# 230

Biological Assessment of

# Mill Creek Elementary School WWTP

St. Johns County

NPDES #FL0025658

Sampled January 1998

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November 1998

**Biology Section**
**Division of Administrative and Technical Services**
**Bureau of Laboratories**

Comprehensive Quality Assurance Plan No. 870346G

# Department of Environmental Protection

## Results of Fifth Year Inspections

Discharger: Mill Creek Elementary School WWTP
County: St. Johns County
NPDES Number: FL0025658
State Permit Expiration Date: 31 August 1998

### Toxics Sampling Inspection (**XSI**)

Date Sampled: 12 January 1998

Results: No organic pollutants were detected in the effluent. Effluent metals complied with Class III water quality standards.

### Compliance Biomonitoring Inspection (**CBI**)

Date Sampled: 12 January 1998

Results: The effluent sample was not acutely toxic to the fish, *Cyprinella leedsi*, or to the invertebrate, *Ceriodaphnia dubia*.

### Impact Bioassessment Inspection (**IBI**)

Date Sampled: 12 January 1998

Results: Habitat quality was "optimal" at both the control and test site. Quantitative and qualitative measures of macroinvertebrate community health suggested improvement at the test site compared to the control site. The Stream Condition Index (SCI) score placed both the control and test sites in the "excellent" category. Quantitative measures of algal community health did not indicate any degradation of algal communities in Mill Creek. Chlorophyll *a* was undetected at the control and test site.

### Water Quality Inspection (**WQI**)

Date Sampled: 12 January 1998

Results: Physical/chemical measurements were comparable at the control and test sites. Effluent nutrient levels were somewhat elevated. All nutrient levels for both the control and test site were typical for Florida waters. Algal Growth Potential (AGP) values at both the control (8.4 mg dry wt/L) and test site (8.5 mg dry wt/L) exceeded the 5 mg dry wt/L "problem threshold". The AGP of the effluent was 26.8 mg dry wt/L. Effluent fecal coliform (860 counts/100 mL) exceeded the permitted monthly average. Runoff from a cattle pasture and the decay of a dead cow upstream from the control site may have contributed to elevated values of coliforms at the control and test sites.

These fifth year inspections provide the necessary information to evaluate the facility's impact on its receiving waters and to provide the basis for specific condition recommendations for permit renewal.

## Introduction

The Mill Creek Elementary School WWTP, located in St. Johns County, Florida (see maps in Appendix) is a 0.018 MGD extended aeration plant providing secondary treatment with chlorination and dechlorination.

The facility seasonally discharges to a periodically dry stormwater ditch that discharges into Mill Creek that enters Sixmile Creek, which ultimately flows into the St. Johns River. The ditch generally has flow whenever there is a significant storm event. The stormwater ditch enters Mill Creek at approximately 200 meters upstream of the bridge over State Route 16. The control and test sites are approximately 17 meters upstream and downstream of the input from the stormwater ditch, respectively. Mill Creek is a very sinuous creek that drains a large area of cattle pasture, wetlands, and some row crop agriculture. Within the two week time-frame prior to the sampling event and the Fifth Year Inspection there had been two remarkable periods of rainfall, one totaling 23 cm over three days and another totaling 30 cm over a five day period. Due to these heavy rains, a high water level was apparent in the immediate area of the streambed creating the potential for scouring and sand deposition. A dead cow was found upstream of the two sampling points.

State Permit limits for the Mill Creek WWTP are listed in Table 1. The plant had an unionized-ammonia violation in May, 1997. This is the first Fifth Year Inspection conducted on this facility since it became operational approximately 7 years ago.

## Methods

The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a control site (located approximately 17 meters upstream of the point where the stormwater ditch joins Mill Creek) and a test site (located approximately 17 meters downstream of the point where the stormwater ditch joins Mill Creek) (see maps in Appendix). A habitat assessment was performed to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. The effluent was analyzed for nutrients, metals, and for organic constituents (base neutral and acid extractables, and pesticide extractables). Methods used for all chemical analyses are on file at the DEP Central Chemistry Laboratory in Tallahassee.

Phytoplankton were sampled at both control and test sites via subsurface grabs. Chlorophyll *a* was determined for phytoplankton communities. Periphyton would normally be sampled at both control and test sites by incubating glass microscope slides in a standard periphytometer for 28 days. However, the periphyton racks at the test site were damaged when the stream overflowed its bank and therefore were not processed. Due to the lack of comparison data, control site periphyton racks were not processed.

Benthic macroinvertebrate communities were evaluated at control and test sites. Invertebrates were collected from multiple substrates (*e.g.*, snags, leaf packs, vegetation) using discrete dip-net sweeps. Additional invertebrate collections were accomplished using Hester-Dendy multiplate samplers which were incubated for 28 days.

Acute toxicity bioassays, using the invertebrate, *Ceriodaphnia dubia*, and the fish, *Cyprinella leedsi*, as test organisms, were performed on an effluent sample. *Selenastrum capricornutum* was used as the test organism for the algal growth potential tests. Bacterial populations were analyzed for total and fecal coliforms. All field and laboratory biological methods were carried out following Biology Section Standard Operating Procedures (SOP's). The latest version of the SOP's can be viewed on our web site at: 'www.dep.state.fl.us/labs/sops.htm'.

Several different measurements of macroinvertebrate and algal community health have been employed to determine the effects of the discharge. These measurements include: habitat assessment, taxa richness, Shannon-Weaver Diversity Index, the Florida Index, Ephemeroptera/Plecoptera/Trichoptera (EPT) Index, community composition, functional feeding groups, algal biomass, and the Stream Condition Index (SCI). For a discussion of each of these measures, see *Explanation of Measurements of Community Health* in the Appendix.

For graphical purposes, the percent differences between the control and test sites involving the number of taxa, the diversity index, the Florida Index, the EPT Index, and the % filter-feeders are measured as the control site minus test site divided by the control site. The percent differences between sites involving the algal density, chlorophyll *a*, and algal growth potential are measured as the test site minus control site divided by the control site.

The following personnel were involved in this investigation: Tim McKelvey, Kathleen Gerard and Pat O'Connor (DEP Northeast District), Roger Caron, Jennifer Eichelberger, Ken Espy, Marshall Faircloth, Russel Frydenborg, Joy Jackson, Scott Lashbrook, Elizabeth Miller, Urania Quintana, Johnny Richardson, Lisa Tamburello, David Whiting, Vicki Whiting, and Steve Wolfe (DEP Central Biology Laboratory in Tallahassee). The report was reviewed by the Point Source Studies Review Committee, consisting of Wayne Magley, Chuck Ziegmont, and Michael Tanski, as well as District representatives.

## Results and Discussion

Habitat quality was "optimal" at both the control site (135 points) and test site (135 points) (see Habitat Assessment Field Data Sheets in Appendix). Substrate at both sites consisted of 40% sand, 40% woody debris, 10% leaf packs or mats, and 10% undercut banks and roots.

Physical/chemical measurements were comparable at the control and test sites (Table 1). Dissolved oxygen levels were 7.7 mg/L at the control site and 7.6 mg/L at the test site. The temperature (control site = 14.9°C, test site = 14.0°C), pH (control site = 6.3 SU, test site = 6.2 SU) and conductivity (147 µmhos/cm at both sites) were similar at both sites.

Copper, iron, and zinc were detected in the effluent at concentrations which were less than the minimum quantitation limit, but greater than or equal to the minimum detection limit. For regulatory purposes, the above metals were assumed to be at the minimum detection limits. The silver concentration (0.11µg/L) was a violation of Class III water quality standards (Rule 62-302.530(60) FAC).

The effluent sample was not acutely toxic to the fish, *Cyprinella leedsi,* or to the invertebrate, *Ceriodaphnia dubia,* during the 48-hour bioassay (Appendix).

Nutrient levels are shown in Table 1. Effluent nutrient levels were somewhat elevated. The ortho-phosphate of the effluent was 2.7 mg/L, while the total phosphorus of the effluent was 4.5 mg/L. The nitrate+nitrite and TKN of the effluent were 27 mg/L and 2.0 mg/L, respectively. All nutrient levels for both the control and test sites were typical for Florida waters.

Algal Growth Potential (AGP) values (control = 8.4 mg dry wt/L and test = 8.5 mg dry wt/L) exceeded the 5 mg dry wt/L "problem threshold" (Raschke and Schultz 1987). The AGP of the effluent was 26.8 mg dry wt/L.

The effluent fecal coliform level was 860 counts/100 mL and the total coliform level was greater than 800 counts/100 mL (Table 1). Fecal coliform values exceeded the one-time grab permit limit of 200 counts/mL at the control and test sites (270 and 450 counts/100 mL, respectively). Total coliforms were 890 counts/100 mL at the test site and 8,600 counts/100 mL at the control site. The control site level (8,600 counts/100 mL) exceeded the Class III water quality standard of 2,400 counts/100mL, a violation of Rule 62-302.530(7) FAC.

Quantitative measures of phytoplankton community health did not indicate any degradation of the algal communities in Mill Creek (Table 2). Measures of community health such as algal density, diversity, and community structure were similar at the control and test site and taxa richness was identical at both sites (Figure 1). Chlorophyll *a* was undetected at both sites.

