 0.48 | 1.92 |
| 04/15/02 | Effluent | GC-Water | Metribuzin | 0.096 | ug/L | U | 0.096 | 0.384 |
| 04/15/02 | Effluent | GC-Water | Mevinphos | 0.19 | ug/L | U | 0.19 | 0.76 |
| 04/15/02 | Effluent | GC-Water | Naled | 0.77 | ug/L | U | 0.77 | 3.08 |
| 04/15/02 | Effluent | GC-Water | Norflurazon | 0.096 | ug/L | U | 0.096 | 0.384 |
| 04/15/02 | Effluent | GC-Water | Parathion Ethyl | 0.14 | ug/L | U | 0.14 | 0.56 |
| 04/15/02 | Effluent | GC-Water | Parathion Methyl | 0.096 | ug/L | U | 0.096 | 0.384 |
| 04/15/02 | Effluent | GC-Water | Phorate | 0.048 | ug/L | U | 0.048 | 0.192 |
| 04/15/02 | Effluent | GC-Water | Prometryn | 0.14 | ug/L | U | 0.14 | 0.56 |
| 04/15/02 | Effluent | GC-Water | Simazine | 0.048 | ug/L | U | 0.048 | 0.192 |
| 04/15/02 | Effluent | Metals-Water | Aluminum_308 | 190 | ug/L | I | 50 | 200 |
| 04/15/02 | Effluent | Metals-Water | Arsenic | 3 | ug/L | U | 3 | 12 |
| 04/15/02 | Effluent | Metals-Water | Cadmium | 0.032 | ug/L | I | 0.025 | 0.1 |
| 04/15/02 | Effluent | Metals-Water | Calcium | 24.1 | mg/L | A | 0.1 | 0.4 |
| 04/15/02 | Effluent | Metals-Water | Chromium | 2 | ug/L | U | 2 | 8 |
| 04/15/02 | Effluent | Metals-Water | Copper | 4.7 | ug/L | A | 0.75 | 3 |
| 04/15/02 | Effluent | Metals-Water | Iron_271 | 296 | ug/L | A | 25 | 100 |
| 04/15/02 | Effluent | Metals-Water | Lead | 0.57 | ug/L | I | 0.25 | 1 |
| 04/15/02 | Effluent | Metals-Water | Magnesium | 3 | mg/L | A | 0.025 | 0.1 |
| 04/15/02 | Effluent | Metals-Water | Nickel | 2 | ug/L | U | 2 | 8 |
| 04/15/02 | Effluent | Metals-Water | Selenium | 0.5 | ug/L | U | 0.5 | 2 |
| 04/15/02 | Effluent | Metals-Water | Silver | 0.25 | ug/L | A | 0.02 | 0.08 |
| 04/15/02 | Effluent | Metals-Water | Zinc | 28 | ug/L | A | 3 | 12 |
| 04/15/02 | Effluent | Nutrients-Liquid | Ammonia-N | 0.53 | mg N/L | | 0.02 | 0.04 |
| 04/15/02 | Effluent | Nutrients-Liquid | NO2NO3-N | 0.28 | mg N/L | J | 0.004 | 0.01 |
| 04/15/02 | Effluent | Nutrients-Liquid | N_KJEL_TOT | 1.5 | mg N/L | | 0.06 | 0.2 |
| 04/15/02 | Effluent | Nutrients-Liquid | O-Phosphate-P | 0.68 | mg P/L | | 0.04 | 0.1 |
| 04/15/02 | Effluent | Nutrients-Liquid | Total-P | 0.87 | mg P/L | | 0.015 | 0.04 |
| 04/15/02 | BLANKS | BNA-Water | 1,2,4,5-Tetrachlorobenzene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 1,2,4-Trichlorobenzene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 1,2-Dichlorobenzene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 1,3,5-Trinitrobenzene | 3.8 | ug/L | U | 3.8 | 15 |
| 04/15/02 | BLANKS | BNA-Water | 1,3-Dichlorobenzene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 1,3-Dinitrobenzene | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | BLANKS | BNA-Water | 1,4-Dichlorobenzene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 1,4-Naphthoquinone | 19 | ug/L | U | 19 | 77 |
| 04/15/02 | BLANKS | BNA-Water | 1-Naphthylamine | 9.6 | ug/L | U | 9.6 | 38 |
| 04/15/02 | BLANKS | BNA-Water | 2,3,4,6-Tetrachlorophenol | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | BLANKS | BNA-Water | 2,4,5-Trichlorophenol | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 2,4,6-Trichlorophenol | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 2,4-Dichlorophenol | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 2,4-Dimethylphenol | 48 | ug/L | U | 48 | 190 |
| 04/15/02 | BLANKS | BNA-Water | 2,4-Dinitrophenol | 14 | ug/L | U | 14 | 58 |

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|---|---|---|---|---|---|---|---|---|
| 04/15/02 | BLANKS | BNA-Water | 2,4-Dinitrotoluene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 2,6-Dichlorophenol | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 2,6-Dinitrotoluene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 2-Acetylaminofluorene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 2-Chloronaphthalene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 2-Chlorophenol | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 2-Methyl-4,6-dinitrophenol | 2.9 | ug/L | U | 2.9 | 12 |
| 04/15/02 | BLANKS | BNA-Water | 2-Methylnaphthalene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 2-Naphthylamine | 9.6 | ug/L | U | 9.6 | 38 |
| 04/15/02 | BLANKS | BNA-Water | 2-Nitroaniline | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 2-Nitrophenol | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 2-Picoline | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 3,3'-Dichlorobenzidine | 38 | ug/L | U | 38 | 150 |
| 04/15/02 | BLANKS | BNA-Water | 3,3'-Dimethylbenzidine | 19 | ug/L | U | 19 | 77 |
| 04/15/02 | BLANKS | BNA-Water | 3-Methylcholanthrene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 3-Nitroaniline | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 4,4'-DDD | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | BLANKS | BNA-Water | 4,4'-DDE | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | BLANKS | BNA-Water | 4,4'-DDT | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | BLANKS | BNA-Water | 4-Aminobiphenyl | 3.8 | ug/L | U | 3.8 | 15 |
| 04/15/02 | BLANKS | BNA-Water | 4-Bromophenyl phenyl ether | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 4-Chloro-3-methylphenol | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 4-Chloroaniline | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 4-Chlorophenyl phenyl ether | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | BLANKS | BNA-Water | 4-Nitroaniline | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 4-Nitrophenol | 14 | ug/L | U | 14 | 58 |
| 04/15/02 | BLANKS | BNA-Water | 5-Nitro-o-toluidine | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | 7,12-Dimethylbenz(a)anthracene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Acenaphthene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Acenaphthylene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Acetophenone | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Aldrin | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | BLANKS | BNA-Water | Aniline | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Anthracene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Azobenzene/1,2-Diphenylhydrazine | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Benzidine | 96 | ug/L | U | 96 | 380 |
| 04/15/02 | BLANKS | BNA-Water | Benzo(a)anthracene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Benzo(a)pyrene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Benzo(b)fluoranthene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Benzo(g,h,i)perylene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Benzo(k)fluoranthene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Benzyl alcohol | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Bis(2-chloroethoxy)methane | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Bis(2-chloroethyl)ether | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Bis(2-chloroisopropyl)ether | 2.9 | ug/L | U | 2.9 | 12 |
| 04/15/02 | BLANKS | BNA-Water | Bis(2-ethylhexyl)phthalate | 14 | ug/L | U | 14 | 58 |
| 04/15/02 | BLANKS | BNA-Water | Butyl benzyl phthalate | 4.8 | ug/L | U | 4.8 | 19 |
| 04/15/02 | BLANKS | BNA-Water | Chrysene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Di-n-butyl phthalate | 4.8 | ug/L | U | 4.8 | 19 |
| 04/15/02 | BLANKS | BNA-Water | Di-n-octyl phthalate | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Dibenzo(a,h)anthracene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Dibenzofuran | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Dieldrin | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | BLANKS | BNA-Water | Diethyl phthalate | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Dimethyl phthalate | 48 | ug/L | U | 48 | 190 |
| 04/15/02 | BLANKS | BNA-Water | Dimethylaminoazobenzene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Dinoseb | 3.8 | ug/L | U | 3.8 | 15 |
| 04/15/02 | BLANKS | BNA-Water | Diphenylamine | 2.9 | ug/L | U | 2.9 | 12 |
| 04/15/02 | BLANKS | BNA-Water | Endosulfan I | 3.8 | ug/L | U | 3.8 | 15 |
| 04/15/02 | BLANKS | BNA-Water | Endosulfan II | 3.8 | ug/L | U | 3.8 | 15 |
| 04/15/02 | BLANKS | BNA-Water | Endosulfan sulfate | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | BLANKS | BNA-Water | Endrin | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | BLANKS | BNA-Water | Endrin aldehyde | 3.8 | ug/L | U | 3.8 | 15 |
| 04/15/02 | BLANKS | BNA-Water | Ethyl methanesulfonate | 0.96 | ug/L | U | 0.96 | 3.8 |

