

Biological Assessment of

City of Starke Sewage Treatment Plant

Bradford County

NPDES #FL0028126

Sampled March and April 1991

September 1991

Biology Section
Division of Technical Services

Department of Environmental Regulation
Results of Fifth Year Inspections

Discharger: Starke Sewage Treatment Plant
County: Bradford
NPDES Number: FL0028126
State Permit Expiration Date: 25 November 1991

Toxics Sampling Inspection (**XSI**)	
Date Sampled:	20 March and 22 April, 1991
Results:	Silver (0.4 µg/L) and zinc (68 µg/L) concentrations in the March samples were in violation of ambient standards for Class III freshwaters (17-302.560 FAC). No priority pollutants found above detection limit.

Compliance Biomonitoring Inspection (**CBI**)	
Date Sampled:	22 April 1991
Results:	Chlorinated sample (1.1 mg/L residual chlorine) toxic to *Ceriodaphnia dubia* and *Pimephales promelas*.

Impact Bioassessment Inspection (**IBI**)	
Date Sampled:	22 April 1991
Results:	A shift from a diatom to a chlorophyte-dominated periphyton community was observed, but all other measures of algal community health indicated little or no degradation. Decreases in macroinvertebrate taxa richness and Florida Index occurred in timed qualitative samples, possibly a result of habitat loss downstream of the plant. A violation of biological integrity criteria was noted in Hester-Dendy samples.

Water Quality Inspection (**WQI**)	
Date Sampled:	22 April 1991
Results:	Effluent nutrient levels were as follows: NH_3 (3.92 mg/L), NO_2NO_3 (0.45 mg/L), TKN (6.62 mg/L), Total P (1.1 mg/L), and O-PO_4 (0.24 mg/L). Permit limits for organic nitrogen were not exceeded. Algal growth potential was relatively low, and no enrichment problems were indicated.

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 City of Starke Wastewater Treatment Plant, located in Bradford County, Florida, is an activated sludge-contact stabilization facility. Treatment of sewage consists of grit removal, aeration, waste tank processing, clarification, and chlorination. Design capacity of the plant is 1.25 MGD. A construction permit for adding dechlorination to the treatment process was issued on August 21, 1991. Effluent is discharged to Alligator Creek, which flows to Lake Rowell.

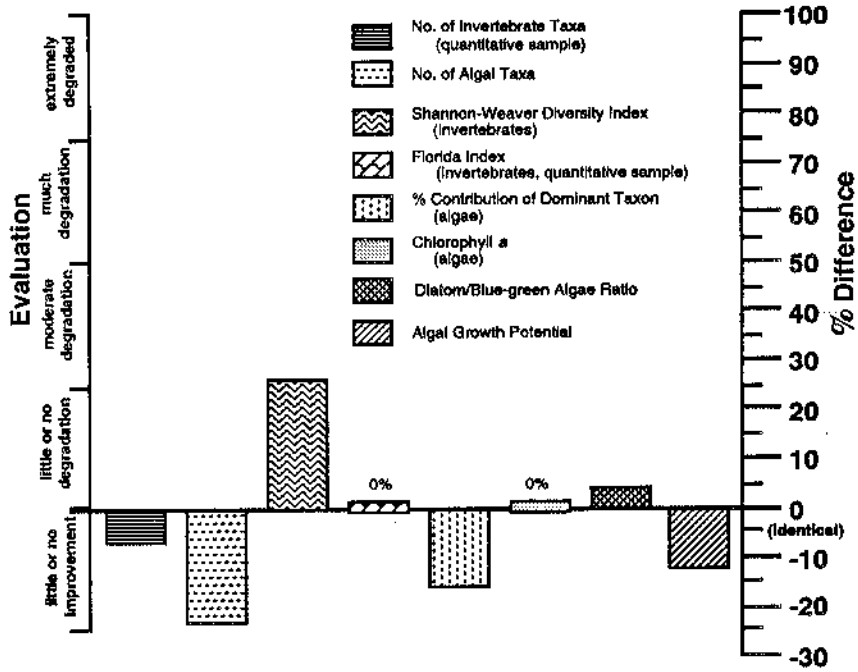
Monthly report data indicate numerous violations between July 1988 and November 1990, mostly involving fecal coliform bacteria and less frequently, organic nitrogen and ammonia. In March and April of 1991, microbiological samples analyzed by the DER Northeast District Office did not exceed permit limits. The Department conducted an inspection of the facility in April 1991, and found all parameters to be in compliance except for flow, which routinely exceeds 2.0 MGD. These flow violations were attributed to infiltration problems during periods of heavy rainfall. The DER has requested a plan of action for addressing this problem prior to renewal of the state permit.

Methods

The focus of this investigation was to determine the discharger's

Major characteristics of community structure of control and test sites.