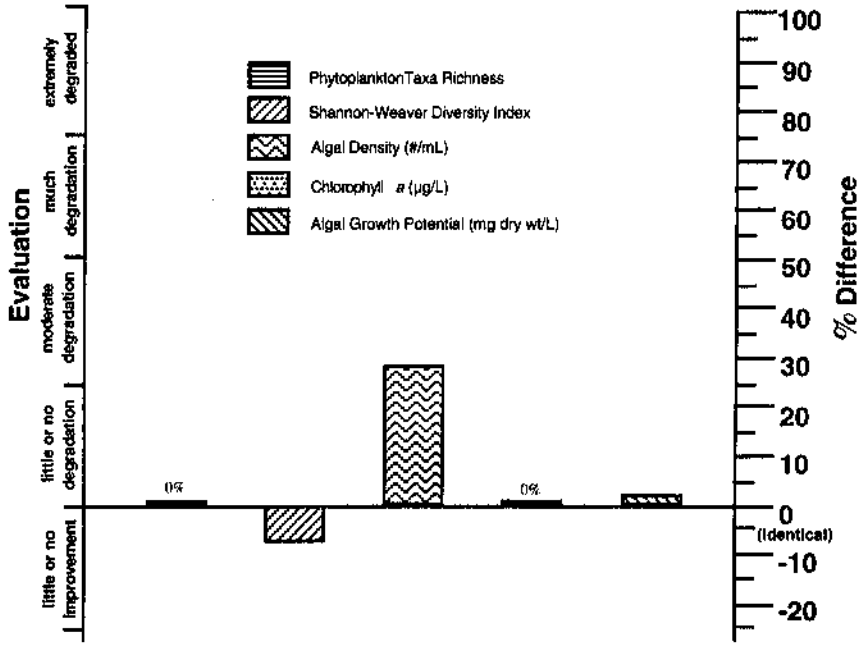



***Figure 1. Effect of discharge on the phytoplanton community.***

*Table 1. Effluent permit limits and summary of chemistry data.*

| Mill Creek W W TP | Effluent Limits | Effluent Sample | Control Site | TestSite |
|---|---|---|---|---|
| **Organic Constituents (µg/L)** | | | | |
| none detected | - | - | - | - |
| **Metals (µg/L)** | | | | |
| Aluminum | ≤ 1,500 ** | 57 I | - | - |
| Arsenic | ≤ 50 ** | 40 U | - | - |
| Cadmium | ≤ 2.9 **c | 0.1 I | - | - |
| Chromium | ≤ 549 **c | 10 U | - | - |
| Copper | ≤ 33 **c | 17.5 A | - | - |
| Iron | ≤ 1,000 ** | 99 A | - | - |
| Lead | ≤ 14 **c | 0.3 I | - | - |
| Mercury | ≤ 0.012 ** | 0.1 U | - | - |
| Nickel | ≤ 432 **c | 7.0 U | - | - |
| Selenium | ≤ 5.0 ** | 50 U | - | - |
| Silver | ≤ 0.07 ** | 0.11 I | - | - |
| Zinc | ≤ 291 **c | 85 A | - | - |
| **Nutrients (mg/L)** | | | | |
| Ortho-phosphate | - | 2.7 | 0.043 | 0.041 A |
| Total phosphorus | - | 4.5 A | 0.13 | 0.13 |
| Ammonia | - | 0.051 A | 0.091 A | 0.060 |
| Unionized Ammonia | ≤ 0.02 *b | 0.0 | 0.0 | 0.0 |
| Nitrate+Nitrite | - | 27 | 0.09 | 0.09 A |
| TKN | - | 2.0 A | 1.1 A | 1.1 A |
| **General Phys-Chem Parameters** | | | | |
| HabitatAssessment | - | - | 135 | 135 |
| D.O. (mg/L) | ≥ 5.0 *b | 9.8 | 7.7 | 7.6 |
| pH (SU) | 6.0-8.5 * | 6.14 | 6.3 | 6.2 |
| Conductivity (µmhos/cm) | - | 85 | 147 | 147 |
| Temperature (°C) | - | 16.3 | 14.9 | 14.0 |
| C.B.O.D., 5day (mg/L) | ≤ 30 *b | 2.0 | < 2.0 | < 2.0 |
| Tot. Residual Chlorine (mg/L) | 0.5-0.01 * | 0.0 | - | - |
| Total Suspended Solids (mg/L) | ≤ 30 *b | 6.0 | 5.0 | 5.0 |
| Hardness (mg $CaCO_3$) | - | 328.8 | - | - |
| AGP (mg dry wt/L) | - | 26.8 A | 8.4 | 8.5 |
| **Toxicity** | | | | |
| Bioassay Fish | report | no mortality | - | - |
| Bioassay Invertebrate | report | no mortality | - | - |
| **Microbiology (# organisms/100 mL)** | | | | |
| Fecal Coliforms | ≤ 800 **d | 860 B | 270 | 450 |
| Total Coliforms | ≤ 2,400 **d | > 800 L | 8,600 B | 890 B |

* Permitlimit
** Class III water quality standard
a - Annual average
b - Monthly average
c - Value is calculated based on hardness
d – Based on a one-time grabevent
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 less than the minimum quantitation limit, and greater than or equal to the minimum detection limit
L - Actual value is known to be greater than value given
U - Material analyzed for butnotdetected; value reported is the minimum detection limit

The quantitative measures of macroinvertebrate community health derived from the Hester-Dendy sampler results showed little difference between the control and test sites (Table 3). Figure 2 indicates the degree of difference between the macroinvertebrate communities at the control site and test site. Larger differences (that is higher percentages) correspond with greater degrees of degradation at the test site. Negative values suggest the test site is healthier than the control site.

Taxa richness (control = 35 taxa and test = 34 taxa) and Shannon-Weaver diversity (control = 3.7 and test = 3.8) were very similar at the two study sites (Table 3). The Florida Index increased from 16 points at the control site to 19 points at the test site. The EPT Index increased from 4 points at the control site to 5 points at the test site. Suspension/filter-feeders, an indicator of good water quality, made up 10% of the control community and 17% of the test community.

Most of the results of dip-net sampling showed a slight improvement at the test site compared to the control site (Table 3). The SCI score increased from 27 at the control site to 29 at the test site, placing both sites in the "excellent" category (see SCI Worksheet in Appendix). Further, taxa richness increased from 30 at the control site to 39 at the test site. The EPT Index increased from 1 at the control site to 5 at the test site. The number of Chironomid taxa was the same (n = 11) at both the control and test sites. The percent contribution of dominant taxon increased from 13% at the control site to 21% at the test site. The Florida Index increased from 7 points at the control site to 15 points at the test site. Suspension/filter-feeders, an indicator of good water quality, made up 16% of the control community and 13% of the test community.

## Conclusions

Physical/chemical measurements were comparable at the control and test sites. Aluminum, cadmium, copper, iron, lead, and zinc were detected in the effluent at levels that complied with Class III water quality standards. The silver concentration (0.11µg/L) was a violation of Class III water quality standards (Rule 62-302.530(60) FAC).

The effluent sample was not acutely toxic to the fish, *Cyprinella leedsi,* or to the invertebrate, *Ceriodaphnia dubia,* during the 48-hour bioassay.

Effluent nutrient levels were somewhat elevated; however, the discharge did not appear to be having any adverse affects on the nutrient levels in Mill Creek. All nutrient levels for both the control and test site were typical for Florida waters.

The AGP values, (control = 8.4 mg dry wt/L and test = 8.5 mg dry wt/L) exceeded the 5 mg dry wt/L "problem threshold". This elevation is probably a result of the nutrient inputs from the facility's discharge. The AGP of the effluent was 26.8 mg dry wt/L.

The effluent fecal coliform level was 860 counts/100 mL and the total coliform level was greater than 800 counts/100 mL (Table 1). Fecal coliform values exceeded the one-time grab permit limit of 200 counts/mL at the control and test sites (270 and 450 counts/100 mL, respectively). Total coliforms were 890 counts/100 mL at the test site and 8,600 counts/100 mL at the control site. The control site level (8,600 counts/100 mL) exceeded the Class III water quality standard of 2,400 counts/100mL, a violation of Rule 62-302.530(7) FAC. Runoff from a cattle pasture and the decay of a dead cow upstream of the control site may have contributed to elevated values of coliforms at the control and test sites.