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|---|---|---|---|---|---|---|---|---|
| 04/15/02 | BLANKS | BNA-Water | Fluoranthene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Fluorene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Heptachlor | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | BLANKS | BNA-Water | Heptachlor epoxide | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | BLANKS | BNA-Water | Hexachlorobenzene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Hexachlorobutadiene | 2.9 | ug/L | U | 2.9 | 12 |
| 04/15/02 | BLANKS | BNA-Water | Hexachlorocyclopentadiene | 2.9 | ug/L | U | 2.9 | 12 |
| 04/15/02 | BLANKS | BNA-Water | Hexachloroethane | 2.9 | ug/L | U | 2.9 | 12 |
| 04/15/02 | BLANKS | BNA-Water | Hexachloropropene | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | BLANKS | BNA-Water | Indeno(1,2,3-cd)pyrene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Isophorone | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Isosafrole | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Methapyrilene | 3.8 | ug/L | U | 3.8 | 15 |
| 04/15/02 | BLANKS | BNA-Water | Methyl methanesulfonate | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | N-Nitrosodi-n-butylamine | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | N-Nitrosodi-n-propylamine | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | BLANKS | BNA-Water | N-Nitrosodiethylamine | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | N-Nitrosodimethylamine | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | BLANKS | BNA-Water | N-Nitrosodiphenylamine | 2.9 | ug/L | U | 2.9 | 12 |
| 04/15/02 | BLANKS | BNA-Water | N-Nitrosomethylethylamine | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | BLANKS | BNA-Water | N-Nitrosomorpholine | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | N-Nitrosopiperidine | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | N-Nitrosopyrrolidine | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | BLANKS | BNA-Water | Naphthalene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Nitrobenzene | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | BLANKS | BNA-Water | Nitroquinoline-1-oxide | 19 | ug/L | U | 19 | 77 |
| 04/15/02 | BLANKS | BNA-Water | Pentachlorobenzene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Pentachloroethane | 48 | ug/L | U | 48 | 190 |
| 04/15/02 | BLANKS | BNA-Water | Pentachloronitrobenzene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Pentachlorophenol | 2.9 | ug/L | U | 2.9 | 12 |
| 04/15/02 | BLANKS | BNA-Water | Phenacetin | 3.8 | ug/L | U | 3.8 | 12 |
| 04/15/02 | BLANKS | BNA-Water | Phenanthrene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Phenol | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Pyrene | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | Pyridine | 3.8 | ug/L | U | 3.8 | 15 |
| 04/15/02 | BLANKS | BNA-Water | Safrole | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | BNA-Water | alpha-BHC | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | BLANKS | BNA-Water | beta-BHC | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | BLANKS | BNA-Water | delta-BHC | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | BLANKS | BNA-Water | gamma-BHC | 1.4 | ug/L | U | 1.4 | 5.8 |
| 04/15/02 | BLANKS | BNA-Water | m,p-Cresols | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | BLANKS | BNA-Water | o-Cresol | 1.9 | ug/L | U | 1.9 | 7.7 |
| 04/15/02 | BLANKS | BNA-Water | o-Toluidine | 0.96 | ug/L | U | 0.96 | 3.8 |
| 04/15/02 | BLANKS | GC-Water | Alachlor | 0.58 | ug/L | U | 0.58 | 2.32 |
| 04/15/02 | BLANKS | GC-Water | Ametryn | 0.049 | ug/L | U | 0.049 | 0.196 |
| 04/15/02 | BLANKS | GC-Water | Atrazine | 0.049 | ug/L | U | 0.049 | 0.196 |
| 04/15/02 | BLANKS | GC-Water | Azinphos Methyl | 0.049 | ug/L | U | 0.049 | 0.196 |
| 04/15/02 | BLANKS | GC-Water | Bromacil | 0.19 | ug/L | U | 0.19 | 0.76 |
| 04/15/02 | BLANKS | GC-Water | Butylate | 0.19 | ug/L | U | 0.19 | 0.76 |
| 04/15/02 | BLANKS | GC-Water | Chlorpyrifos Ethyl | 0.049 | ug/L | U | 0.049 | 0.196 |
| 04/15/02 | BLANKS | GC-Water | Chlorpyrifos Methyl | 0.097 | ug/L | U | 0.097 | 0.388 |
| 04/15/02 | BLANKS | GC-Water | Diazinon | 0.049 | ug/L | U | 0.049 | 0.196 |
| 04/15/02 | BLANKS | GC-Water | Ethion | 0.049 | ug/L | U | 0.049 | 0.196 |
| 04/15/02 | BLANKS | GC-Water | Ethoprop | 0.097 | ug/L | U | 0.097 | 0.388 |
| 04/15/02 | BLANKS | GC-Water | Fenamiphos | 0.19 | ug/L | U | 0.19 | 0.76 |
| 04/15/02 | BLANKS | GC-Water | Fonofos | 0.097 | ug/L | U | 0.097 | 0.388 |
| 04/15/02 | BLANKS | GC-Water | Hexazinone | 0.097 | ug/L | U | 0.097 | 0.388 |
| 04/15/02 | BLANKS | GC-Water | Malathion | 0.15 | ug/L | U | 0.15 | 0.6 |
| 04/15/02 | BLANKS | GC-Water | Metalaxyl | 0.24 | ug/L | U | 0.24 | 0.96 |
| 04/15/02 | BLANKS | GC-Water | Metolachlor | 0.49 | ug/L | U | 0.49 | 1.96 |
| 04/15/02 | BLANKS | GC-Water | Metribuzin | 0.097 | ug/L | U | 0.097 | 0.388 |
| 04/15/02 | BLANKS | GC-Water | Mevinphos | 0.19 | ug/L | U | 0.19 | 0.76 |
| 04/15/02 | BLANKS | GC-Water | Naled | 0.78 | ug/L | U | 0.78 | 3.12 |
| 04/15/02 | BLANKS | GC-Water | Norflurazon | 0.097 | ug/L | U | 0.097 | 0.388 |

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|---|---|---|---|---|---|---|---|---|
| 04/15/02 | BLANKS | GC-Water | Parathion Ethyl | 0.15 | ug/L | U | 0.15 | 0.6 |
| 04/15/02 | BLANKS | GC-Water | Parathion Methyl | 0.097 | ug/L | U | 0.097 | 0.388 |
| 04/15/02 | BLANKS | GC-Water | Phorate | 0.049 | ug/L | U | 0.049 | 0.196 |
| 04/15/02 | BLANKS | GC-Water | Prometryn | 0.15 | ug/L | U | 0.15 | 0.6 |
| 04/15/02 | BLANKS | GC-Water | Simazine | 0.049 | ug/L | U | 0.049 | 0.196 |
| 04/15/02 | BLANKS | Metals-Water | Aluminum_308 | 50 | ug/L | U | 50 | 200 |
| 04/15/02 | BLANKS | Metals-Water | Arsenic | 3 | ug/L | U | 3 | 12 |
| 04/15/02 | BLANKS | Metals-Water | Cadmium | 0.025 | ug/L | U | 0.025 | 0.1 |
| 04/15/02 | BLANKS | Metals-Water | Calcium | 0.1 | mg/L | U | 0.1 | 0.4 |
| 04/15/02 | BLANKS | Metals-Water | Chromium | 2 | ug/L | U | 2 | 8 |
| 04/15/02 | BLANKS | Metals-Water | Copper | 0.75 | ug/L | U | 0.75 | 3 |
| 04/15/02 | BLANKS | Metals-Water | Iron_271 | 25 | ug/L | U | 25 | 100 |
| 04/15/02 | BLANKS | Metals-Water | Lead | 0.25 | ug/L | U | 0.25 | 1 |
| 04/15/02 | BLANKS | Metals-Water | Magnesium | 0.025 | mg/L | U | 0.025 | 0.1 |
| 04/15/02 | BLANKS | Metals-Water | Nickel | 2 | ug/L | U | 2 | 8 |
| 04/15/02 | BLANKS | Metals-Water | Selenium | 0.5 | ug/L | U | 0.5 | 2 |
| 04/15/02 | BLANKS | Metals-Water | Silver | 0.02 | ug/L | U | 0.02 | 0.08 |
| 04/15/02 | BLANKS | Metals-Water | Zinc | 3 | ug/L | U | 3 | 12 |
| 04/15/02 | BLANKS | Nutrients-Liquid | Ammonia-N | 0.013 | mg N/L | I | 0.01 | 0.02 |
| 04/15/02 | BLANKS | Nutrients-Liquid | NO2NO3-N | 0.004 | mg N/L | U | 0.004 | 0.01 |
| 04/15/02 | BLANKS | Nutrients-Liquid | N_KJEL_TOT | 0.061 | mg N/L | I | 0.06 | 0.2 |
| 04/15/02 | BLANKS | Nutrients-Liquid | O-Phosphate-P | 0.005 | mg P/L | I | 0.004 | 0.01 |
| 04/15/02 | BLANKS | Nutrients-Liquid | Total-P | 0.015 | mg P/L | U | 0.015 | 0.04 |
| 04/16/02 | Control | Bio-AGP/LimNut | Algal Growth Potential | 6.01 | mg DryWt/L | | 0.1 | 0.3 |
| 04/16/02 | Control | Nutrients-Liquid | Ammonia-N | 0.072 | mg N/L | | 0.01 | 0.02 |
| 04/16/02 | Control | Nutrients-Liquid | NO2NO3-N | 0.038 | mg N/L | J | 0.004 | 0.01 |
| 04/16/02 | Control | Nutrients-Liquid | N_KJEL_TOT | 0.45 | mg N/L | | 0.06 | 0.2 |
| 04/16/02 | Control | Nutrients-Liquid | O-Phosphate-P | 0.034 | mg P/L | | 0.004 | 0.01 |
| 04/16/02 | Control | Nutrients-Liquid | Total-P | 0.094 | mg P/L | | 0.015 | 0.04 |
| 04/16/02 | Test | Bio-AGP/LimNut | Algal Growth Potential | 18.5 | mg DryWt/L | | 0.1 | 0.3 |
| 04/16/02 | Test | Nutrients-Liquid | Ammonia-N | 0.13 | mg N/L | | 0.01 | 0.02 |
| 04/16/02 | Test | Nutrients-Liquid | NO2NO3-N | 0.097 | mg N/L | J | 0.004 | 0.01 |
| 04/16/02 | Test | Nutrients-Liquid | N_KJEL_TOT | 1.1 | mg N/L | | 0.06 | 0.2 |
| 04/16/02 | Test | Nutrients-Liquid | O-Phosphate-P | 0.43 | mg P/L | | 0.008 | 0.02 |
| 04/16/02 | Test | Nutrients-Liquid | Total-P | 0.6 | mg P/L | | 0.015 | 0.04 |