	Control Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	41	21
Florida Index	22	13
% Contribution of Dominant Taxon	22.3	50.3
% Oligochaeta	0.2	1.9
% Diptera	82.6	89.7
% Ephemeroptera	1.9	0.6
% Trichoptera	0	1.9
% Odonata	6.3	3.2
% Coleoptera	7.0	1.9
% Other	1.9	0.6
% Predators	26.3	33.8
% Collector-Gatherers	27.8	31.0
% Collector-Filterers	23.8	17.6
% Scrapers	8.5	1.6
% Shredders	13.6	16.0
Macroinvertebrate Hester-Dendy		
Number of Taxa	27	29
Florida Index	15	15
Shannon-Weaver Diversity	4.07	3.02
% Oligochaeta	6.9	1.6
% Diptera	86.1	91.5
% Ephemeroptera	2.8	0
% Trichoptera	2.8	0.2
% Odonata	0	0.5
% Coleoptera	1.4	6.0
% Gastropoda	0	0.2
% Predators	34.6	28.3
% Collector-Gatherers	35.2	28.8
% Collector-Filterers	13.2	19.3
% Scrapers	6.5	5.7
% Shredders	10.0	17.8
Periphyton Algae		
Number of Taxa	13	16
% Contribution of Dominant Taxon	70.5	59.0
Chlorophyll a (mg/sq. m)	2.8	2.8
Diatom/Diatom + B-G Abundance Ratio	84.4	80.3
% Blue-green	15.5	6.9
% Green	0.7	64.7
% Diatoms	83.8	28.3
Algal Growth Potential (mg dry wt/l)	1.865	1.640



Effect of discharge on receiving stream
(measured as difference between control and test sites).

effects on the receiving waters. A comparison of biological community health was made between a control site (located upstream of the outfall on Alligator Creek) and a test site (the area down gradient of the discharge). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. Acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Pimephales promelas* as test organisms, were performed on an effluent sample (Peltier and Weber 1985, FDER 1985). The effluent was analyzed for organic constituents (base neutrals, acid extractables, and pesticide extractables) and both the discharge and surface water stations were tested for metals. Additionally, nutrient analyses were performed on effluent, control, and test sites. Methods used for all chemical analyses are on file at the Tallahassee DER Chemistry Laboratory.

Benthic macroinvertebrate communities were evaluated at control and test sites. Collection methods consisted of a timed (one hour per site) multi-substrate (*e.g.*, snags, vegetation, sediment) semi-quantitative effort. Additional invertebrate collections were accomplished using Hester-Dendy multiplate samplers which were incubated for 28 days (Ross 1990). Periphyton was sampled at both reference and test sites by incubating glass microscope slides in a standard periphytometer for 28 days (Ross 1990). Chlorophyll *a* was also determined for periphyton communities (Ross 1990). Algal Growth Potential tests, using *Selenastrum capricornutum* as the test organism, followed Miller *et al.* (1978).

Explanation of Measurements of Community Health

Several different measurements of macroinvertebrate and algal community health have been employed. Many of these, such as the number of taxa, Shannon-Weaver Diversity Index, and chlorophyll *a* are well known. Others are briefly explained here. 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 (*i.e.*, many clean-water organisms are present). Excessive numerical dominance of a single type of organism (a high % contribution of dominant taxon) is usually associated with disturbance. 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. The determination of the Quantitative Stability Index (for taxonomic % composition) is a two step process. First, the relative proportions of major taxonomic groups are calculated for each site. Then, the lesser of the two percentages for each discrete taxonomic group is totaled. A QSI (% composition) of 100% means that the two sites being compared are identical. This same type of procedure is used for calculating the QSI (functional feeding groups).

For graphical purposes, the percent differences between the control and test sites involving the number of taxa, the diversity index, Florida Index and the diatom to blue-green algae ratio are measured as the control site minus test site divided by the control site. The percent differences

between sites involving 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: Scott Bulgrin (DER Northeast District) and Lyn Burton, Russel Frydenborg, Kathleen Lurding, and Sandy McClure (Tallahassee Biology Laboratory).

Results and Discussion

Assessment of habitat quality resulted in a higher score for the upstream station (Appendix). Although the stations were similar with regard to vegetation quality and water velocity (both were 0.3 m/s), the control station scored slightly higher for bottom substrate characteristics, flow alteration, and bank stability. Both sites in this surficial aquifer fed stream were amply oxygenated (8.1 and 7.7 mg/l at control and test sites, respectively), and slightly acidic (Appendix). While the downstream site was directly influenced by the sewage treatment plant, the control site had more potential sources of nonpoint source pollution in its watershed, as 60% of the surrounding land use was deemed commercial.

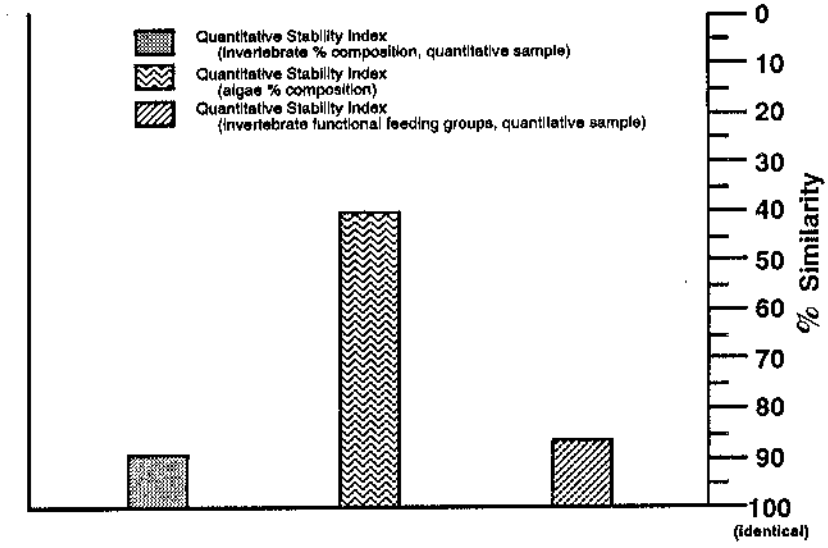
The dechlorinated effluent was not toxic to the cladoceran, *Ceriodaphnia dubia*, or the fish, *Pimephales promelas*. However, the chlorinated sample (residual chlorine = 1.1 mg/l, Appendix) killed all of the test animals within one hour.