Quantitative measures of phytoplankton community health

***Table 2. Major characteristics of community structure of control and test sites.***

| Mill Creek WWTP | Control Site | Test Site |
|---|---|---|
| **Phytoplankton Algae** | | |
| Number of Taxa | 15 | 15 |
| Shannon-Weaver Diversity | 2.9 | 3.1 |
| Algal Density (#/mL) | 493 | 630 |
| % Euglenophyceae | 25 | 18 |
| % Cryptophyceae | 25 | 37 |
| % Chrysophyceae | 22 | 9 |
| % Green | 39 | 35 |
| % Diatoms | 22 | 60 |
| **AGP (mg dry wt/L)** | 8.4 | 8.5 |

***Table 3. Majjor characteristics of macroinvertebrate community structure of control and test sites.***

| Mill Creek WWTP | Control Site | Test Site |
|---|---|---|
| **Macroinvertebrate Qualitative** | | |
| Number of Taxa | 30 | 39 |
| Florida Index | 7 | 15 |
| SCI | 27 | 29 |
| EPT Index | 1 | 5 |
| % Dominant Taxon | 13 | 21 |
| Community Composition | | |
| % Amphipoda | 0.0 | 1 |
| % Coleoptera | 16 | 39 |
| % Diptera | 38 | 39 |
| % Ephemeroptera | 1 | 3 |
| % Gastropoda | 13 | 5 |
| % Oligochaeta | 18 | 5 |
| % Pelecypoda | 13 | 5 |
| % Trichoptera | 0.0 | 2 |
| % Other | 1 | 1 |
| Functional Feeding Groups | | |
| % Predators | 2 | 5 |
| % Burrowing Deposit Feeders | 18 | 4 |
| % Surface Deposit Feeders | 33 | 37 |
| % Suspension Feeders | 16 | 13 |
| % Scrapers | 14 | 24 |
| % Shredders | 11 | 15 |
| **Macroinvertebrate Hester-Dendy** | | |
| Number of Taxa | 35 | 34 |
| Florida Index | 16 | 19 |
| Shannon-Weaver Diversity | 3.7 | 3.8 |
| EPT Index | 4 | 5 |
| Community Composition | | |
| % Coleoptera | 9 | 5 |
| % Diptera | 65 | 78 |
| % Ephemeroptera | 16 | 4 |
| % Gastropoda | 1 | 1 |
| % Trichoptera | 6 | 9 |
| % Other | 3 | 3 |
| Functional Feeding Groups | | |
| % Predators | 1 | 4 |
| % Surface Deposit Feeders | 44 | 48 |
| % Suspension Feeders | 10 | 17 |
| % Scrapers | 13 | 5 |
| % Shredders | 20 | 21 |

showed no degradation of the algal communities in Mill Creek. Measures of algal community health were either the same or similar at the control and test site. Chlorophyll *a* was undetected at both sites.

There was very little difference between the macroinvertebrate communities at the control and test sites based on quantitative and qualitative measures. The Shannon-Weaver diversity was similar (control = 3.7 and test = 3.8) at both sites, and the SCI scores placed both sites in the "excellent" category. Overall the facility does not appear to be adversely affecting the water quality of Mill Creek.

## Literature Cited

Barbour, M. T., J. Gerritsen, and J. S. White. 1996. Development of the Stream Condition Index for Florida. Prepared for the Fla. Dept. Environ. Protection. 105 p.

EA Engineering, Science, and Technology and Tetra Tech, Inc. 1994. Bioassessment for the nonpoint source program (draft). Prepared for the Fla. Dept. Environ. Protection. Unpaginated.

FDEP. 1994. Lake bioassessments for the determination of nonpoint source impairment in Florida. Fla. Dept. Environ. Prot. Biology Section, Tallahassee, Fla. 73 p.

Miller, W. E., T. E. Maloney, and J. C. Greene. 1978. The *Selenas-*

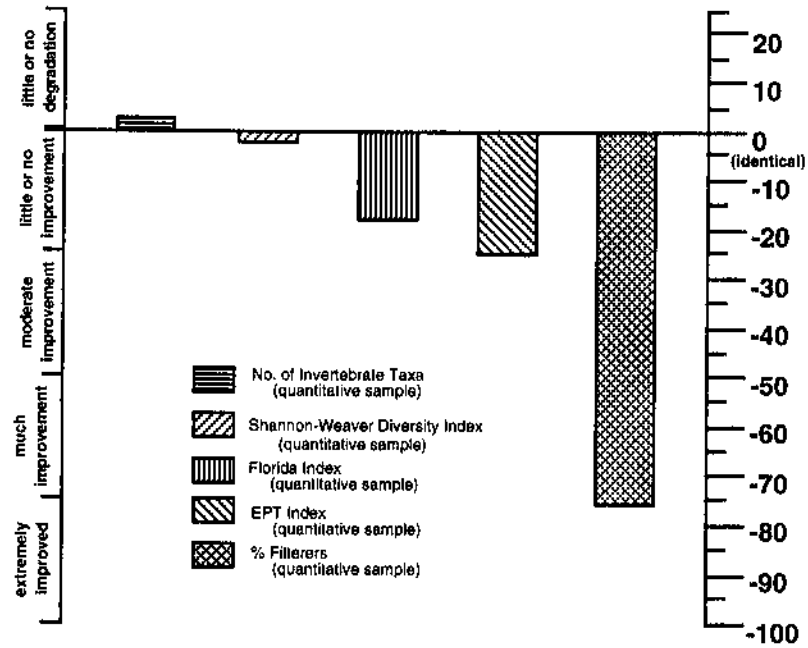



***Figure 2. Effect of discharge on the benthic marcroinvertebrate community.***

*trum capricornutum* Printz algal assay bottle test. U. S. Environ. Prot. Agency, EPA-600/9-78-018. 126 p.

Raschke, R. L. and D. A. Schultz. 1987. The use of the algal growth potential test for data assessment. J. Wat. Poll. Cont. Fed. 59(4): 222-227.

## Explanation of Measurements of Community Health

Several different measurements of macroinvertebrate and algal community health may have been employed to determine the effects of a discharge. These are briefly discussed here.

**Habitat Assessment**: Seven attributes known to have potential effects on the stream biota were evaluated and scored, with 20 possible points for each factor. Based on the sum of these individual scores, overall habitat quality is assigned to one of four categories: Optimal (105-140 points); Suboptimal (70-104 points); Marginal (35-69 points); and Poor (0-34 points).

**Taxa richness**: Stress tends to reduce the number of different types of organisms present in a system, although moderate nutrient enrichment may sometimes be correlated with increased algal taxa richness.

**Shannon-Weaver diversity**: This index is specified in the Florida Administrative Code as a measure of biological integrity. Low diversity scores are undesirable. They represent conditions where only a few organisms are abundant, to the exclusion of other taxa.

**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 (see Ross 1990). A site with a high Florida Index score is considered healthy.

**Ephemeroptera/Plecoptera/Trichoptera (EPT) Index**: This index is the sum of the number of EPT taxa present. Higher EPT values are associated with healthier systems.

**Community structure**: Substantial shifts in proportions of major groups of organisms, compared to control conditions, may indicate degradation.

**Algal biomass**: High algal biomass (algal density or chlorophyll *a*) implies nutrient stress. A decreased diatom to blue-green algae ratio (calculated by dividing the number of individuals in the Bacillariophyta by the number of individuals in the Bacillariophyta + Cyanophyta) is often indicative of nutrient enriched conditions in flowing streams.

**Functional Feeding Groups**: Disturbance can shift the feeding strategies of invertebrates. In Florida, for example, pollution may be responsible for reducing the numbers of filter-feeders (FDEP 1994) and shredders (EA Engineering 1994).

**The Stream Condition Index (SCI)**: The SCI is a composite macroinvertebrate metric (Barbour *et al.* 1996) developed for Florida. The SCI assigns points to a variety of parameters, depending on how closely each parameter approaches an expected control condition (see SCI calculation table in Appendix).

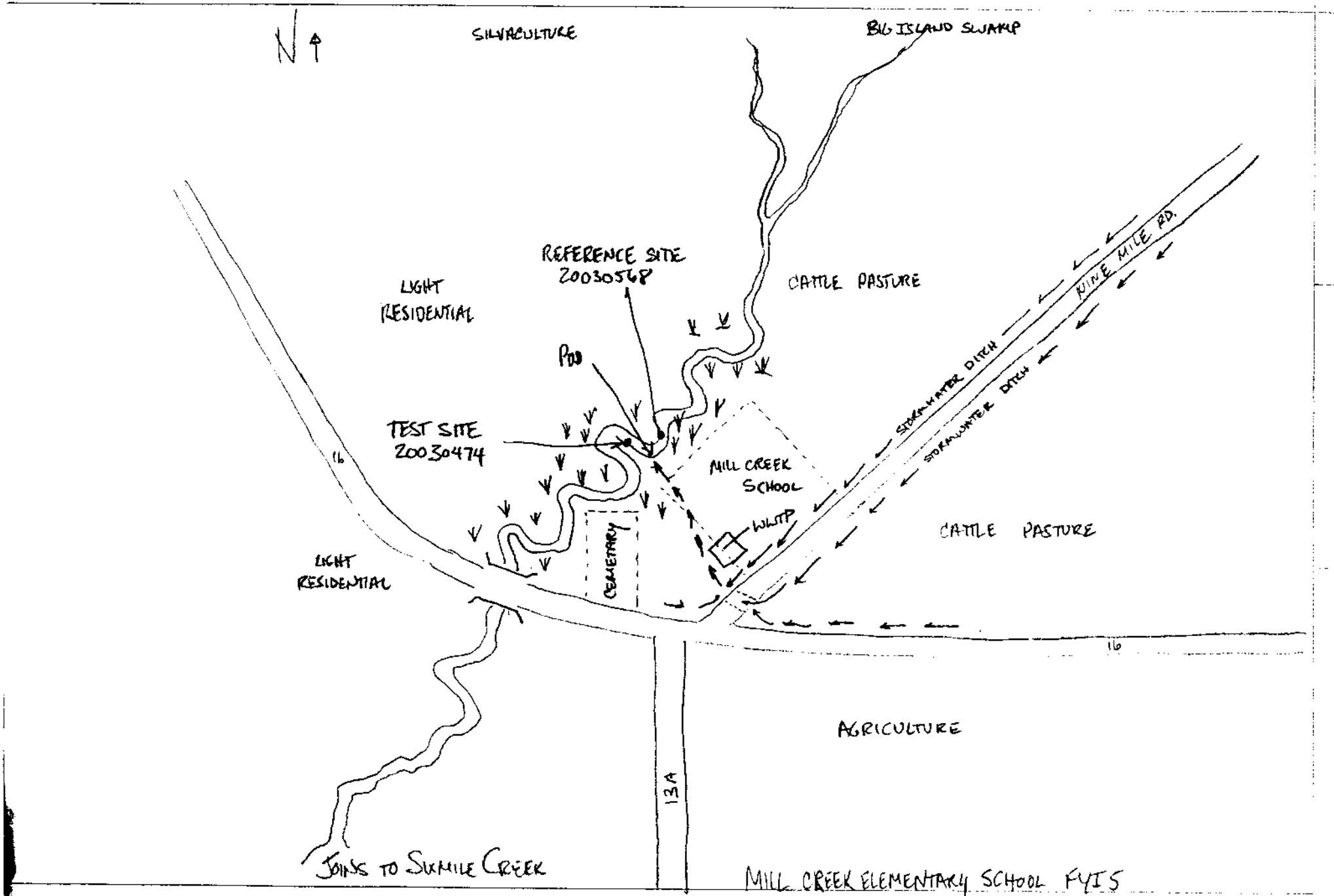
# Typical Values for Selected Parameters in Florida Waters