## Appendix 4

## Explanation of Biological Measures

**(1) Habitat Assessment**:

Eight aspects of the physical structure and extent of disturbance are ranked, with 20 possible points for each factor (FDEP SOP FT 3100, based on Plafkin *et al.*, 1989 and Barbour and Stribling, 1994). The Habitat Assessment score includes types and amounts of benthic substrates, water velocity, amount of sand or silt accumulation, extent of artificial channelization, bank stability, and riparian zone width and vegetation type. All scores are summed to yield an overall Habitat Assessment score. Habitat Assessment score ranges from 11-160 and overall habitat quality is assigned to one of four categories: Optimal (120-160 points), Suboptimal (80-119 points), Marginal (40-79 points), and Poor (11-39 points).

**(2) Effluent and Water Samples from Control and Test Sites**

**Algal Growth Potential (AGP)**: The effluent and water from control and test sites are autoclaved, filtered (0.45μm), inoculated with the unicellular green alga, *Rhapidocelis subcapitata* (formerly *Selenastrum capricornutum),* and incubated for 14 days. The algal growth potential (AGP) value is the peak growth of the alga within that 14-day period, recorded as mg dry weight/L (Miller *et al.* 1978). Raschke and Shultz (1987) found that an AGP above 5.0 mg dry weight/L represents a "problem" threshold for fresh receiving waters, implying nutrient enrichment. High AGP values may constitute one line of evidence for violation of FAC 62-302.530(47), FAC 62-302.530(48)(a) and/or 62-302.530(48)(b).

The concentration of nutrients in a water sample may be used to calculate the expected yield of AGP under the assumption that other required nutrients (e.g. silicon, micronutrients) are present in excess (Miller *et al.* 1978). The expected amount of production is calculated as 38 times the total soluble inorganic nitrogen (nitrate and nitrite plus ammonia) under nitrogen limitation or 430 times the ortho-phosphate (OP) concentration under phosphorus limitation with an error of ± 20%. When the ratio of nitrogen to phosphorus (N: P) is less than 11:1, nitrogen limitation of algal production is likely. When the N: P ratio is above 11:1, phosphorus limitation is likely. Production of lower biomass than expected may be evidence of growth inhibition related to toxic compounds present in the water sample tested and may be a violation of FAC 62-302.530(62).

**(3) Periphyton Assemblages**

**Chlorophyll *a* Content:** Chlorophyll *a* content was measured in periphyton samples to estimate algal biomass (APHA 1992, modified from *Standard Methods* 10200H). High algal biomass implies nutrient stress (Stevenson and Bahls 1999) and may be a violation of FAC 62-302.530(47), 62-302.530(48)(a) and/or 62-302.530(48)(b).

**Cell Density**: Cell density was estimated as number/cm$^2$ for periphyton samples (APHA 1992, modified from *Standard Methods* 10200F and 10900G).

**Taxa richness**: Taxa richness is the number of distinct algal taxa present in a sample. Stress tends to reduce the number of different types of algae present in a sample, but moderate nutrient enrichment of nutrient poor waters may sometimes be correlated with increased algal taxa richness (Stevenson and Bahls 1999).

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

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

**(4) Benthic Macroinvertebrate Assemblages**

**Taxa Richness**: Taxa richness is the number of distinct macroinvertebrate taxa present in a sample. Stress, habitat destruction and pollution tend to reduce the number of different types of organisms present (Karr

and Chu 1998). Decreases in taxa richness related to a facility's effluent may constitute violations of FAC 62-302.530(47), 62-302.530(48)(a) 62-302.530(48)(b) and/or 62-302.530(62).

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

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

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

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

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

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

**The Stream Condition Index (SCI):** The SCI is a composite macroinvertebrate metric (Barbour *et al.* 1996a, b) developed for Florida. Using data from qualitative dipnet samples, the SCI assigns points to seven parameters, depending on how closely each parameter approaches an expected reference condition (see Table 4, Barbour *et al.* 1996a, b). Points are summed to yield a final SCI score (range 7-33, depending on region and index period). Included in the calculation of SCI are taxa richness, number of EPT taxa, number of Chironomid taxa, percent contribution of the dominant taxon, the Florida Index, percent contribution of Diptera, and the percent contribution of suspension and filter feeders. Scores are broken into four ordinal groups: Excellent, Good, Poor and Very Poor. A decrease in ordinal SCI score from the Control to the Test Site may be evidence of degradation related to a facility's effluent. An SCI score of "Poor" or "Very Poor" related to a facility's effluent may constitute violations of FAC 62-302.530(47), 62-302.530(48)(a) 62-302.530(48)(b) and/or 62-302.530(62).

## Appendix 5

## Typical Values for Selected Parameters in Florida Waters

## Percentile Distribution (1617 stations)

**CONTROL SITE**

| Parameter | 5% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 95% | Measured |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Periphyton Chlorophyll *a* ($mg/m^2$) | 0.31 | 0.43 | 0.77 | 1.04 | 2.16 | 2.94 | 6.45 | 10.51 | 17.00 | 39.51 | 60.85 | **No data** |
| H-D Diversity | 0.84 | **2.12** | 2.48 | 2.74 | 2.88 | 3.09 | 3.25 | 3.40 | 3.52 | 3.76 | 3.90 | **2.4** |
| Qualitative Taxa Richness | 9 | 12 | 17 | 20 | **22** | 24.5 | 26 | 28 | 31 | 37 | 53 | **22** |
| H-D Taxa Richness | 6 | 6.5 | 9 | 11.5 | **13** | 15 | 17 | 21.5 | 26 | 29 | 32 | **14** |
| Nutrients (mg/L) | | | | | | | | | | | | |
| Total Kjeldahl Nitrogen | 0.30 | **0.39** | 0.56 | 0.73 | 0.87 | 1.00 | 1.11 | 1.26 | 1.49 | 1.93 | 2.80 | **0.45** |
| Ammonia | 0.02 | 0.02 | 0.04 | 0.05 | **0.06** | 0.08 | 0.11 | 0.14 | 0.20 | 0.34 | 0.60 | **0.072** |
| Nitrate and nitrite | 0.01 | 0.01 | 0.03 | 0.05 | 0.07 | 0.10 | 0.14 | 0.20 | 0.32 | 0.64 | 1.05 | **0.038** |
| Total Phosphorus | 0.02 | 0.03 | 0.05 | **0.06** | 0.10 | 0.13 | 0.18 | 0.25 | 0.39 | 0.74 | 1.51 | **0.094** |
| Ortho-phosphate | 0.01 | 0.01 | **0.03** | 0.04 | 0.05 | 0.08 | 0.11 | 0.17 | 0.27 | 0.59 | 1.37 | **0.034** |
| Turbidity (NTU) | 0.60 | 0.90 | 1.20 | 1.45 | 2.10 | 2.80 | 3.60 | 4.50 | 6.65 | 10.45 | **16.30** | **26** |