No organic priority pollutants or pesticides were detected in the discharge sample. Effluent was collected twice for metals analysis, on 20 March and 22 April, 1991. The average concentrations of the following metals were found: aluminum (49.5 µg/L), silver (0.2 µg/L), lead (5.45 µg/L), barium (27.5 µg/L), copper (10 µg/L), iron 291.5 µg/L), and zinc (43.5 µg/L) (Appendix). Silver (0.4 µg/L) and zinc (68 µg/L) levels detected in the March samples violated water quality standards for Class III freshwaters. At the control and test sites, aluminum, barium, iron, and zinc were detected. None of these metals occurred at concentrations above standards (Appendix).

Nutrients were sampled at the discharge site in both March and April. Although most concentrations were considerably higher in March (Appendix), the average of the two values will be reported here: NH_3 (3.92 mg/L), NO_2NO_3 (0.45 mg/L), TKN (6.62 mg/L), Total P (1.1 mg/L), and the single sampling of $O\text{-}PO_4$ was 0.24 mg/L. The permit limit for organic nitrogen was not exceeded. Nutrient concentrations (except for NO_2NO_3) were slightly higher at the downstream station compared to the control (Appendix), but the influence of the discharge did not appear to threaten the trophic status of the receiving waters.

Algal growth potential (AGP) was slightly higher at the upstream site. These values of 1.865 and 1.640 mg dry wt/L for control and test station, respectively, do not suggest an enrichment problem, corresponding with the nutrient data. AGP results above 5 mg algal dry wt/L generally indicate the onset of eutophication troubles (Raschke and Schultz 1987).

Quantitative measures of the periphyton community in Alligator Creek were ambiguous. The upstream site was dominated by diatoms (70.5 % *Cocconeis placentula*), which is not unusual, while green algae (mainly *Characium* sp.) were most abundant downstream (see taxa list in Appendix). While such a drastic shift in community composition



Effect of discharge on receiving stream
(measured as similarity between control and test sites).

would normally suggest disturbance, the percent change in number of taxa, percent contribution of dominant taxon, chlorophyll *a*, and the diatom/blue-green abundance ratio did not indicate a significant amount of improvement or degradation (see Table and Figures). The figure on p. 2 indicates the degree of difference between the control and test sites. Larger differences (that is, higher percentages) correspond with greater degrees of degradation. Negative values mean that the test site is better than the control. The figure on p. 3 summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation. In this particular case, though, the lack of similarity between periphyton communities at the two sites is related to the shift from diatom to green algal dominance.

Analysis of the benthic macroinvertebrate community by qualitative means indicated some disturbance downstream of the discharge (see Table). Taxa richness and Florida Index were considerably greater at the control site, and the % contribution of dominant taxon increased by more than 100% at the test site. A comparison of the relative proportions of the different taxonomic groups and the functional feeding group composition did not indicate degraded conditions (see Table, p. 1).

Artificial substrate samples indicated that the macroinvertebrate communities above and below the outfall were similar with regard to major taxonomic groups and functional feeding strategies (see bottom right Figure). In contrast to the qualitative samples, Florida Index values calculated from Hester-Dendy samplers were identical. Although two more taxa were recovered from the downstream site, the distribution of individual abundance was such that a 25.8 % reduction in diversity occurred. This constitutes a violation of Biological Integrity (FAC 17-302.560(7)). The overwhelmingly dominant taxon (53%) was the dipteran, *Polypedilum illinoense*, which is known to be somewhat tolerant to organic pollution, sewage, and toxic wastes (Hudson *et al.* 1990).

Conclusions

The chlorinated effluent sample collected from the Starke Sewage Treatment Plant was toxic to the cladoceran, *Ceriodaphnia dubia*, and the fish, *Pimephales promelas*. All of the test animals were dead within one hour. This problem should soon be alleviated, as the facility has been granted a construction permit to install dechlorination.

While no organic priority pollutants were detected in the sample, concentrations of the metals zinc and silver violated Class III standards for ambient freshwater.

Nutrient levels in Alligator Creek below the outfall did not appear to be elevated from the input of the treated effluent. Algal growth potential was relatively low above and below the facility.

A shift in periphyton community structure occurred, from a diatom-dominated assemblage to one where green algae were most numerous. All other measures of periphyton community health did not indicate a significant amount of degradation or improvement.

Qualitative analysis of the benthic macroinvertebrates showed some signs of stress downstream of the discharge. This may be partially due to somewhat more suitable habitat at the upstream site. Taxa richness was higher and the Florida Index indicated that more pollution-sensitive taxa were inhabiting the area of Alligator Creek above the discharge.

The use of artificial substrates reduces the influence of habitat variation in the analysis of the benthic community. Although most measures of community stability were quite similar above and below the plant outfall (indicating no degradation), diversity was reduced by >25 %. This is in violation of biological integrity criteria (17-302.560(7) FAC).