Adapted from Joe Hand, FDER, personal communication, 1991
(data was collected between 1980 and 1989)

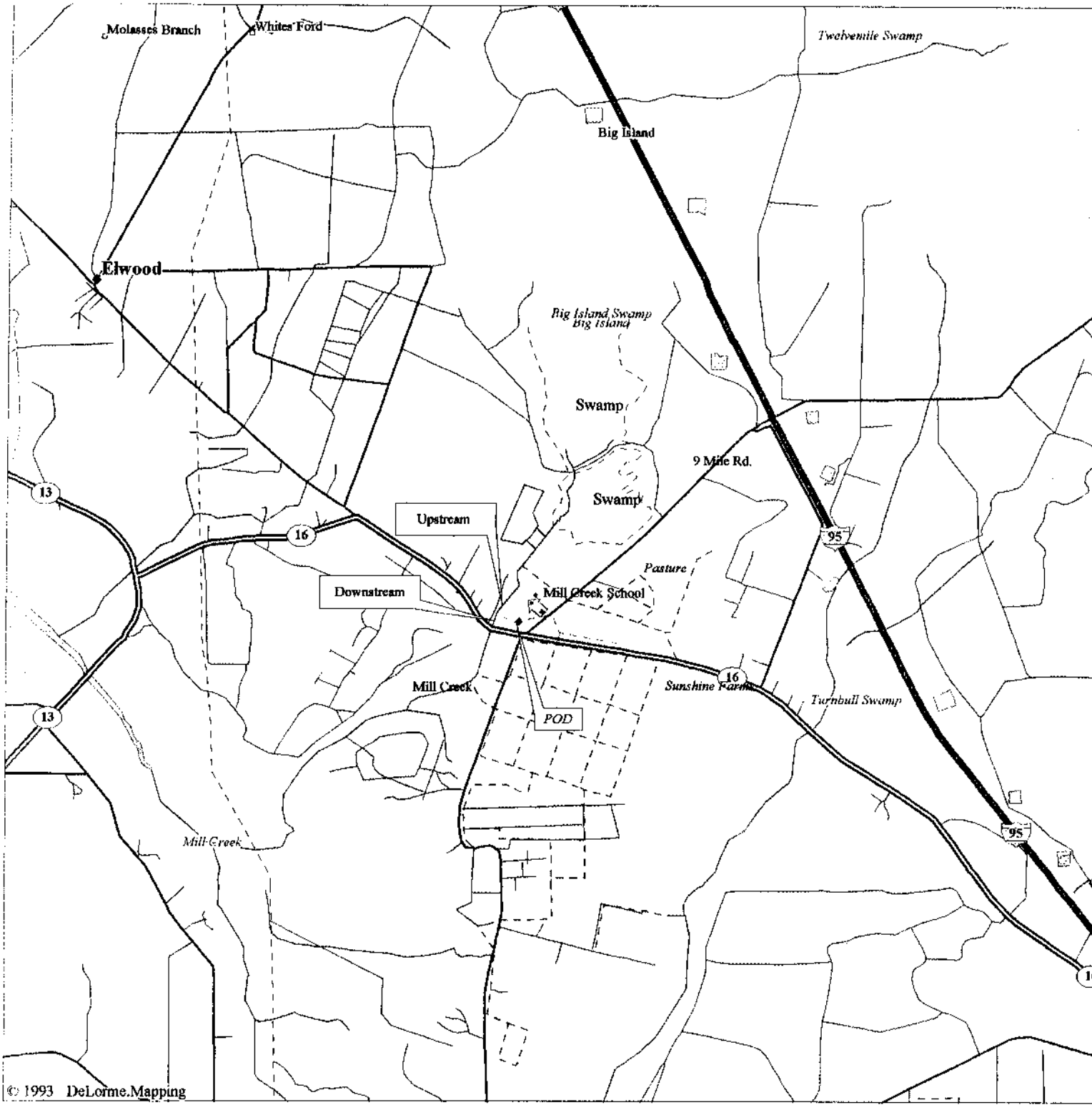
**Percentile Distribution**

| Parameter | 5% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 95% |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **STREAMS** (1617 stations) | | | | | | | | | | | |
| Phytoplankton Chlorophyll *a* | 0.22 | 0.52 | 0.94 | 1.60 | 3.02 | 4.63 | 6.72 | 9.87 | 14.68 | 27.35 | 48.70 |
| Periphyton Chlorophyll *a* | 0.31 | 0.43 | 0.77 | 1.04 | 2.16 | 2.94 | 6.45 | 10.51 | 17.00 | 39.51 | 60.85 |
| 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 |
| Qualitative Taxa Richness | 9.00 | 12.00 | 17.00 | 20.00 | 22.00 | 24.50 | 26.00 | 28.00 | 31.00 | 37.00 | 53.00 |
| H-D Taxa Richness | 6.00 | 6.50 | 9.00 | 11.50 | 13.00 | 15.00 | 17.00 | 21.50 | 26.00 | 29.00 | 32.00 |
| TKN | 0.30 | 0.39 | 0.56 | 0.73 | 0.87 | 1.00 | 1.11 | 1.26 | 1.49 | 1.93 | 2.80 |
| Ammonia | 0.02 | 0.02 | 0.04 | 0.05 | 0.06 | 0.08 | 0.11 | 0.14 | 0.20 | 0.34 | 0.60 |
| NO2-NO3 | 0.01 | 0.01 | 0.03 | 0.05 | 0.07 | 0.10 | 0.14 | 0.20 | 0.32 | 0.64 | 1.05 |
| Total Phosphorus | 0.02 | 0.03 | 0.05 | 0.06 | 0.10 | 0.13 | 0.18 | 0.25 | 0.39 | 0.74 | 1.51 |
| Ortho Phosphate | 0.01 | 0.01 | 0.03 | 0.04 | 0.05 | 0.08 | 0.11 | 0.17 | 0.27 | 0.59 | 1.37 |
| Turbidity | 0.60 | 0.90 | 1.20 | 1.45 | 2.10 | 2.80 | 3.60 | 4.50 | 6.65 | 10.45 | 16.30 |

Units:
Phytoplankton Chlorophyll *a* (ug/L), Periphyton Chlorophyll *a* ($mg/m^2$), Nutrients (mg/L), Turbidity (NTU), Taxa richness and diversity values are for macroinvertebrates




MILL CREEK ELEMENTARY SCHOOL FYI'S




LEGEND

- State Route
- Interstate, Turnpike
- Street, Road
- Major Street/Road
- Interstate Highway
- State Route
- River
- Intermittent River
- Utility (powerline)
- Open Water

Scale 1:62,500 (at center)

1 Miles

2 KM

Mag 13.00
Thu Jan 15 10:09:59 1998

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

# FACILITY SUMMARY

| | | |
|---|---|---|
| **Facility Name:** Mill Creek Elementary School WWTF | | **Date Summary Prepared :** January 9, 1998 |
| **Location (attach detailed map):** | **County** St. Johns | **District** Northeast District |
| **Federal Permit #** FL0025658 **and expiration date:** August 31, 1998. | **State GMS # and** 3 155CD3273 **State expiration date:** August 31, 1998. | **Facility Type:** Industrial (Municipal) Federal Agricultural Other (list): County |

**Function of facility:**
Wastewater Treatment facility

**Description of treatment process:**
The facility is permitted as a 0.018 mgd extended aeration plant with chlorination, dechlorination and discharge to Mill Creek.