**TEST SITE**

| Parameter | 5% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 95% | Measured |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Periphyton Chlorophyll *a* ($mg/m^2$) | 0.31 | 0.43 | 0.77 | 1.04 | 2.16 | 2.94 | 6.45 | 10.51 | 17.00 | 39.51 | 60.85 | **No data** |
| H-D Diversity | **0.84** | 2.12 | 2.48 | 2.74 | 2.88 | 3.09 | 3.25 | 3.40 | 3.52 | 3.76 | 3.90 | **0.9** |
| Qualitative Taxa Richness | **9** | 12 | 17 | 20 | 22 | 24.5 | 26 | 28 | 31 | 37 | 53 | **7** |
| H-D Taxa Richness | 6 | 6.5 | 9 | 11.5 | 13 | **15** | 17 | 21.5 | 26 | 29 | 32 | **15** |
| Nutrients (mg/L) | | | | | | | | | | | | |
| Total Kjeldahl Nitrogen | 0.30 | 0.39 | 0.56 | 0.73 | 0.87 | **1.00** | 1.11 | 1.26 | 1.49 | 1.93 | 2.80 | **1.1** |
| Ammonia | 0.02 | 0.02 | 0.04 | 0.05 | 0.06 | 0.08 | **0.11** | 0.14 | 0.20 | 0.34 | 0.60 | **0.13** |
| Nitrate and Nitrite | 0.01 | 0.01 | 0.03 | 0.05 | **0.07** | 0.10 | 0.14 | 0.20 | 0.32 | 0.64 | 1.05 | **0.097** |
| Total Phosphorus | 0.02 | 0.03 | 0.05 | 0.06 | 0.10 | 0.13 | 0.18 | 0.25 | **0.39** | 0.74 | 1.51 | **0.60** |
| Ortho-phosphate | 0.01 | 0.01 | 0.03 | 0.04 | 0.05 | 0.08 | 0.11 | 0.17 | **0.27** | 0.59 | 1.37 | **0.43** |
| Turbidity (NTU) | 0.60 | 0.90 | 1.20 | 1.45 | 2.10 | 2.80 | 3.60 | 4.50 | 6.65 | **10.45** | 16.30 | **11** |

Taxa richness and diversity values are for benthic macroinvertebrates. H-D = Hester-Dendy sample. Qualitative taxa richness = number of taxa collected in standardized dipnet samples. Diversity = Shannon-Weaver H'. NTU = Nephelometric turbidity units. Adapted from Joe Hand, FDER, personal communication, 1991, (data collected 1980-1989).

# Appendix 6

## Bioassay bench sheets: Acute toxicity screening.

## Microbiological Results

## Additional Physical and Chemical Measurements

**Table 1.** *Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the Bonifay Wastewater Treatment Facility, 911 East Bay Avenue, Bonifay, Holmes County, Florida, NPDES# FL00257731, performed from 16 to 18 April 2002.*

Facility: Bonifay Wastewater Treatment Facility
Location: 911 East Bay Ave, Bonifay
County: Holmes
Sample Collection Date: 4/15/2002 Time: 1000
Test Beginning Date: 4/16/2002 Time: 1430
Test Ending Date: 4/18/2002 Time: 1335

NPDES # FL00257731
Contact/District: G. Butts/Northwest
Test type: static acute screen
# tests: 2
Chlorination Type: Chlorinated

Facility Type: Wastewater Treatment Facility
Receiving Water: Unnamed trib of Camp Branch
Class III Fresh
Page 1 of 1

Analysts: Della Parker-Henson, Joshua Ayres, Gary Hardie, Marshall Faircloth
Reviewer: David Whiting

Organism: Ceriodaphnia dubia  Life stage: <24 hours

| Concentrations | Sample/Diluent Volume(mL) | SURVIVAL # Alive 0 hr | 24 hr | 48 hr | pH 0 hour | 24 hour | 48 hour | Temperature[a] 0 hour | 24 hour | 48 hour | Dissolved Oxygen 0 hour | 24 hour | 48 hour | Conductivity Uncorrected µmhos/cm 0 hour | 48 hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Control A | 0/20 | 5 | 5 | 5 | 8.2 | - | 8.2 | 24.3 | - | 23.4 | 7.9 | - | 8.0 | 160 | 180 |
| Control B | 0/20 | 5 | 5 | 5 | - | - | 8.2 | - | - | 23.4 | - | - | 8.0 | - | 180 |
| Control C | 0/20 | 5 | 5 | 5 | - | - | 8.2 | - | - | 23.4 | - | - | 8.0 | - | 175 |
| Control D | 0/20 | 5 | 5 | 5 | - | - | 8.2 | - | - | 23.3 | - | - | 8.0 | - | 180 |
| Dechl Ctrl A | 0/20 | 5 | 5 | 5 | 8.3 | - | 8.2 | 24.2 | - | 23.5 | 8.0 | - | 7.9 | 175 | 180 |
| Dechl Ctrl B | 0/20 | 5 | 5 | 5 | - | - | 8.2 | - | - | 23.5 | - | - | 7.9 | - | 180 |
| Dechl Ctrl C | 0/20 | 5 | 5 | 5 | - | - | 8.2 | - | - | 23.4 | - | - | 7.9 | - | 185 |
| Dechl Ctrl D | 0/20 | 5 | 5 | 5 | - | - | 8.2 | - | - | 23.3 | - | - | 7.9 | - | 190 |
| Dechl 100 A | 20/0 | 5 | 5 | 5 | 7.9 | - | 8.2 | 24.5 | - | 23.5 | 8.2 | - | 7.9 | 230 | 240 |
| Dechl 100 B | 20/0 | 5 | 5 | 5 | - | - | 8.2 | - | - | 23.6 | - | - | 7.9 | - | 235 |
| Dechl 100 C | 20/0 | 5 | 5 | 5 | - | - | 8.2 | - | - | 23.5 | - | - | 7.9 | - | 235 |
| Dechl 100 D | 20/0 | 5 | 5 | 5 | - | - | 8.2 | - | - | 23.5 | - | - | 8.0 | - | 240 |
| 100% A | 20/0 | 5 | 0 | - | 7.9 | 8.1 | - | 24.7 | 23.8 | - | 8.1 | 7.7 | - | 230 | - |
| 100% B | 20/0 | 5 | 0 | - | - | 8.1 | - | - | 23.9 | - | - | 7.6 | - | - | - |
| 100% C | 20/0 | 5 | 0 | - | - | 8.2 | - | - | 23.9 | - | - | 7.6 | - | - | - |
| 100% D | 20/0 | 5 | 0 | - | - | 8.2 | - | - | 23.8 | - | - | 7.7 | - | - | - |

[a] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 24.0-25.5 °C.
Incubator #3 temperature range for the test period was 23.5-25.0°C.

Organism: Cyprinella leedsi  Life stage: 12 days

| Concentrations | Sample/Diluent Volume(mL) | SURVIVAL # Alive 0 hr | 24 hr | 48 hr | pH 0 hour | 24 hour | 48 hour | Temperature[a] 0 hour | 24 hour | 48 hour | Dissolved Oxygen 0 hour | 24 hour | 48 hour | Conductivity Uncorrected µmhos/cm 0 hour | 48 hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Control A | 0/500 | 5 | 5 | 5 | 8.0 | 8.3 | 8.5 | 24.3 | 23.9 | 25.8 | 7.9 | 7.5 | 7.3 | 255 | 280 |
| Control B | 0/500 | 5 | 5 | 5 | 8.0 | 8.4 | 8.5 | 24.2 | 24.2 | 25.1 | 7.9 | 7.6 | 7.2 | 260 | 275 |
| Control C | 0/500 | 5 | 5 | 5 | 8.0 | 8.4 | 8.5 | 24.2 | 24.6 | 24.2 | 8.0 | 7.5 | 7.7 | 260 | 280 |
| Control D | 0/500 | 5 | 5 | 5 | 8.0 | 8.4 | 8.5 | 24.1 | 24.6 | 25.0 | 8.0 | 7.4 | 7.7 | 255 | 280 |
| Dechl Ctrl A | 0/500 | 5 | 5 | 5 | 8.0 | 8.3 | 8.4 | 24.2 | 24.3 | 24.9 | 8.1 | 7.5 | 7.5 | 260 | 275 |
| Dechl Ctrl B | 0/500 | 5 | 5 | 5 | 8.0 | 8.4 | 8.5 | 24.2 | 24.2 | 25.3 | 8.0 | 7.5 | 7.7 | 255 | 280 |
| Dechl Ctrl C | 0/500 | 5 | 5 | 5 | 8.0 | 8.4 | 8.5 | 24.2 | 24.1 | 25.9 | 8.0 | 7.6 | 7.4 | 255 | 290 |
| Dechl Ctrl D | 0/500 | 5 | 5 | 5 | 8.0 | 8.4 | 8.5 | 24.1 | 24.7 | 25.3 | 8.0 | 7.8 | 7.2 | 255 | 280 |
| Dechl 100% A | 500/0 | 5 | 5 | 5 | 7.9 | 8.0 | 8.1 | 24.6 | 24.4 | 25.9 | 8.1 | 7.4 | 7.1 | 235 | 260 |
| Dechl 100% B | 500/0 | 5 | 5 | 5 | 7.9 | 7.9 | 8.1 | 24.7 | 24.2 | 24.9 | 8.0 | 7.4 | 6.8 | 230 | 245 |
| Dechl 100% C | 500/0 | 5 | 5 | 5 | 7.9 | 8.0 | 8.1 | 24.7 | 24.4 | 25.9 | 8.1 | 7.0 | 7.1 | 230 | 260 |
| Dechl 100% D | 500/0 | 5 | 5 | 5 | 7.9 | 8.0 | 8.1 | 24.6 | 24.7 | 25.1 | 8.0 | 7.0 | 6.7 | 230 | 250 |
| 100% A | 500/0 | 5 | 0 | - | 7.9 | 7.9 | - | 24.7 | 24.4 | - | 8.1 | 6.9 | - | 230 | - |
| 100% B | 500/0 | 5 | 0 | - | 7.9 | 7.9 | - | 24.8 | 24.2 | - | 8.1 | 6.9 | - | 230 | - |
| 100 % C | 500/0 | 5 | 0 | - | 7.9 | 7.9 | - | 24.8 | 25.2 | - | 8.1 | 6.5 | - | 230 | - |
| 100% D | 500/0 | 5 | 0 | - | 7.9 | 7.9 | - | 24.8 | 25.0 | - | 8.1 | 6.4 | - | 230 | - |