Literature Cited

Florida Department of Environmental Regulation. 1985. Quality assurance manual for performing acute toxicity tests. 2nd edition. Fla. Dept. Environmental Regulation, Biology Section, Tallahassee. 53 pp.

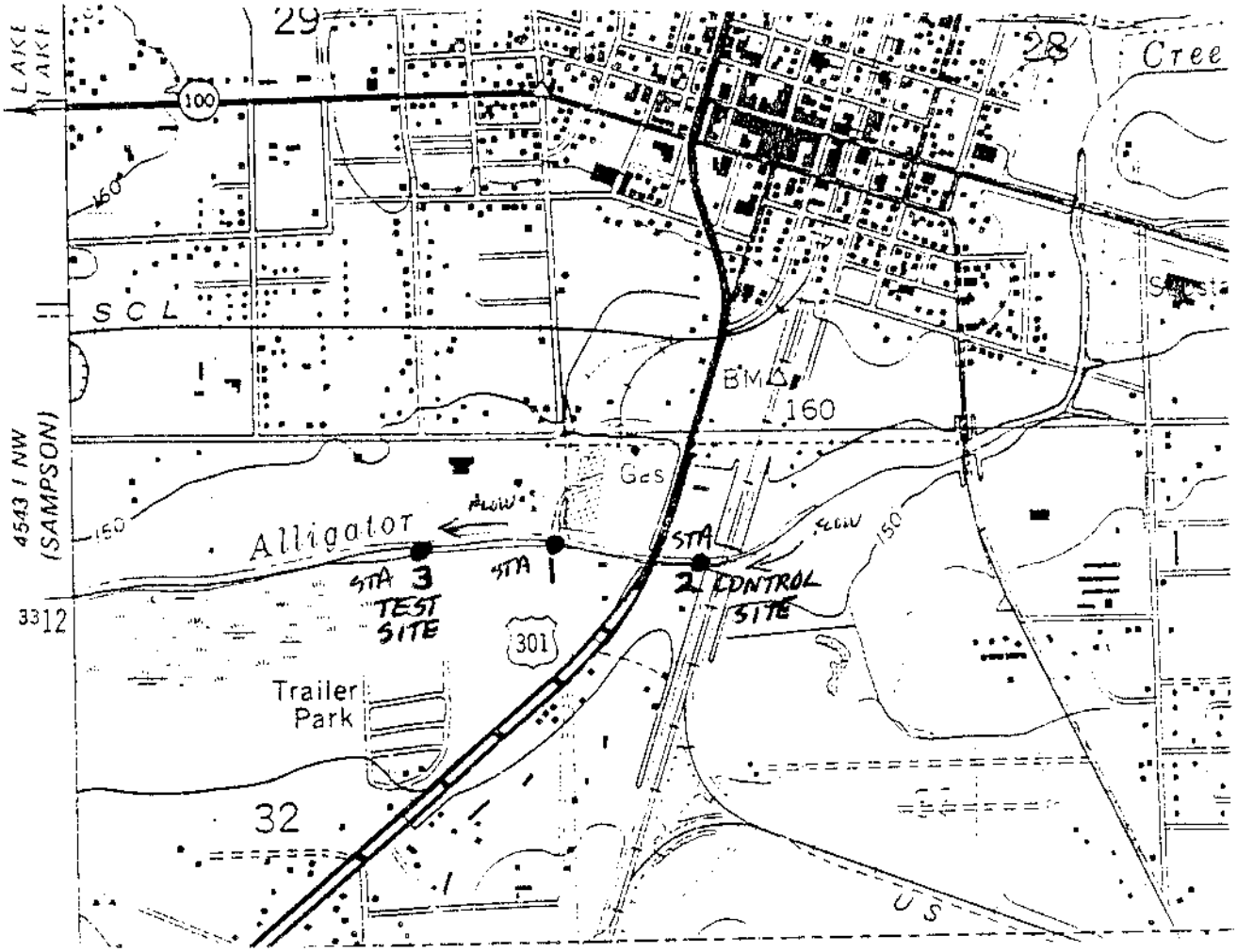
Hudson, P. L., D. R. Lenat, B. A. Caldwell, and D. Smith. 1990. Chironomidae of the southeastern United States: a checklist of species and notes on biology, distribution, and habitat. U. S. Fish Wildl. Serv., Fish. Wildl. Res. 7. 46 pp.

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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.

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STA 1. City of Starke WWTP Discharge into Alligator Creek

STA 2. Alligator Creek upstream of City of Starke WWTP discharge. ~ 50 yds east of US301 CONTROL SITE

STA 3. Alligator Creek Downstream of City of Starke WWTP discharge. ~ 1/4 mile downstream TEST SITE

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
SUBMITTING AGENCY NAME:			

REMARKS:	LOCATION:	FIELD ID/NAME:

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover [14]	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs, undercut banks, rubble, or other stable habitat. **23-30 points**	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. **16-22 points**	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat. **8-15 points**	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious. **0-7 points**
Water Velocity [30]	Max. observed; >0.3 m/sec. **23-30 points**	Max. observed; 0.1 to 0.3 m/sec **16-22 points**	Max. observed; 0.05 to 0.1 m/sec **8-15 points**	Max. observed; <0.05 m/sec **0-7 points**
Artificial Channel/ Flow Alteration [14]	No artificial channelization. Little activity (impervious surface) in watershed which would cause scouring during spates. **12-15 points**	—	—	Artificially channelized, or scouring present during spates because of excess impervious surface in watershed. **0-3 points**
Bank Stability [10]	Stable. No evidence of erosion or bank failure. Little potential for future problems. **9-10 points**	Moderately stable. Infrequent or small areas of erosion, mostly healed over. **6-8 points**	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. **3-5 points**	Unstable. Many raw, eroded areas. Obvious bank sloughing. **0-2 points**
Riparian Zone Vegetation Quality [7]	Over 80% of streambank surfaces consist of native plants, classified as: bottomland hardwoods, understory shrubs, or non-woody macrophytes. **9-10 points**	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. **6-8 points**	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. **3-5 points**	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture) present. **0-2 points**

Adjustments		TOTAL SCORE
[5]	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	[76]

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
06/03/11	SCOTT BUCKLIN	

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: FC31 SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:

REMARKS:	LOCATION:	FIELD ID/NAME:

Habitat Parameter score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 12	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs, undercut banks, rubble, or other stable habitat. **23-30 points**	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. **16-22 points**	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat. **8-15 points**	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious. **0-7 points**
Water Velocity 20	Max. observed; >0.3 m/sec. **23-30 points**	Max. observed; 0.1 to 0.3 m/sec **16-22 points**	Max. observed; 0.05 to 0.1 m/sec **8-15 points**	Max. observed; <0.05 m/sec **0-7 points**
Artificial Channel/ Flow Alteration 12	No artificial channelization. Little activity (impervious surface) in watershed which would cause scouring during spates. **12-15 points**	—	—	Artificially channelized, or scouring present during spates because of excess impervious surface in watershed. **0-3 points**
Bank Stability 8	Stable. No evidence of erosion or bank failure. Little potential for future problems. **9-10 points**	Moderately stable. Infrequent or small areas of erosion, mostly healed over. **6-8 points**	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. **3-5 points**	Unstable. Many raw, eroded areas. Obvious bank sloughing. **0-2 points**
Riparian Zone Vegetation Quality 5	Over 80% of streambank surfaces consist of native plants, classified as: bottomland hardwoods, understory shrubs, or non-woody macrophytes. **9-10 points**	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. **6-8 points**	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. **3-5 points**	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture) present. **0-2 points**

Adjustments		TOTAL SCORE
	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	77

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y): 06/13/11	RECEIVING BODY OF WATER:
REMARKS:	LOCATION:	FIELD ID/NAME:	

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
25 %	5 %		5%	CC		

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

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

Point-Source Pollution (list location and describe):

Estimated Stream Width (range, m):	Estimated Stream Depth (range, m):	yes
High Water Mark (m above bed):	Velocity (range, m/s):	Impounded ☐ Channelized ☒

Canopy Cover % (check box): Open: ☐ Lightly Shaded: ☒ 25 Moderately Shaded: ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

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

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

Sediment Deposits: Sludge: ☐ Paper Fiber: ☐ Mud: ☐ Sand: ☒ Shell: ☐ Other: ☐

Substrate Types (estimated % surface coverage):

Limestone:		Sand/Silt/Clay Mix:	
Consolidated Clay:		Clay/Silt (inorganic):	
Gravel/Shell		Coarse Organic Debris:	
Sand:	100	Mud/Muck (organic):	

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top			Secchi Depth (m):	
Mid-depth			pH (SU):	
Bottom			Conductivity (µmho/cm):	
			Other Parameters:	

Stream Type (check box): Blackwater: ☐ Deep Aquifer Fed: ☐ Surficial Aquifer Fed: ☒ Alluvial: ☐ Other: ☐ _____

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

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

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

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

Weather Conditions: Sunny

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:
06/13/11	SCOTT BURGIN	

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: FCA	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
SUBMITTING AGENCY NAME:			

REMARKS:	LOCATION:	FIELD ID/NAME:

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
90 %				5 %		

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

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

Point-Source Pollution (list location and describe):

Estimated Stream Width (range, m):	Estimated Stream Depth (range, m):	yes
High Water Mark (m above bed):	Velocity (range, m/s):	Impounded ☐ Channelized ☒

Canopy Cover % (check box): Open: ☐ Lightly Shaded: ☐ Moderately Shaded: ☒ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

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

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

Sediment Deposits: Sludge: ☐ Paper Fiber: ☐ Mud: ☐ Sand: ☒ Shell: ☐ Other: ☐

Substrate Types (estimated % surface coverage):

Limestone:		Sand/Silt/Clay Mix:	
Consolidated Clay:		Clay/Silt (inorganic):	
Gravel/Shell		Coarse Organic Debris:	
Sand:	75	Mud/Muck (organic):	

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top			Secchi Depth (m):	
Mid-depth			pH (SU):	
Bottom			Conductivity (µmho/cm):	
			Other Parameters:	

Stream Type (check box): Blackwater: ☐ Deep Aquifer Fed: ☐ Surficial Aquifer Fed: ☒ Alluvial: ☐ Other: ☐

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

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

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

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

Weather Conditions: Hot Sunny 90's

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: CITY OF STARKE
Address/City:
County: BRADFORD
Contact/District: SCOTT BULGRIN / NE
NPDES Permit #: FL0023126 Outfall #:

Sample Collection: Date 4-22-91 Time 1050
Test Beginning: Date 4-23-91 Time 1110
Test Ending: Date 4-25-91 Time 0350
Test Organism: C. dubia
Life Stage/Age: < 24 HRS

Test Number: 1 of 2 Test Type: Screening | Definitive
Static | Static Renewal | Flow-through

Remarks: * dead < 1 hr after loading

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr	7.2, 7.0	8.1@23°		
24 hr	7.1, 7.9	8.1@23°		
48 hr	7.0, 7.0	8.0@21.5	1380@24.0	210@23.9

Conc.	Chamber #	Number Live 0	24	48	DO (mg/l) 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	Cond. (µmhos/cm) 0	24	48
CONTROL	A	5	5	5	9.0	8.4	10.2	6.6	8.2	7.4	21.0	23.3	21.5	156	144	154
CONTROL	B	5	5	5					8.2							
CONTROL	C	5	5	5												
CONTROL	D	5	5	5												
100%	A	5	0*	—	10.4	8.5	—	7.1	8.0	—	20.5	23.2	—	318	1464	—
100%	B	5	0*	—												
100%	C	5	0*	—												
100%	D	5	0*	—												
DeCl	A	5	5	5	10.3	8.5	10.1	7.2	8.3	8.4	20.5	22.0	21.5	1440	1471	1430
DeCl	B	5	5	5												
DeCl	C	5	5	5												
DeCl	D	5	5	5												
Measured/Loaded by:		MF	MF	MF	KP	MF	KP	KP	MF	KP	KP	MF	KP	KP	MF	KP
Recorded by:		MF	MF	MF	LB	MF	MF	MF	MF	MF	LB	MF	MF	LB	MF	MF

Investigators' Signatures

Kim Pearce
Mark Faircloth
Lynn Burton

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			1.1	HACH	SCOTT BULGRIN
Lab Tot. Resid. Cl2:			12/0.9	Hach/Hach	Mark Faircloth
Alkalinity:	27	62	150	Hach	MF
Hardness:	128	70	140	Hach	MF
Total Ammonia:	0.0	0.0	4.8	Hach	MF

Ammonia meter slope:

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: CITY OF STARKE
Address/City:
County: BRADFORD
Contact/District: SCOTT BULGREN / NE
NPDES Permit #: FL0028126 Outfall #:

Sample Collection: Date 4-22-91 Time 1030
Test Beginning: Date 4-23-91 Time 1110
Test Ending: Date 4-25-91 Time 0830
Test Organism: ~~P. No. CCD~~ P. PROMELAS
Life Stage/Age: 13 DAYS

Test Number: 2 of 2 Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through

Remarks: * add chlm, all

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr	7@7,9@9	8.7@23	1394@24, 1389	21.9@23.9
24 hr	7@7,9@9	8.7@23	1401@24.3	20@24.1
48 hr	7@7,9@9	8.9@21.5	1386@24.0	21@23.8

Conc.	Chamber #	Number Live 0	24	48	DO (mg/l) 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	Cond. (µmhos/cm) 0	24	40
CONTROL	76	5	5	5	8.1	8.1	10.3	7.6	7.9	8.2	20.5	21.4	20.5			
CONTROL	7	5	5	5	8.9	8.2	10.2	7.7	7.9	8.4				239	239	241
100%	67	5	OK		11.0	8.3	—	7.4	7.9	—	20.5	21.3	—			
100%	22	5	OK	OK	11.2	8.1	—	7.3	7.9	—				439	441	—
DeCl 50%	79	5	OK	5	10.7	7.9	10.0	7.4	7.9	8.1	20.5	21.4	20.5			
DeCl	190	5	5	5	10.6	7.9	10.1	7.4	7.9	8.2				448	459	455
Counted/Loaded by		BH	MF	MF	KP	MF	KP	KP	MF	KP	KP	MF	KP	KP	MF	KP
Recorded:		MF	MF	MF	LB	MF	MF	LB	MF	MF	LB	MF	MF	LB	MF	MF

Investigators' Signatures

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			1.1	HACH	SCOTT BULGREN
Lab Tot. Resid. Cl2:			1.2/0.9	HACH/IODO	MF
Alkalinity:	127	62	150	Hach	MF
Hardness:	128	70	140	Hach	MF
Total Ammonia:	0.0	0.0	4.5	Hach	MF

Ammonia meter slope:

Sample ID: 15992/91-MAR-22-28-01 Matrix: W-EFFLUENT
Location: City Of Starke WWTP
Field ID:
Collected: 20-MAR-1991 14:00 By: Scott Bulgrin
Authorized: 26-JUN-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments:

Analysis ID: AG-G-W
Silver in water by furnace AA
Analyzed: 24-APR-1991 By: Jack Merritt
Authorized: 26-APR-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01077	Silver	0.4	ug/L

Analysis ID: CD-G-W
Cadmium by graphite furnace for water samples
Analyzed: 29-APR-1991 By: Jack Merritt
Authorized: 15-MAY-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01027	Cadmium	0.4 K	ug/L

Analysis ID: HG-H-W
Mercury by cold vapor using hydride sys.-water
Analyzed: 12-APR-1991 By: Kate Brackett
Authorized: 18-APR-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
71900	Mercury	0.1 K	ug/L

Analysis ID: PB-G-W
Lead by furnace AA in water
Analyzed: 9-MAY-1991 By: Kate Brackett
Authorized: 15-MAY-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01051	Lead	10.9	ug/L