| | | |
|---|---|---|
| **Receiving waters:** Mill Creek | **Classification:** I II (III) | |
| **Design Flow:** 0.018 mgd | **Mean Flow:** | **Flow during survey:** |

**Discharge is:** Continuous Intermittent (Seasonal) Rainfall dependent Other (describe)

**therefore, the best time to sample is:** when school is in session.

**If facility has a mixing zone, give details (size, parameters affected, etc.):**
– None –

**List effluent limits (if necessary, attach relevant paperwork):**

| Parameter | Limit (units) | |
|---|---|---|
| | Annual | Monthly |
| CBOD5 | 20 | 30 mg/L |
| TSS | 20 | 30 mg/L |
| Fecal Coliforms | 200 | 200 No./100 ml. |
| Dissolved Oxygen | 5 minimum | |
| pH | minimum 6.0 maximum 8.5 | |
| Chlorine | minimum 0.5 mg/L | |
| Chlorine | Maximum 0.01 mg/L. | |
| Unionized ammonia | MAXimum .02mg/L. | |

**Describe special permit conditions and permit modifications:**
The department reserves the right to require acute screening static renewal toxicity testing. The department may also require tests to evaluate whole effluent toxicity.
The department requires monthly monitoring and reporting of unionized ammonia.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

Mill Creek Elementary School WWTF. (Facility)

## FACILITY SUMMARY

**Description of permitted outfall(s):**

**List permit violations (from MOR data or other source) and plant upsets that occurred within past year:**

Unionized ammonia violation in May 1997.

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

none

**Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set:**

Results summarized on MORs are consistant with sampling results obtained during past inspections by department personnel.

**Additional information:**

**Staff contributing to this review (signature):**

| | |
|---|---|
| Tim McKelvey | (Biologist) |
| Kathleen A. Durand | (Inspector) |
| | (Engineer) |
| Pat O'Connor | (BIOLOGIST) |
| | ( ) |
| | ( ) |

# MILL CREEK ELEMENTARY SCHOOL FYI5

This is the first Fifth Year Inspection conducted at this facility since put into operation, approximately 7 years ago.

The Hestrer-Dendys and periphyton racks were deployed by Pat O'Connor on December 22, 1997, 28 days prior to the facility inspection and sampling event.

The 0.018 MGD WWTP, discharges to a periodically dry stormwater ditch that discharges into Mill Creek that empties into Sixmile Creek, which is a tributary of the St. Johns River. The ditch generally has a flow whenever there is a significant storm event with greater than 1' of rainfall. Even without rainfall to create a flow, the ditch will hold water. The ditch receives runoff from roadway and cattle pasture, with a slight row crop agriculture influence. Nutient loading in this stormwater ditch may be a concern to the receiving stream, Mill Creek.

The ditch enters Mill Creek at approximately 200 yards upstream of the bridge over SR 16. Mill Creek is a very sinuous and winding creek that also drains a very large area of cattle pasture, wetlands (Big Island Swamp), and some row crop agriculture. Nutrient loading may be a concern. Within the two week timeframe prior to the sampling event and the Fifth Year Inspection, there have been two significant rainfall events, one totaling 9'' over three days and another totaling 12" over a five day period. There appeared to have been a very high water level and sheet flow through the immediate area of the streambed. There is a concern for some scouring and sand deposition during these two events. The water was very turbid at the time sampled. There was a dead cow, apparently died during calving, upstream of the two sampling points. Although not in the water of Mill Creek, it may be a concern if there are some high fecal counts in the bacteriological samples.

The point of discharge (6" PVC pipe ) from the WWTP is to a stormwater drainage ditch that discharges into Mill Creek. All samples were taken from the end of pipe at the POD.

The Reference Site (storet # 20030568) is located fifty feet upstream of the point where the stormwater ditch joins Mill Creek. The Hester-Dendy and the periphyton rack were retrieved on January 12, 1998 (28 day incubation period).

TheTest Site (storet # 20030474) is located approximately fifty feet downstream of the point where the stormwater ditch joins Mill Creek. The Hester-Dendy was recovered from this site but the periphyton rack had been caught up in the sheet flow when the stream overflowed its banks and left high and dry. The samples were no longer viable.

The point of an upstream and downstream site is to look for differences the final effluent from the WWTP could possibly be causing to the receiving stream. Therefore, the two sampling sites very closely bracketed the point where the ditch carrying the effluent entered Mill Creek. The two sampling sites were within 100 feet of each other. The stream was a freshwater flowing stream and was not tidally influence so there was never a concern that there might be influence from the effluent to the upstream reference site. The facility had no mixing zone so the sampling sites bracket the "POD' to the creek a closely as possible top determine effects from effluent.

Due to the factors mentioned above, there was no difference in the habitat assessment sheet for both sites. All the primary and secondary habitat components were constant between the sites.

# STATE OF FLORIDA
## DEPARTMENT OF ENVIRONMENTAL PROTECTION

## PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-96)

| SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: NED - JAX | STORET STATION NUMBER: 20030568 | DATE (M/D/Y): 1/12/97 | TIME: 1400 | RECEIVING BODY OF WATER: MILL CREEK |
|---|---|---|---|---|

| REMARKS: recent 9" & 12" rainfall events. | COUNTY: ST JOHNS | LOCATION: 300 YDS ABOVE SR 16 | FIELD ID/NAME: DOWNSTREAM POD. REFERENCE SITE |
|---|---|---|---|

### 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) |
|---|---|---|---|---|---|---|---|
| 10 | 10 | 50 | 20 | 10 | | | |

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

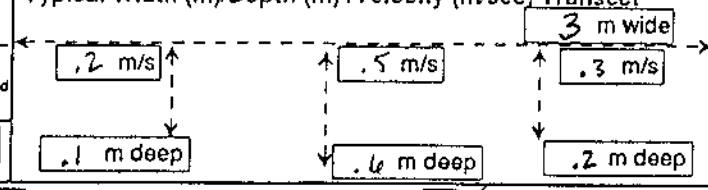
Local Watershed NPS Pollution (check box): No evidence ☐ Slight ☐ Moderate potential ☐ Obvious sources ☑

Width of riparian vegetation (m) on least buffered side: — *List & map dominant vegetation on back*

Artificially Channelized ☐ no ☐ ☐ ☐ ☐ Artificially Impounded ☐ yes
(recent, severe / some recovery / mostly recovered / more sinuous)

High Water Mark: .6 (m above present water level) + .6 (present depth in m) = 1.2 (m above bed)

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




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

### SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☑ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☐

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

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

| Substrate Types | % coverage | # times sampled | method | Substrate Types | % coverage | # times sampled | method |
|---|---|---|---|---|---|---|---|
| Woody Debris (Snags) | 40 | 5 | DIPNET | Sand | 40 | 5 | DIPNET |
| Leaf Packs or Mats | 10 | 5 | DIPNET | Mud/Muck/Silt | 0 | | |
| Aquatic Vegetation | 0 | | | Other: | 0 | | |
| Rock or Shell Rubble | 0 | | | Other: | 0 | | |
| Undercut banks/Roots | 10 | 5 | DIPNET | *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): |
|---|---|---|---|---|---|---|---|---|
| Top | | | | | | | | |
| Mid-depth | | 14.85 | 6.33 | 7.65 | 147 | | | |
| Bottom | | | | | | | | |

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

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

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

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

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

Weather Conditions/Notes:
Low 70's F, sunny, clear

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

SAMPLING TEAM: JIM MCKELVEY & PAT O'CONNOR SIGNATURE: [signature] DATE: 1/12/97

# STATE OF FLORIDA
## - DEPARTMENT OF ENVIRONMENTAL PROTECTION
## FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET (experimental 10-15-97)

| SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: NED-JAX | STORET STATION NUMBER: 20030548 | DATE (M/D/Y): 1/12/98 | RECEIVING BODY OF WATER: MILL CREEK |
|---|---|---|---|

| REMARKS: | COUNTY: ST. JOHNS | LOCATION: 275 YARDS UPSTREAM OF S.R. 16 | FIELD ID/NAME: UPSTREAM POD / REFERENCE SITE |
|---|---|---|---|

| Habitat Parameter | Optimal | Suboptimal | Marginal | Poor |
|---|---|---|---|---|
| **Primary Habitat Components** | | | | |
| Substrate Diversity [16] | Four or more productive habitats present (snags, tree roots, aquatic vegetation, leaf packs (partially decayed), undercut banks, rock). 20 19 18 17 16 | Three productive habitats present. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11 | Two productive habitats present. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6 | One or less productive habitat. Lack of habitat is obvious, substrates unstable or smothered. 5 4 3 2 1 |
| Substrate Availability [16] | Greater than 30% productive habitat present at site. 20 19 18 17 16 | 16% to 30% productive habitat, by aerial extent. 15 14 13 12 11 | 6% to 15 % productive habitat 10 9 8 7 6 | Less than 5% productive habitat. 5 4 3 2 1 |
| Water Velocity [18] | Max. observed at typical transect: >0.25 m/sec. but < 1 m/sec 20 19 18 17 16 | Max. observed at typical transect: 0.1 to 0.25 m/sec 15 14 13 12 11 | Max. observed at typical transect: 0.05 to 0.1 m/sec 10 9 8 7 6 | Max. observed at typical transect <0.05 m/sec, or spate occurring: > 1 m/sec 5 4 3 2 1 |
| Habitat Smothering [15] | 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 [64] | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 2 1 |
| **Secondary Habitat Components** | | | | |
| Artificial Channelization [20] | No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16 | May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11 | Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6 | Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1 |
| Bank Stability [10] | Stable. No evidence of erosion or bank failure. Little potential for future problems. 20 19 18 17 16 | Moderately stable. Infrequent or small areas of erosion, mostly healed over. 15 14 13 12 11 | Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 10 9 8 7 6 | Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 5 4 3 2 1 |
| Riparian Buffer Zone Width [20] | Width of native vegetation (least buffered side) greater than 18 m 20 19 18 17 16 | Width of native vegetation (least buffered side) 12 m to 18 m 15 14 13 12 11 | Width of native vegetation 6 to 12 m, human activities still close to system 10 9 8 7 6 | Less than 6 m of native buffer zone due to intensive human activities 5 4 3 2 1 |
| Riparian Zone Vegetation Quality [20] | 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. | 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. | 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. | 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. |
| Secondary Score [70] | (20) 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 2 1 |