[a] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 24.0-25.5°C.
Incubator #3 temperature range for the test period was 23.5-25.0°C.

| LIMS | |
|---|---|
| Job number: | TLH-2002-04-16-02 |
| sample number: | 587637 |

| Data Transcription Verification | |
|---|---|
| date: | 10/25/2002 |
| by: | Lisa Homann |
| | Brad Richardson |

| Total Residual CL2 | mg/L | Method |
|---|---|---|
| Field 100% sample: | - | - |
| Lab 100% Sample: | 0.54 | Hach |
| Dechlorinated Sample: | <0.03 | Hach |

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

| Alk & Hardness | Alkalinity (mg/L) | Hardness (mg/L) |
|---|---|---|
| Control water (fish): | 136 | 130 |
| Control water (water flea): | 76 | 79 |
| 100% Sample: | 81 | 74 |

Northwest District Laboratory
160 Governmental Center
Pensacola, FL 32501

Project: BONIFAY WWTP Type: DW Requested By: BUTTS

| Site | Date | Time | Depth | Log | Samplers |
|---|---|---|---|---|---|
| EFFL | 04/15/02 | 1000 | 0.15 | 10182 | BUTTS |

NOTE: DO=8.74 PH=6.64 COND=218 TEMP=22.29°C

| Code | Parameter | Units | Site ID EFFL |
|---|---|---|---|
| 00029 | Log Number | LOG | 10182 |
| 00076 | Turbidity | NTU | 7 |
| 00080 | Color | Pt-Co | 30 |
| 00310 | BOD, 5 day, total | mg/l | 2U |
| 00530 | Residue, nonfilt. | mg/l | 13A |
| 00900 | Hardness | mg/l | 69 |
| 31501 | Total coliform | #/100ml | 220 |
| 31616 | Fecal coliform | #/100ml | 10u |

A denotes mean, B counts unacceptable, J estimate, K less than L greater than, 00 data lost, P too numerous to count, Q out of holding time, T value below detection limit, U not detected

Northwest District Laboratory
160 Governmental Center
Pensacola, FL 32501

Project: BONIFAY WWTP  Type: DW  Requested By: BUTTS

| Site | Date | Time | Depth | Log | Samplers |
|---|---|---|---|---|---|
| UPSTREAM | 04/16/02 | 1040 | 0.15 | 10205 | BUTTS |
| NOTE: PH=6.54 DO=7.12 CONC=170 TEMP=21.73°C | | | | | |
| DOWNSTREAM | 04/16/02 | 0930 | 0.15 | 10206 | BUTTS |
| NOTE: PH=6.88 DO=7.55 COND=209 TEMP=22.13°C | | | | | |

| Code | Parameter | Units | Site ID UPSTREAM | Site ID DOWNSTREAM |
|---|---|---|---|---|
| 00029 | Log Number | LOG | 10205 | 10206 |
| 00076 | Turbidity | NTU | 26 | 11A |
| 00080 | Color | Pt-Co | 160 | 80A |
| 00310 | BOD, 5 day, total | mg/l | 1.7A | 1.8 |
| 00530 | Residue, nonfilt. | mg/l | 26 | 13 |
| 00900 | Hardness | mg/l | 70 | 72 |
| 31501 | Total coliform | #/100ml | 660 | 785A |
| 31616 | Fecal coliform | #/100ml | 610B | 295A |

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

## Appendix 7

## Habitat Assessment Field Sheets.

HD IN 03-18-02
HD OUT 04-16-02

**STATE OF FLORIDA**
**DEPARTMENT OF ENVIRONMENTAL PROTECTION**
**PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET** (5-10-99)

| SUBMITTING AGENCY CODE: SAL0 / SUBMITTING AGENCY NAME: FDEP NWD | STORET STATION NUMBER: 32 02 0031 | DATE (M/D/Y): 03-18-02 | TIME: 1040 | RECEIVING BODY OF WATER: CAMP BRANCH CREEK |
|---|---|---|---|---|
| REMARKS: TEST SITE | COUNTY: Holmes | LOCATION: TRIB 100 m BELOW BONIFAY WWTP | | FIELD CREW ID: #3 |

**RIPARIAN ZONE/INSTREAM FEATURES**

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

| Forest/Natural | Silviculture | Field/Pasture | Agricultural | Residential | Commercial | Industrial | Other (Specify) |
|---|---|---|---|---|---|---|---|
| 15 | 20 | 10 | | 5 | 50 | | |

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

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

Width of riparian vegetation (m) on least buffered side: 6

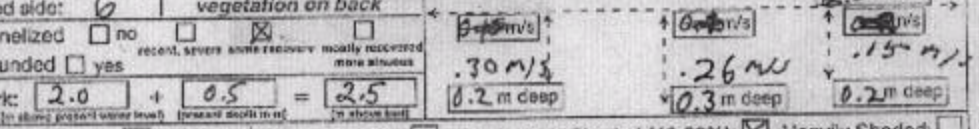
List & map dominant vegetation on back

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

Artificially Impounded ☐ yes

High Water Mark: 2.0 (in stable, pooled water level) + 0.5 (measured depth in m) = 2.5 (m above bed)

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




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

**SEDIMENT/SUBSTRATE**

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

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

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

| Substrate Types | % coverage | # times sampled | method | Substrate Types | % coverage | # times sampled | method |
|---|---|---|---|---|---|---|---|
| Woody Debris (Snags) | 5 | | | Sand | 60 | | |
| Leaf Packs or Mats | 5 | | | Mud/Muck/Silt | 10 | | |
| Aquatic Vegetation | | | | Other: | | | |
| Rock or Shell Rubble | 5 | | | Other: | | | |
| Undercut banks/Roots | 15 | | | Draw aerial view sketch of habitats found in 100 m section | | | |

| WATER QUALITY | Depth (m): | Temp. (°C): | pH (SU): | D.O. (mg/l): | Cond. (µmho/cm) or Salinity (ppt): | % DO | | Secchi (m): |
|---|---|---|---|---|---|---|---|---|
| 03-18-02 | 0.1 | 21.02 | 6.27 | 9.1 | 217 | | | |
| [illegible] | | | | | | | | |
| 04-16-02 | 0.1 | 22.13 | 6.88 | 7.65 | 209 | | | |

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

Water Odors (check box): Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☒ MUSTY

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

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

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

Weather Conditions/Notes:
HD's 50m below WWTP, small patch of sludge-like material at OUTFALL

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

SAMPLING TEAM: F. Butera, G. Butts

SIGNATURE: [signature] DATE: 03-11-02

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

| SUBMITTING AGENCY CODE: 8010 / SUBMITTING AGENCY NAME: FDEP NWD | STORET STATION NUMBER: 32.02.0031 | DATE (M/D/Y): 03-18-02 | RECEIVING BODY OF WATER: CAMP BRANCH CREEK |
|---|---|---|---|

| REMARKS: | COUNTY: | LOCATION: | FIELD ID/NAME: |
|---|---|---|---|
| TEST SITE | Holmes | TRIB 100M BELOW BONIFAY WWTP | # 3 |