15992/91-MAR-22-28-01 Continued from Page 2

Analysis ID: SE-G-W
Selenium in water by furnace AA
Analyzed: 14-JUN-1991 By: Kate Brackett
Authorized: 14-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01147	Selenium	3 U	ug/L

Analysis ID: W-ICP-23
ICP multielement analysis for water samples
Analyzed: 28-MAR-1991 By: Kate Brackett
Authorized: 26-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01106	Aluminum	NR	ug/L
01002	Arsenic	20 U	ug/L
01097	Antimony	NR	ug/L
01007	Barium	30	ug/L
01012	Beryllium	NR	ug/L
01027	Cadmium	NR	ug/L
00916	Calcium	NR	mg/L
01034	Chromium	10 U	ug/L
01037	Cobalt	NR	ug/L
01042	Copper	20	ug/L
01045	Iron	474	ug/L
01051	Lead	NR	ug/L
00927	Magnesium	NR	mg/L
01055	Manganese	NR	ug/L
01067	Nickel	5 U	ug/L
00937	Potassium	NR	mg/L
01147	Selenium	NR	ug/L
01077	Silver	NR	ug/L
00929	Sodium	NR	mg/L
01082	Strontium	NR	ug/L
01059	Thallium	NR	ug/L
01087	Vanadium	NR	ug/L
01092	Zinc	68	ug/L
Comment	NONE		

Sample ID: 17904/91-APR-23-26-01 Matrix: W-EFFLUENT
Location: City Of Starke WWTP
Field ID:
Collected: 22-APR-1991 10:30 By: Scott Bulgrin
Authorized: 9-JUL-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments:

Analysis ID: AG-G-W
Silver in water by furnace AA
Analyzed: 5-JUL-1991 By: Kate Brackett
Authorized: 9-JUL-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01077	Silver	0.2 U	ug/L

Analysis ID: CD-G-W
Cadmium by graphite furnace for water samples
Analyzed: 10-JUN-1991 By: Jack Merritt
Authorized: 14-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01027	Cadmium	0.3 U	ug/L

Analysis ID: HG-H-W
Mercury by cold vapor using hydride sys.-water
Analyzed: 1-MAY-1991 By: Laurie Roughton
Authorized: 3-MAY-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
71900	Mercury	0.2 U	ug/L

Analysis ID: SE-G-W
Selenium in water by furnace AA
Analyzed: 14-JUN-1991 By: Kate Brackett
Authorized: 14-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01147	Selenium	3 U	ug/L

 Continued on Page 3

17904/91-APR-23-26-01 Continued from Page 2

Analysis ID: W-ICP-23
ICP multielement analysis for water samples
Analyzed: 17-MAY-1991 By: Kate Brackett
Authorized: 9-JUL-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01106	Aluminum	99	ug/L
01002	Arsenic	20 U	ug/L
01097	Antimony	NR	ug/L
01007	Barium	25	ug/L
01012	Beryllium	NR	ug/L
01027	Cadmium	3 U	ug/L
00916	Calcium	NR	mg/L
01034	Chromium	20 U	ug/L
01037	Cobalt	NR	ug/L
01042	Copper	5 U	ug/L
01045	Iron	109	ug/L
01051	Lead	15 U	ug/L
00927	Magnesium	NR	mg/L
01055	Manganese	NR	ug/L
01067	Nickel	5 U	ug/L
00937	Potassium	NR	mg/L
01147	Selenium	30 U	ug/L
01077	Silver	3 U	ug/L
00929	Sodium	NR	mg/L
01082	Strontium	NR	ug/L
01059	Thallium	NR	ug/L
01087	Vanadium	NR	ug/L
01092	Zinc	19	ug/L
Comment	NONE		

Sample ID: 17905/91-APR-23-26-02 Matrix: W-FIELD-BK
Location: City Of Starke
Field ID:
Collected: 22-APR-1991 10:50 By: Scott Bulgrin
Authorized: 9-JUL-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments:

17905/91-APR-23-26-02 Continued on Page 4

Sample ID: 17914/91-APR-23-31-01 Matrix: W-SURF-FRH
Location: Alligator Creek Upstream of City of Starke
Field ID:
Collected: 22-APR-1991 12:30 By: Scott Bulgrin
Authorized: 9-JUL-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments:

Analysis ID: AG-G-W
Silver in water by furnace AA
Analyzed: 5-JUL-1991 By: Kate Brackett
Authorized: 9-JUL-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01077	Silver	0.2 U	ug/L

Analysis ID: CD-G-W
Cadmium by graphite furnace for water samples
Analyzed: 10-JUN-1991 By: Jack Merritt
Authorized: 14-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01027	Cadmium	0.3 U	ug/L

Analysis ID: HG-H-W
Mercury by cold vapor using hydride sys.-water
Analyzed: 1-MAY-1991 By: Laurie Roughton
Authorized: 3-MAY-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
71900	Mercury	0.2 U	ug/L

Analysis ID: SE-G-W
Selenium in water by furnace AA
Analyzed: 14-JUN-1991 By: Kate Brackett
Authorized: 14-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01147	Selenium	3 U	ug/L