[135] TOTAL SCORE

| ANALYSIS DATE: 1/12/98 | ANALYST: Tim McKelvey | SIGNATURE: Timothy R. McKelvey |
|---|---|---|

# STATE OF FLORIDA
## DEPARTMENT OF ENVIRONMENTAL PROTECTION

## PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-96)

| SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: NED-JAX | STORET STATION NUMBER: 20030474 | DATE (M/D/Y): 1/12/98 | TIME: 12:30 | RECEIVING BODY OF WATER: MILL CREEK |
|---|---|---|---|---|

| REMARKS: RECENT 9" & 12" rain events. | COUNTY: ST. JOHNS | LOCATION: 200 YDS. ABOVE S.R. 16 | FIELD ID/NAME: DOWNSTREAM POND TEST SITE |
|---|---|---|---|

### 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) |
|---|---|---|---|---|---|---|---|
| 10 | 10 | 50 | 20 | 10 | | | NOTE: 1 |

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

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

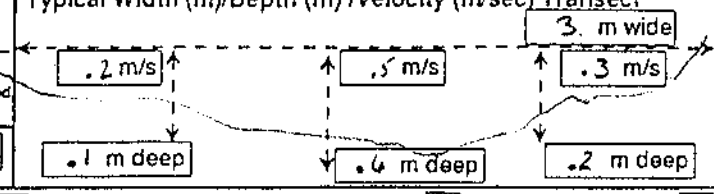
Width of riparian vegetation (m) on least buffered side: 18M + | *List & map dominant vegetation on back*

Artificially Channelized ☑ no ☐ recent, severe ☐ some recovery ☐ mostly recovered, more sinuous

Artificially Impounded ☐ yes

High Water Mark: .4 (m above present water level) + .4 (present depth in m) = 1.2 (m above bed)

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




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

### SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☑ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☐

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

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

| Substrate Types | % coverage | # times sampled | method | Substrate Types | % coverage | # times sampled | method |
|---|---|---|---|---|---|---|---|
| Woody Debris (Snags) | 40 | 5 | DIPNET | Sand | 40 | 5 | dipnet |
| Leaf Packs or Mats | 10 | 5 | DIPNET | Mud/Muck/Silt | | | / |
| Aquatic Vegetation | 0 | | | Other: | | | |
| Rock or Shell Rubble | 0 | | | Other: | | | |
| Undercut banks/Roots | 10 | 5 | DIPNET | *Draw aerial view sketch of habitats found in 100 m section* | | | |

| WATER QUALITY | Depth (FT.): | Temp. (°C): | pH (SU): | D.O. (mg/l): | Cond. (µmho/cm) or Salinity (ppt): | SAL. | | Secchi (m): |
|---|---|---|---|---|---|---|---|---|
| Top | 0 | | | | | | | |
| Mid-depth | 1 | 19.0 | 6.2 | 7.6 | 147 | 0.1 | | .1 |
| Bottom | 2 | | | | | | | |

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

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

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

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

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

Weather Conditions/Notes:
① ELEMENTARY SCHOOL & PLAYGROUNDS
② NEW DEVELOPMENT UPSTREAM @ WORLD GOLF VILLAGE
LOGGED AND UP. LOW 70's, [illegible]

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

| SAMPLING TEAM: | SIGNATURE: | DATE: |
|---|---|---|
| TIM McELVEEN PAT O'CONNOR | Tim McElveen | 1/12/98 |

# STATE OF FLORIDA
## DEPARTMENT OF ENVIRONMENTAL PROTECTION
## FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET (experimental 10-15-97)

| SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: NED - JAX | STORET STATION NUMBER: 20030474 | DATE (M/D/Y): 1/12/98 | RECEIVING BODY OF WATER: MILL CREEK |
|---|---|---|---|
| REMARKS: recent 9" & 12" rainfall events | COUNTY: ST JOHNS | LOCATION: 200 YARDS ABOVE SR 16 | FIELD ID/NAME: DOWNSTREAM POD TEST SITE |

| Habitat Parameter | Optimal | Suboptimal | Marginal | Poor |
|---|---|---|---|---|
| Primary Habitat Components<br>Substrate Diversity [16] | 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 [16] | 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 [18] | 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 [15] | 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 [65] | | | | |
| Secondary Habitat Components<br>Artificial Channelization [20] | 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 [10] | Stable. No evidence of erosion or bank failure. Little potential for future problems.<br>20 19 18 17 16 | Moderately stable. Infrequent or small areas of erosion, mostly healed over.<br>15 14 13 12 11 | Moderately unstable. Moderate areas of erosion, high erosion potential during floods.<br>(10) 9 8 7 6 | Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing.<br>5 4 3 2 1 |
| Riparian Buffer Zone Width [20] | Width of native vegetation (least buffered side) greater than 18 m<br>(20) 19 18 17 16 | Width of native vegetation (least buffered side) 12 m to 18 m<br>15 14 13 12 11 | Width of native vegetation 6 to 12 m, human activities still close to system<br>10 9 8 7 6 | Less than 6 m of native buffer zone due to intensive human activities<br>5 4 3 2 1 |
| Riparian Zone Vegetation Quality [20] | 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>(20) 19 18 17 16 | 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>15 14 13 12 11 | 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>10 9 8 7 6 | 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>5 4 3 2 1 |
| Secondary Score [70] | | | | |

**135 TOTAL SCORE**

| ANALYSIS DATE: 1/12/98 | ANALYST: TIM McKELVEY | SIGNATURE: Tim McKelvey |
|---|---|---|

# FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Mill Creek School
County: St. Johns Co.
Contact / District: Tim McKelvey / Northeast
NPDES Permit #: FL0025658
LIMS Sample #: 300888 LIMS Job #: 1998-01-13-11
sample log: 1/26/98
Test Type: Screening / Definitive
Static / Static Renewal / Flow-through
Temperature range: room 24.5-25.5 °C
incubator 23.9-25.0 °C
Test Number: 1 of 2
Remarks: D = dead, M = missing

Sample Collection: Date 1-12-98 Time 1100
Test Beginning: Date 1-13-98 Time 1445
Test Ending: Date 1-15-98 Time 1500 mf
Organism Batch #: 2 Diluent Batch #: 2-2
Organism Age: < 24 hours
Test Organism: Ceriodaphnia dubia

Instrument Calibrations:

| | pH | Temperature °C | D.O. mg/L | Conductivity µmhos/cm |
|---|---|---|---|---|
| meter # | 7851 | 90H018262 | 90H018262 | G9005749 |
| 0 hr | 7.0 @ 7.0 | 24.1 @ 24.0 | 8.2 @ 25.2 °C | 103.4 @ 103.2 |
| | 9.0 @ 9.0 | 24.2 mf 1-13-98 neutralization and number | | 1003 @ 1005 @ 24.6 °C |
| 24 hr | 7.0 @ 7.0 | 23.2 @ 24.2 | 8.1 @ 25.6 °C | 101.4 @ 103.2 |
| | 9.0 @ 9.0 | | | 980 @ 1005 @ 24.8 °C |
| 48 hr | 7.0 @ 7.0 | 23.1 @ 23.1 | 8.2 @ 25.2 °C | 102.7 @ 103.2 |
| | 9.0 @ 9.0 | | | 988 @ 1005 @ 25.0 °C |

| Conc. | Chamber # | Number Live 0 hr | Number Live 24 h | Number Live 48 h | pH 0 hr | pH 24 h | pH 48 h | Temperature (°C) 0 hr | Temperature (°C) 24 h | Temperature (°C) 48 h | D.O. (mg/L) 0 hr | D.O. (mg/L) 24 h | D.O. (mg/L) 48 h | UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr | 24 h | 48 h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Control A | A | 5 | 5 | 5 | 8.1 | | 8.1 | 24.6 | | 24.4 | 8.0 | | 7.9 | 160 | | 190 |
| Control B | B | 5 | 5 | 5 | | | 8.1 | | | 24.3 | | | 7.9 | | | 190 |
| Control C | C | 5 | 5 | 5 | | | 8.1 | | | 24.2 | | | 7.9 | | | 165 |
| Control D | D | 5 | 5 | 5 | | | 8.1 | | | 24.0 | | | 7.9 | | | 190 |
| 100% A | A | 5 | 5 | 5 | 7.7 | | 7.9 | 24.6 | | 24.1 | 8.1 | | 7.9 | 890 | | 915 |
| 100% B | B | 5 | 5 | 5 | | | 7.9 | | | 24.2 | | | 7.9 | | | 950 |
| 100% C | C | 5 | 5 | 5 | | | 7.9 | | | 24.2 | | | 7.9 | | | 955 |
| 100% D | D | 5 | 5 | 5 | | | 7.9 | | | 24.1 | | | 7.9 | | | 1010 |
| Measured/Loaded by | | MF | MF | MF | MF | | MF | MF | | MF | MF | | MF | MF | | MF |
| Recorded by | | MF | MF | MF | MF | | FW | MF | | FW | MF | | FW | MF | | FW |