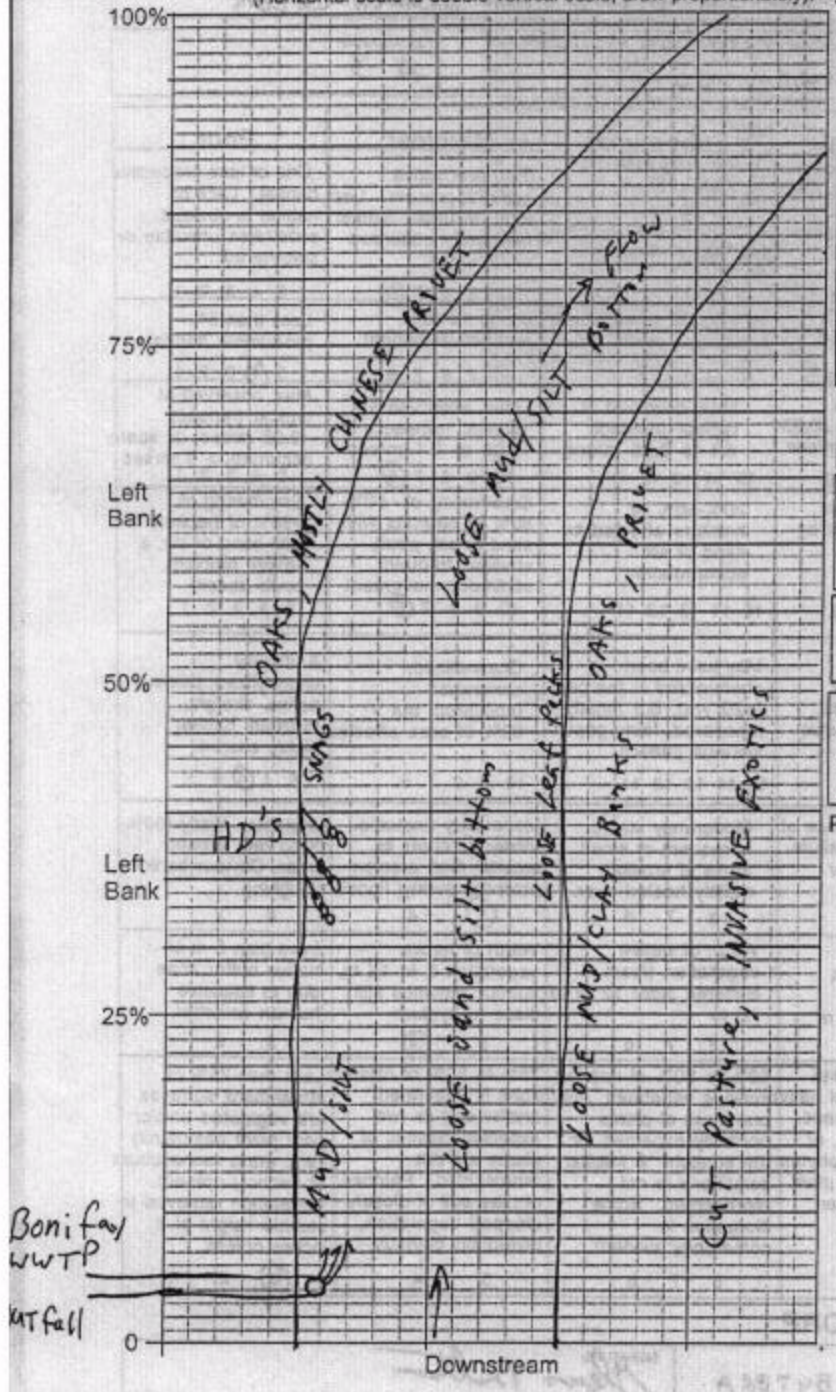
| Habitat Parameter | Optimal | Suboptimal | Marginal | Poor |
|---|---|---|---|---|
| Primary Habitat Components<br>Substrate Diversity [6] | Four or more productive habitats present (snags tree roots, aquatic vegetation, leaf packs (partially decayed), undercut banks, rock).<br>20 19 18 17 16 | Three productive habitats present. Adequate habitat. Some substrates may be new fall (fresh leaves or snags).<br>15 14 13 12 11 | Two productive habitats present. Less than desirable habitat, frequently disturbed or removed.<br>10 9 8 7 (6) | One or less productive habitat. Lack of habitat is obvious. substrates unstable or smothered.<br>5 4 3 2 1 |
| Substrate Availability [4] | Greater than 30% productive habitat present at site.<br>20 19 18 17 16 | 16% to 30% productive habitat, by aerial extent.<br>15 14 13 12 11 | 6% to 15 % productive habitat<br>10 9 8 7 6 | Less than 5% productive habitat.<br>5 (4) 3 2 1 |
| Water Velocity [6] | Max. observed at typical transect: >0.25 m/sec. but < 1 m/sec<br>20 19 18 17 16 | Max. observed at typical transect: 0.1 to 0.25 m/sec<br>15 14 13 12 11 | Max. observed at typical transect: 0.05 to 0.1 m/sec<br>10 9 8 7 (6) | Max. observed at typical transect <0.05 m/sec, or spate occurring; > 1 m/sec<br>5 4 3 2 1 |
| Habitat Smothering [6] | Less than 20% of habitats affected by sand or silt accumulation<br>20 19 18 17 16 | 20%-50% of habitats affected by sand or silt accumulation<br>15 14 13 12 11 | Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement<br>10 9 8 7 (6) | Smothering of >80% of habitats with sand or silt, a severe problem, pools absent<br>5 4 3 2 1 |
| Primary Score [22] | | | | |
| Secondary Habitat Components<br>Artificial Channelization [3] | No artificial channelization or dredging. Stream with normal, sinuous pattern<br>20 19 18 17 16 | May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern<br>15 14 13 12 11 | Channelized, somewhat recovered, but > 80% of area affected<br>10 9 6 7 6 | Artificially channelized, box-cut banks, straight, instream habitat highly altered<br>5 4 (3) 2 1 |
| Bank Stability<br>Right Bank [5]<br>Left Bank [5] | Stable. No evidence of erosion or bank failure. Little potential for future problems.<br>10 9 | Moderately stable. Infrequent or small areas of erosion, mostly healed over.<br>8 7 6 | Moderately unstable. Moderate areas of erosion, high erosion potential during floods<br>(5) 4 | Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing.<br>3 2 1 |
| Riparian Buffer Zone Width<br>Right Bank [4]<br>Left Bank [4] | Width of native vegetation (least buffered side) greater than 18 m<br>10 9 | Width of native vegetation (least buffered side) 12 m to 18 m<br>8 7 6 | Width of native vegetation 6 to 12 m, human activities still close to system<br>5 (4) | Less than 6 m of native buffer zone due to intensive human activities<br>3 2 1 |
| Riparian Zone Vegetation Quality<br>Right Bank [3]<br>Left Bank [3] | Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions.<br>10 9 | 50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident.<br>8 7 6 | 25% to 50% of riparian zone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious.<br>5 4 | Less than 25% of streambank surfaces are vegetated and/or poor plant community (e.g. grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less.<br>(3) 2 1 |
| Secondary Score [27] | | | | |

**[49] TOTAL SCORE**

| ANALYSIS DATE: | ANALYST: | SIGNATURE: |
|---|---|---|
| 03-18-02 | BUTTS, BUTERA | Glenn Butts |

## Site Map / Habitat Sketch

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




Field ID: _____

**Substrates: Code key, draw proportionate habitat abundance.**

| | |
|---|---|
| 5 | Snags |
| 10 | Roots/undercut banks |
| 5 | Leaf Packs (or mats) |
| | Macrophytes |
| 10 | MUD/SILT |
| 70 | 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 vegetaton is altered or eliminated.

**Plants observed/other notes:**

CHINESE PRIVET
WATER OAK
RED MAPLE
SYCAMORE
SWEET GUM
INVASIVE EXOTICS

HD IN 03-18-02

# STATE OF FLORIDA
## DEPARTMENT OF ENVIRONMENTAL PROTECTION

HD OUT 04-16-02

## PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

| SUBMITTING AGENCY CODE: 3010 | STORET STATION NUMBER: 32.02.0030 | DATE (MO/DY): 03-18-02 | TIME: 1115 | RECEIVING BODY OF WATER: CAMP BRANCH CREEK |
|---|---|---|---|---|
| SUBMITTING AGENCY NAME: FDEP NWD | | | | |

| REMARKS: | COUNTY: | LOCATION: | FIELD ID/NAME: |
|---|---|---|---|
| CONTROL | Holmes | TRIB 50 YDS UPSTREAM FROM BONIFAY WWTP | #2 |

### RIPARIAN ZONE/INSTREAM FEATURES

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

| Forest/Natural | Silviculture | Field/Pasture | Agricultural | Residential | Commercial | Industrial | Other (Specify) |
|---|---|---|---|---|---|---|---|
| | | | | 90 | 10 | | |

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

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

Width of riparian vegetation (m) on least buffered side: 5

List & map dominant vegetation on back

Artificially Channelized ☐ no ☐ recent, severe sand recovery ☒ mostly recovered, mod. sand ☐ other

Artificially Impounded ☐ yes

High Water Mark: 2.5 (m above present water level) + 0.5 (present depth in m) = 3.0 (in above bed)

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect: 3.0 m wide

0.1 m/s 0.025 m/s 0.15 m/s

0.3 m/s

0.2 m deep 0.03 m deep 0.05 m deep

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

### SEDIMENT/SUBSTRATE

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

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

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

| Substrate Types | % coverage | # times sampled | method | Substrate Types | % coverage | # times sampled | method |
|---|---|---|---|---|---|---|---|
| Woody Debris (Snags) | 5 | | | Sand | 05 | | |
| Leaf Packs or Mats | 4 | | | Mud/Muck/Silt | 10 | | |
| Aquatic Vegetation | 1 | | | Other: | | | |
| Rock or Shell Rubble | 65 | | | Other: | | | |
| Undercut banks/Roots | 15 | | | Draw aerial view sketch of habitats found in 100 m section | | | |

| WATER QUALITY | Depth (m): | Temp. (°C): | pH (SU): | D.O. (mg/L): | Cond. (µmho/cm) or Salinity (ppt): | | | Secchi (m): |
|---|---|---|---|---|---|---|---|---|
| 03-18-02 | 0.1 | 22.12 | 7.06 | 14.74* | 190 | | | |
| mid-depth | | | | | | | | |
| 04-16-02 | 0.1 | 21.73 | 6.54 | 7.12 | 170 | | | |

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

Water Odors (check box): Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☒ Fowl

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

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

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

Weather Conditions/Notes:
HD's below bridge

* HIGH DO, will re-cal back in lab
RE-CAL OK ON 03-19-02

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

SAMPLING TEAM: F. Butera, G. Butts

SIGNATURE: Glenn Butts

DATE: 03-18-02

N: 30° 47' 36.5"
W 85° 40' 39.4"

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

| SUBMITTING AGENCY CODE: 8610 / SUBMITTING AGENCY NAME: EPCP NWD | STORET STATION NUMBER: 32.02.0030 | DATE (M/D/Y): 03-18-02 | RECEIVING BODY OF WATER: CAMP BRANCH CREEK |
|---|---|---|---|

| REMARKS: CONTROL | COUNTY: Holmes | LOCATION: TRIB 50 YDS UPSTREAM FROM BONIFAY WWTP | FIELD ID/NAME: # 2 |
|---|---|---|---|

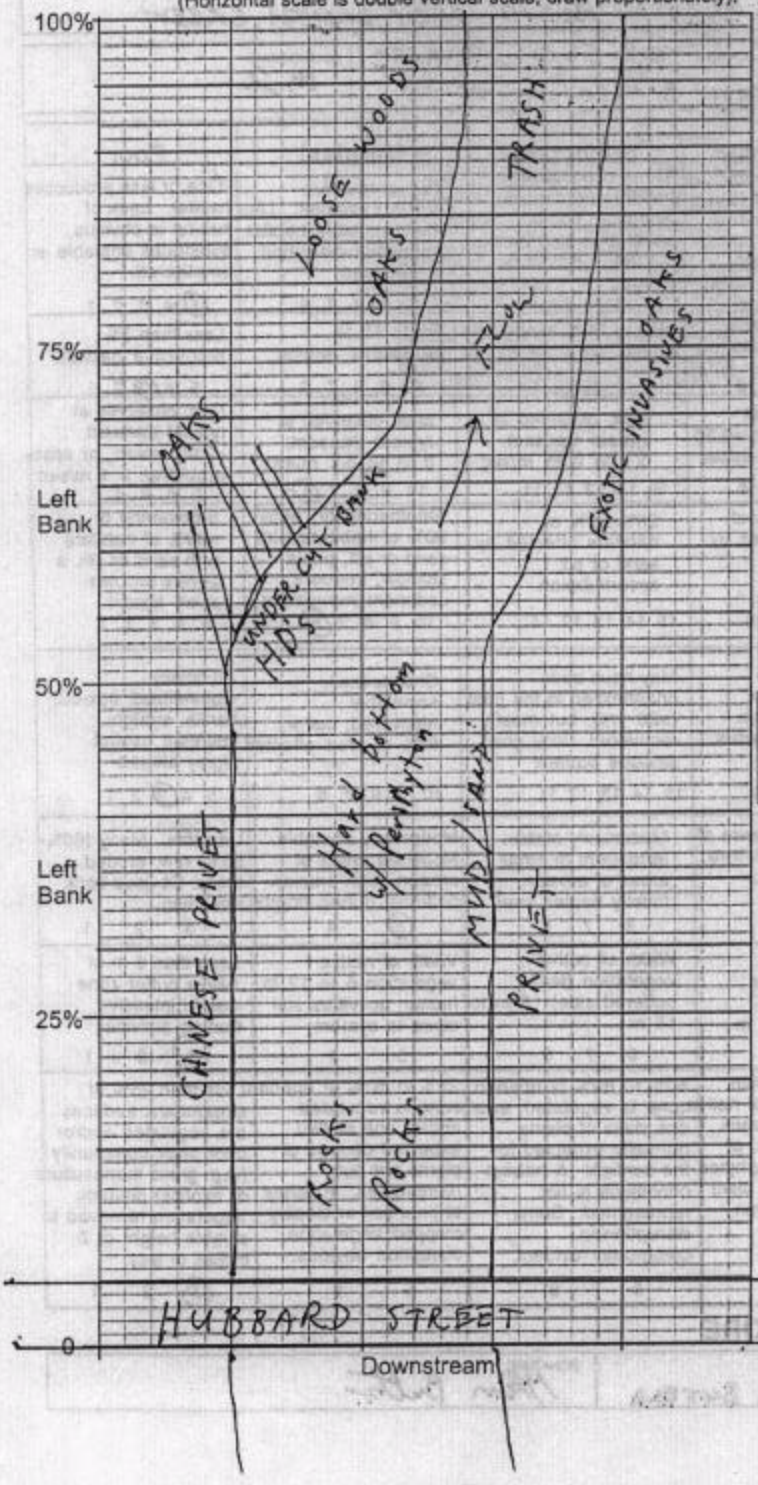
| Habitat Parameter | Optimal | Suboptimal | Marginal | Poor |
|---|---|---|---|---|
| Primary Habitat Components<br>Substrate Diversity [5] | Four or more productive habitats present (snags tree roots, aquatic vegetation, leaf packs (partially decayed), undercut banks, rock).<br>20 19 18 17 16 | Three productive habitats present. Adequate habitat. Some substrates may be new fall (fresh leaves or snags).<br>15 14 13 12 11 | Two productive habitats present. Less than desirable habitat, frequently disturbed or removed.<br>10 9 8 7 6 | One or less productive habitat. Lack of habitat is obvious, substrates unstable or smothered.<br>(5) 4 3 2 1 |
| Substrate Availability [3] | Greater than 30% productive habitat present at site.<br>20 19 18 17 16 | 16% to 30% productive habitat, by aerial extent.<br>15 14 13 12 11 | 6% to 15 % productive habitat<br>10 9 8 7 6 | Less than 5% productive habitat.<br>5 4 (3) 2 1 |
| Water Velocity [6] | Max. observed at typical transect: >0.25 m/sec. but < 1 m/sec<br>20 19 18 17 16 | Max. observed at typical transect: 0.1 to 0.25 m/sec<br>15 14 13 12 11 | Max. observed at typical transect: 0.05 to 0.1 m/sec<br>10 9 8 7 (6) | Max. observed at typical transect <0.05 m/sec, or spate occurring; > 1 m/sec<br>5 4 3 2 1 |
| Habitat Smothering [6] | Less than 20% of habitats affected by sand or silt accumulation | 20%-50% of habitats affected by sand or silt accumulation | Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent, sediment movement | Smothering of >80% of habitats with sand or silt, a severe problem, pools absent |
| Primary Score [20] | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 (6) | 5 4 3 2 1 |
| Secondary Habitat Components<br>Artificial Channelization [3] | No artificial channelization or dredging. Stream with normal, sinuous pattern<br>20 19 18 17 16 | May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern<br>15 14 13 12 11 | Channelized, somewhat recovered, but > 80% of area affected<br>10 9 8 7 6 | Artificially channelized, box-cut banks, straight, instream habitat highly altered<br>5 4 (3) 2 1 |
| Bank Stability<br>Right Bank [5]<br>Left Bank [5] | Stable. No evidence of erosion or bank failure. Little potential for future problems.<br>10 9 | Moderately stable. Infrequent or small areas of erosion, mostly healed over.<br>8 7 6 | Moderately unstable. Moderate areas of erosion, high erosion potential during floods<br>(5) 4 | Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing.<br>3 2 1 |
| Riparian Buffer Zone Width<br>Right Bank [3]<br>Left Bank [3] | Width of native vegetation (least buffered side) greater than 18 m<br>10 9 | Width of native vegetation (least buffered side) 12 m to 18 m<br>8 7 6 | Width of native vegetation 6 to 12 m, human activities still close to system<br>5 4 | Less than 6 m of native buffer zone due to intensive human activities<br>(3) 2 1 |
| Riparian Zone Vegetation Quality<br>Right Bank [3]<br>Left Bank [3]<br>Secondary Score [25] | Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions.<br>10 9 | 50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident.<br>8 7 6 | 25% to 50% of riparian zone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious.<br>5 4 | Less than 25% of streambank surfaces are vegetated and/or poor plant community (e.g. grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less.<br>(3) 2 1 |

**45 TOTAL SCORE**

| ANALYSIS DATE: 03-18-02 | ANALYST: BUTTS, BUTERA | SIGNATURE: Glenn Butts |
|---|---|---|

## Site Map / Habitat Sketch

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




Field ID:

**Substrates:** Code key, draw proportionate habitat abundance.

| | |
|---|---|
| 5 | Snags |
| 10 | Roots/undercut banks |
| 5 | Leaf Packs (or mats) |
| | Macrophytes |
| 10 | MUD/SILT |
| 65 | ROCKS/HARD BOTTOM |
| 5 | 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 vegetaton is altered or eliminated.