Investigators' Signatures

Marshall Faircloth

Tim McKelvey

| Water Quality Parameters (verified by MF 4-9-98) | Salt Water / Well Water | 20% Min Water | Sample | Method | Measured by |
|---|---|---|---|---|---|
| Field Total Residual Cl2 (mg/L) | | | 0.0 | — | Tim McKelvey |
| Lab Total Residual Cl2 (mg/L) | | < 0.03 | < 0.03 | DR-100 | DW |
| Alkalinity (mg/L as $CaCO_3$) | | 61 | 43 | Hach | FW |
| Hardness (mg/L as $CaCO_3$) | | 77 | 321 | Hach | FW |
| Total ammonia (mg/L as N) | | < 0.017 | < 0.017 | Orion | MF |

Ammonia Ammonia Ammonia Control Sample

0 ppt 0 ppt

# FDEP Biology Section — Acute Bioassay Bench Sheet

**Sample Source:** Mill Creek School
**County:** St. Johns
**Contact / District:** Tim McKelvy / NO.-THEAST
**NPDES Permit #:** FL0025658
**LIMS Sample #:** 300888 **LIMS Job #:** TLH 1998-01-13-11
sample log: 1/6/98
**Test Type:** (Screening) / Definitive
(Static) / Static Renewal / Flow-through
Temperature range: room 24.5-25.5°C
incubator 23.9-25.0°C
**Test Number:** 2 of 2
**Remarks:** D = dead, M = missing

**Sample Collection:** Date 1/12/98 Time 1100
**Test Beginning:** Date 1/13/98 Time 1455
**Test Ending:** Date 1/15/98 Time 1500
**Organism Batch #:** 1 **Diluent Batch #:** well H2O
**Organism Age:** 11 days
***Test Organism:*** Cyprinella leedsi

**Instrument Calibrations:**

| | pH | Temperature °C | D.O. mg/L | Conductivity µmhos/cm |
|---|---|---|---|---|
| meter # | 7851 | 90H018262 | 90H018262 | G9005749 |
| 0 hr | 7.0 @ 7.0<br>9.0 @ 9.0 | 24.1 @ 24.0 | 8.2 @ 25.2 °C | 1034 @ 103.2<br>1003 @ 1005 @ 24.6 °C |
| 24 hr | 7.0 @ 7.0<br>9.0 @ 9.0 | 24.2 @ 24.2 | 8.1 @ 25.6 °C | 1014 @ 103.2<br>980 @ 1005 @ 24.8 °C |
| 48 hr | 7.0 @ 7.0<br>9.0 @ 9.0 | 23.1 @ 23.1 | 8.2 @ 25.2 °C | 1027 @ 1032<br>988 @ 1005 @ 25.0 °C |

| Conc. | Chamber # | Number Live | | | pH | | | Temperature (°C) | | | D.O. (mg/L) | | | UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 hr | 24 h | 48 h | 0 hr | 24 h | 48 h | 0 hr | 24 h | 48 h | 0 hr | 24 h | 48 h | 0 hr | 24 h | 48 h |
| Control A | G1 | 5 | 5 | 5 | 7.8 | 8.3 | 8.3 | 24.5 | 25.0 | 25.1 | 7.6 | 7.5 | 7.8 | 250 | 260 | 260 |
| Control B | G2 | 5 | 5 | 5 | 7.8 | 8.3 | 8.4 | 24.4 | 25.4 | 25.4 | 7.7 | 7.6 | 7.8 | 250 | 260 | 265 |
| Control C | G3 | 5 | 5 | 5 | 7.8 | 8.3 | 8.4 | 24.4 | 25.0 | 25.0 | 7.6 | 7.5 | 7.8 | 250 | 260 | 265 |
| Control D | G4 | 5 | 5 | 5 | 7.8 | 8.3 | 8.4 | 24.4 | 24.7 | 25.0 | 7.7 | 7.5 | 7.8 | 255 | 260 | 265 |
| 100% A | G5 | 5 | 5 | 5 | 7.7 | 7.8 | 7.9 | 24.9 | 24.5 | 25.2 | 8.1 | 7.3 | 7.2 | 940 | 740 | 970 |
| 100% B | G6 | 5 | 5 | 5 | 7.7 | 7.8 | 7.8 | 24.9 | 24.8 | 25.1 | 8.1 | 7.3 | 7.2 | 945 | 750 | 965 |
| 100% C | G7 | 5 | 5 | 5 | 7.7 | 7.8 | 7.8 | 24.9 | 24.9 | 24.9 | 8.2 | 7.2 | 7.1 | 950 | 750 | 965 |
| 100% D | G8 | 5 | 5 | 5 | 7.7 | 7.8 | 7.9 | 24.9 | 25.6 | 24.9 | 8.2 | 7.2 | 7.1 | 950 | 785 | 980 |
| Measured/Loaded by: | | MF | MF | MF | MF | MF | MF | MF | MF | MF | MF | MF | MF | MF | MF | MF |
| Recorded by: | | MF | MF | MF | MF | DW | FW | MF | DW | FW | MF | DW | FW | MF | DW | FW |

Investigators' Signatures

Marshall Faircloth
Jennifer Hill
Dan Wilk

**Water Quality Parameters** Verified by MF 4-9-98

| | Salt Water: Well Water / 20% Min Water | Sample | Method | Measured by |
|---|---|---|---|---|
| Field Total Residual Cl2 (mg/L): | | 0.0 | — | Tim McKelvy |
| Lab Total Residual Cl2 (mg/L): | <0.03 | <0.03 | DR-100 | DW |
| Alkalinity (mg/L as $CaCO_3$): | 107 | 43 | Hach | FW |
| Hardness (mg/L as $CaCO_3$): | 121 | 3.21 | Hach | FW |
| Total ammonia (mg/L as N): | <0.017 | <0.017 | Orion | MF |

Ammonia Ammonia Ammonia Control MF 2/4/98 Sample

# Mill Creek WWTP

## Control Site

| Macroinvertebrate Dip Net (20 sweeps of most productive substrates) | Value | 5 | 3 | 1 | Score |
|---|---|---|---|---|---|
| Total Number of Taxa | 30 | ≥18 | 17-9 | <9 | 5 |
| EPT Index | 1 | - | ≥3 | <3 | 1 |
| # Chironomid Taxa | 11 | ≥4 | 3-2 | <2 | 5 |
| % Contribution of Dominant Taxon | 13 | ≤37 | 38-69 | >69 | 5 |
| % Diptera | 38 | - | ≤67 | >67 | 3 |
| Florida Index | 7 | ≥6 | 5-3 | <3 | 5 |
| % Suspension feeders/Filterers | 16 | ≥25 | 25-13 | <13 | 3 |
| Total Score | | **Northeast** | | | **27** |
| Interpretation of Scores | | **Excellent** | | | **26-31** |
| | | **Good** | | | 20-25 |
| | | **Poor** | | | 14-19 |
| | | **Severely Degraded** | | | 7-13 |

Winter Index Period: Stream Condition Index (SCI) for Florida Northeast (April 1996)

## Test Site

| Macroinvertebrate Dip Net (20 sweeps of most productive substrates) | Value | 5 | 3 | 1 | Score |
|---|---|---|---|---|---|
| Total Number of Taxa | 39 | ≥18 | 17-9 | <9 | 5 |
| EPT Index | 5 | - | ≥3 | <3 | 3 |
| # Chironomid Taxa | 11 | ≥4 | 3-2 | <2 | 5 |
| % Contribution of Dominant Taxon | 21 | ≤37 | 38-69 | >69 | 5 |
| % Diptera | 39 | - | ≤67 | >67 | 3 |
| Florida Index | 15 | ≥6 | 5-3 | <3 | 5 |
| % Suspension feeders/Filterers | 13 | ≥25 | 25-13 | <13 | 3 |
| Total Score | | **Northeast** | | | **29** |
| Interpretation of Scores | | **Excellent** | | | **26-31** |
| | | **Good** | | | 20-25 |
| | | **Poor** | | | 14-19 |
| | | **Severely Degraded** | | | 7-13 |

Winter Index Period: Stream Condition Index (SCI) for Florida Northeast (April 1996)