**Plants observed/other notes:**

SWEET GUM
CHINESE PRIVET
WATER OAK
SOUTHERN MAGNOLIA
INVASIVE EXOTICS

## Appendix 8

Periphyton collected from glass microscope slides incubated for 28 days upstream and downstream of Bonifay Wastewater Treatment Facility discharge, 15 April 2002. Taxa collected and density (number/$cm^2$) rounded to nearest individual.

| | Control Site | Test Site |
|---|---|---|
| **Bacillariophyceae** | | |
| *Achnanthes exigua* | 601 | 1410 |
| *Achnanthes hungarica* | - | 235 |
| *Achnanthes lanceolata* | 802 | 1880 |
| *Achnanthes minutissima* | 7218 | 5876 |
| *Achnanthes rupestoides* | 1002 | - |
| *Achnanthes* sp. | - | 940 |
| *Cymbella mexicana* | - | 235 |
| Cymbellaceae | 401 | - |
| *Diploneis* sp. | - | 235 |
| *Eunotia bilunaris* | - | 705 |
| *Eunotia monodon* | 200 | - |
| *Eunotia* sp. | 16641 | 33143 |
| Fragilariaceae | 401 | - |
| *Gomphonema affine* | 601 | - |
| *Gomphonema parvulum* | 2406 | 3761 |
| *Gomphonema* sp. | 7418 | 1410 |
| *Gomphonema truncatum* | 401 | 470 |
| *Gyrosigma* sp. | - | 235 |
| *Hippodonta capitata* | - | 235 |
| *Melosira* sp. | - | 1410 |
| *Navicula constans* | 401 | 470 |
| *Navicula cryptocephala* | 601 | 470 |
| *Navicula cryptotenella* | - | 235 |
| *Navicula minima* | 2205 | 2351 |
| *Navicula pupula* | 200 | - |
| *Neidium* sp. | - | 235 |
| *Nitzschia amphibia* | 401 | 470 |
| *Nitzschia* sp. | 1002 | 2821 |
| *Synedra* sp. | - | 470 |
| *Synedra ulna* | - | 235 |
| **Chlorophyceae** | | |
| *Ankistrodesmus falcatus* | 200 | 705 |
| *Characium* sp. | - | 470 |
| *Chlorella* sp. | 601 | 5876 |
| *Oedogonium* sp. | 601 | 235 |
| *Protococcus* sp. | - | 21390 |
| *Stigeoclonium* sp. | - | 705 |
| **Cyanophyceae** | | |
| *Anabaena* sp. | 1403 | 470 |
| *Aphanocapsa* sp. | - | 235 |
| *Cyanobium parvum* | 401 | 3526 |
| *Lyngbya* sp. | 1804 | - |
| *Oscillatoria formosa* | - | 235 |
| *Oscillatoria* sp. | 1002 | 940 |

## Appendix 9.

Benthic macroinvertebrates collected from Hester-Dendy artificial substrates incubated upstream and downstream of the Bonifay Wastewater Treatment Facility for 28 days (15 April 2002). Taxa collected and density (number/$m^2$) rounded to the nearest individual (n = 3 samples per site).

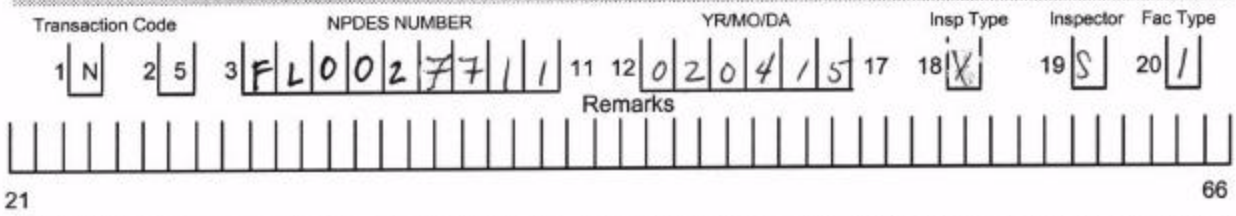
| | Control Site | Test Site |
|---|---|---|
| **Crustacea:** | | |
| Amphipoda | | |
| *Hyalella azteca* | - | 3 |
| Decapoda | | |
| Cambaridae | 3 | - |
| **Annelida:** | | |
| Oligochaeta | | |
| *Bratislavia unidentata* | - | 8 |
| *Dero digitata* complex | 13 | 3 |
| *Dero* sp. | - | 3 |
| *Haber speciosus* | - | 3 |
| Naididae | - | 16 |
| *Nais communis* complex | 19 | 169 |
| *Pristina* sp. | - | 3 |
| *Slavina appendiculata* | 40 | - |
| **Mollusca:** | | |
| Gastropoda | 13 | - |
| *Ferrissia* sp. | 3 | - |
| *Micromenetus* sp. | 3 | - |
| *Physella* sp. | 106 | 3 |
| **Insecta:** | | |
| Coleoptera | | |
| *Hydrocanthus* sp. | - | 3 |
| Diptera | | |
| Chironomidae | 5 | 238 |
| *Chironomus* sp. | 8 | 4114 |
| *Cricotopus bicinctus* | 3 | 13 |
| *Dicrotendipes modestus* | 3 | - |
| *Dicrotendipes simpsoni* | 8 | - |
| *Odontomyia* sp. | 3 | - |
| *Paratanytarsus* sp. | - | 13 |
| *Polypedilum illinoense* grp. | - | 63 |
| *Polypedilum scalaenum* grp. | - | 19 |
| *Polypedilum* sp. | - | 19 |
| *Polypedilum tritum* | - | 13 |
| *Thienemannimyia* grp. | - | 87 |
| Odonata | | |
| *Argia tibialis* | 3 | - |

## Appendix 10

Qualitative benthic macroinvertebrate collections (n = 20 discrete dipnet sweeps) upstream and downstream of Bonifay Wastewater Treatment Facility (16 April 2002). Taxa lists and number of individuals counted.

| | Control Site | Test Site |
|---|---|---|
| **Crustacea:** | | |
| Amphipoda | | |
| *Hyalella azteca* | 1 | - |
| **Annelida:** | | |
| Oligochaeta | | |
| *Bratislavia unidentata* | 1 | - |
| *Dero digitata* complex | 5 | 1 |
| Glossiphoniidae | 4 | - |
| *Haber speciosus* | 2 | - |
| *Limnodrilus hoffmeisteri* | 16 | 11 |
| *Nais communis* complex | 1 | - |
| Oligochaeta | 2 | - |
| **Mollusca:** | | |
| Gastropoda | | |
| Ancylidae | 2 | - |
| *Ferrissia* sp. | 1 | - |
| *Micromenetus dilatatus* | 4 | - |
| *Physella* sp. | 28 | - |
| Pelecypoda | | |
| *Corbicula* sp. | - | 1 |
| Sphaeriidae | 25 | - |
| **Insecta:** | | |
| Diptera | | |
| *Atrichopogon* sp. | 1 | - |
| Chironomidae | 2 | 5 |
| *Chironomus* sp. | 1 | 93 |
| *Cricotopus bicinctus* | 1 | - |
| *Larsia decolorata* | 1 | - |
| *Limnophyes* sp. | 1 | - |
| *Natarsia* sp. | 2 | - |
| *Paracladopelma* sp. | 1 | - |
| *Paratanytarsus* sp. | 1 | - |
| *Polypedilum illinoense* grp. | 0 | 1 |
| *Polypedilum scalaenum* grp. | 1 | 1 |
| *Thienemannimyia* grp. | 4 | 1 |
| *Tipula* sp. | 2 | - |

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




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