Phytoplankton taxa list and densities (#/mL) for Mill Creek Elementary School WWTP, collected via subsurface grabs in Mill Creek, on 12 January, 1998.

| | Control Site | Test Site |
|---|---|---|
| **Bacillariophyceae** | | |
| *Eunotia* sp. | – | 9 |
| *Gomphonema* sp. | 7 | 17 |
| *Navicula* sp. | 7 | – |
| *Nitzschia* sp. | 7 | 26 |
| Undetermined pennate diatom | – | 9 |
| **Chlorophyceae** | | |
| *Ankistrodesmus* sp. | 29 | – |
| *Chlamydomonas* sp. | – | 9 |
| *Chlorococcum* sp. | – | 43 |
| *Chodatella* sp. | – | 9 |
| *Cosmarium* sp. | 7 | – |
| *Crucigenia* sp. | 7 | – |
| *Scenedesmus* sp. | 7 | 17 |
| *Schroederia* sp. | 132 | 136 |
| Undetermined chlorophyceae | 7 | 9 |
| **Chrysophyceae** | | |
| *Mallomonas* sp. | 15 | 9 |
| *Synura* sp. | 7 | – |
| **Cryptophyceae** | | |
| *Chroomonas* sp. | 96 | 153 |
| *Cryptomonas* sp. | 29 | 77 |
| **Dinophyceae** | | |
| *Peridinium* sp. | 7 | – |
| **Euglenophyceae** | | |
| *Phacus* sp. | – | 17 |
| *Trachelomonas* sp. | 125 | 94 |

Benthic macroinvertebrate taxa list for Mill Creek WWTP facility, collected via Hester-Dendy artificial substrates in receiving water, on 12 January, 1998. Densities, in number/$m^2$, represent the mean of three replicates.

| | Control Site | Test Site |
|---|---|---|
| **Coleoptera** | | |
| *Dubiraphia* sp. | 8 | 3 |
| *Dubiraphia vittata* | 3 | – |
| *Microcylloepus pusillus* | 13 | 3 |
| *Microcylloepus* sp. | 11 | 11 |
| *Neoporus* sp. | 3 | – |
| *Stenelmis* sp. | 24 | 8 |
| Undetermined Gyrinidae | 3 | – |
| **Diptera** | | |
| *Corynoneura sp.* | 13 | 16 |
| *Corynoneura taris* | 11 | 13 |
| *Dicrotendipes simpsoni* | 5 | – |
| *Hemerodromia* sp. | – | 5 |
| *Nilothauma* sp. | 3 | – |
| *Pentaneura inconspicua* | 3 | 3 |
| *Polypedilum convictum* grp. | 222 | 159 |
| *Polypedilum halterale* grp. | – | 3 |
| *Polypedilum illinoense* grp. | 45 | 58 |
| *Polypedilum scalaenum* grp. | 16 | – |
| *Polypedilum* sp. | – | 3 |
| *Rheotanytarsus distinctissimus* grp. | – | 3 |
| *Rheotanytarsus exiguus* grp. | 11 | 11 |
| *Rheotanytarsus* sp. | – | 3 |
| *Simulium* sp. | 3 | 21 |
| *Tanytarsus* sp. | 3 | 3 |
| *Tanytarsus* sp. C Epler | – | 5 |
| *Tanytarsus* sp. L Epler | 5 | – |
| *Tanytarsus* sp. T Epler | 3 | 5 |
| *Thienemanniella* sp. | 3 | 16 |
| *Thienemanniella xena* | 29 | 61 |
| *Tribelos fuscicornis* | 5 | – |
| Undetermined Chironomidae | 74 | 26 |
| **Ephmeroptera** | | |
| *Caenis* sp. | 3 | – |
| *Stenacron floridense* | 61 | 8 |
| *Stenacron* sp. | 50 | 5 |
| Undetermined Heptageniidae | – | 5 |
| **Gastropoda** | | |
| *Ferrissia* sp. | – | 3 |
| Undetermined Ancylidae | 3 | – |
| Undetermined Hydrobiidae | 3 | – |
| *Viviparus georgianus* | 3 | 3 |
| **Pelecypoda** | | |
| Undetermined Sphaeriidae | 3 | – |
| **Hirudinea** | | |
| *Gloiobdella elongata* | 3 | – |

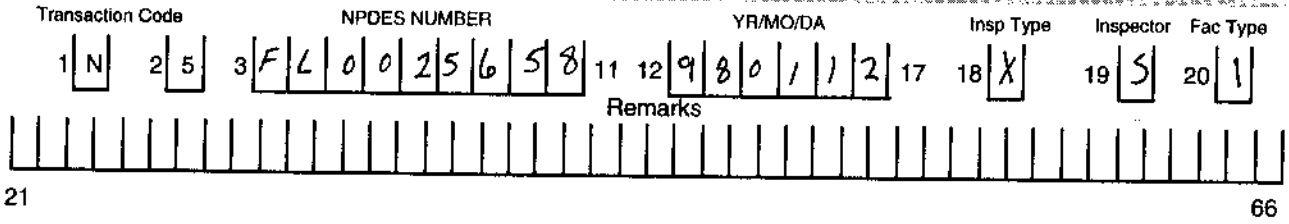
| | | |
|---|---|---|
| **Megaloptera** | | |
| *Corydalus cornutus* | – | 8 |
| *Corydalus* sp. | – | 5 |
| **Oligochaeta** | | |
| *Haber speciosus* | – | 3 |
| *Limnodrilus hoffmeisteri* | – | 3 |
| *Nais communis* | 3 | – |
| *Slavina appendiculata* | 5 | – |
| **Trichoptera** | | |
| *Cheumatopsyche* sp. | 42 | 42 |
| Undetermined Hydropsychidae | – | 3 |
| **Trombidiformes** | | |
| *Oribatei* sp. | – | 3 |

Benthic macroinvertebrate taxa list for facility, collected via 20 discrete dip net sweeps in Mill Creek, on 12 January, 1998.

| | Control Site | Test Site |
|---|---|---|
| **Amphipoda** | | |
| *Hyalella azteca* | – | 1 |
| **Coleoptera** | | |
| *Dubiraphia* sp. | 6 | 2 |
| *Dubiraphia vittata* | – | 15 |
| *Hydrochus* sp. | – | 1 |
| *Liodessus affinis* | – | 1 |
| *Macronychus* sp. | 1 | – |
| *Microcylloepus pusillus* | – | 32 |
| *Neoporus* sp. | 1 | – |
| *Scirtes* sp. | – | 1 |
| *Stenelmis* sp. | 4 | 6 |
| Undetermined Dytiscidae | – | 1 |
| Undetermined Scirtidae | 2 | – |
| **Diptera** | | |
| *Corynoneura* sp. | 3 | 1 |
| *Cryptotendipes* sp. | 2 | – |
| *Glyptotendipes* sp. | 1 | – |
| *Hemerodromia* sp. | – | 1 |
| *Palpomyia/bezzia* grp. | – | 3 |
| *Pentaneura inconspicua* | – | 1 |
| *Polypedilum convictum* grp. | 7 | 7 |
| *Polypedilum illinoense* grp. | 10 | 26 |
| *Polypedilum scalaenum* grp. | 2 | 4 |
| *Rheotanytarsus exiguus* grp. | 1 | 3 |
| *Rheotanytarsus* sp. | 1 | – |
| *Simulium* sp. | – | 5 |
| *Stenochironomus* sp. | – | 3 |
| *Tanytarsus* sp. C Epler | 1 | 1 |
| *Tanytarsus* sp. L Epler | – | 1 |
| *Thienemanniella similis* | 1 | – |
| *Thienemanniella xena* | – | 1 |
| Undetermined Chironomidae | 3 | 3 |
| Undetermined Stratiomyidae | 2 | – |
| **Ephemeroptera** | | |
| *Caenis* sp. | – | 1 |
| *Stenacron floridense* | – | 1 |
| *Stenacron interpunctatum* | – | 1 |
| *Stenacron* sp. | 1 | – |
| Undetermined Baetidae | – | 1 |
| **Gastopoda** | | |
| *Corbicula* sp. | – | 2 |
| *Micromenetus* sp. | 2 | – |
| Undetermined Ancylidae | 4 | 1 |
| Undetermined Gastropoda | – | 1 |
| Undetermined Hydrobiidae | 5 | 1 |
| *Physella* sp. | 1 | 3 |
| Undetermined Planorbidae | – | 2 |

| | | |
|---|---|---|
| **Hemiptera** | | |
| Undetermined Hemiptera | – | 1 |
| **Megaloptera** | | |
| *Corydalus* sp. | 1 | – |
| **Odonata** | | |
| Undetermined Coenagrionidae | – | 2 |
| **Oligochaeta** | | |
| *Dero trifida* | 1 | – |
| *Haber speciosus* | – | 1 |
| *Limnodrilus hoffmeisteri* | 11 | 6 |
| *Pristina* sp. | 1 | – |
| *Pristina synclites* | 1 | – |
| *Slavina appendiculata* | 1 | – |
| Undetermined Enchytraeidae | 1 | – |
| **Pelecypoda** | | |
| Undetermined Sphaeriidae | 12 | 5 |
| **Trichoptera** | | |
| *Cheumatopsyche* sp. | – | 3 |

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




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