 Continued on Page 3

17914/91-APR-23-31-01 Continued from Page 2

Analysis ID: W-ICP-23
ICP multielement analysis for water samples
Analyzed: 17-MAY-1991 By: Kate Brackett
Authorized: 9-JUL-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01106	Aluminum	848	ug/L
01002	Arsenic	20 U	ug/L
01097	Antimony	NR	ug/L
01007	Barium	28	ug/L
01012	Beryllium	NR	ug/L
01027	Cadmium	3 U	ug/L
00916	Calcium	NR	mg/L
01034	Chromium	10 U	ug/L
01037	Cobalt	NR	ug/L
01042	Copper	5 U	ug/L
01045	Iron	708	ug/L
01051	Lead	15 U	ug/L
00927	Magnesium	NR	mg/L
01055	Manganese	NR	ug/L
01067	Nickel	5 U	ug/L
00937	Potassium	NR	mg/L
01147	Selenium	30 U	ug/L
01077	Silver	3 U	ug/L
00929	Sodium	NR	mg/L
01082	Strontium	NR	ug/L
01059	Thallium	NR	ug/L
01087	Vanadium	NR	ug/L
01092	Zinc	10 T	ug/L
Comment	NONE		

Sample ID: 17915/91-APR-23-31-02 Matrix: W-SURF-FRH
Location: Alligator Creek Downstream City of Starke
Field ID:
Collected: 22-APR-1991 11:20 By: Scott Bulgrin
Authorized: 9-JUL-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments:

17915/91-APR-23-31-02 Continued on Page 4

17915/91-APR-23-31-02 Continued from Page 3

Analysis ID: AG-G-W
Silver in water by furnace AA
Analyzed: 5-JUL-1991 By: Kate Brackett
Authorized: 9-JUL-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01077	Silver	0.2 U	ug/L

Analysis ID: CD-G-W
Cadmium by graphite furnace for water samples
Analyzed: 10-JUN-1991 By: Jack Merritt
Authorized: 14-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01027	Cadmium	0.3 U	ug/L

Analysis ID: HG-H-W
Mercury by cold vapor using hydride sys.-water
Analyzed: 1-MAY-1991 By: Laurie Roughton
Authorized: 3-MAY-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
71900	Mercury	0.2 U	ug/L

Analysis ID: SE-G-W
Selenium in water by furnace AA
Analyzed: 14-JUN-1991 By: Kate Brackett
Authorized: 14-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01147	Selenium	3 U	ug/L

17915/91-APR-23-31-02 Continued on Page 5

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Analysis ID: W-ICP-23
ICP multielement analysis for water samples
Analyzed: 17-MAY-1991 By: Kate Brackett
Authorized: 9-JUL-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01106	Aluminum	858	ug/L
01002	Arsenic	20 U	ug/L
01097	Antimony	NR	ug/L
01007	Barium	28	ug/L
01012	Beryllium	NR	ug/L
01027	Cadmium	3 U	ug/L
00916	Calcium	NR	mg/L
01034	Chromium	10 U	ug/L
01037	Cobalt	NR	ug/L
01042	Copper	5 U	ug/L
01045	Iron	702	ug/L
01051	Lead	15 U	ug/L
00927	Magnesium	NR	mg/L
01055	Manganese	NR	ug/L
01067	Nickel	5 U	ug/L
00937	Potassium	NR	mg/L
01147	Selenium	30 U	ug/L
01077	Silver	3 U	ug/L
00929	Sodium	NR	mg/L
01082	Strontium	NR	ug/L
01059	Thallium	NR	ug/L
01087	Vanadium	NR	ug/L
01092	Zinc	10	ug/L
Comment	NONE		

********** END OF REPORT **********

Sample ID: 17908/91-APR-23-28-01 Matrix: W-EFFLUENT
Location: City Of Starke WWTP
Field ID:
Collected: 22-APR-1991 10:30 By: Scott Bulgrin
Authorized: 7-JUN-1991 By: Yuh-Hsu Pan
Type: Grab Sample
Lab Comments:
Field Comments:

Analysis ID: W-PEST-CL
Chlorinated pesticide in water and waste
Analyzed: 14-MAY-1991 By: Adrian Niculescu
Authorized: 7-JUN-1991 By: Yuh-Hsu Pan
Sample exceeded holding time prior to analysis.

Storet#	Analyte	Value	Units
39330	Aldrin	0.01 U	ug/L
39337	Alpha-BHC	0.01 U	ug/L
39338	Beta-BHC	0.01 U	ug/L
34259	Delta-BHC	0.01 U	ug/L
39340	Gamma-BHC	0.01 U	ug/L
39350	Chlordane	0.2 U	ug/L
39460	Chlorobenzilate	N	ug/L
39360	DDD-p,p'	0.02 U	ug/L
39365	DDE-p,p'	0.02 U	ug/L
39370	DDT-p,p'	0.05 U	ug/L
39380	Dieldrin	0.02 U	ug/L
	Endosulfan I	0.01 U	ug/L
	Endosulfan II	0.01 U	ug/L
34351	Endosulfan sulfate	0.05 U	ug/L
39390	Endrin	N	ug/L
34366	Endrin aldehyde	0.01 U	ug/L
39410	Heptachlor	0.01 U	ug/L
39420	Heptachlor epoxide	0.01 U	ug/L
39430	Isodrin	0.03 U	ug/L
39480	Methoxychlor	0.02 U	ug/L
	PCNB	0.05 U	ug/L
39400	Toxaphene	0.5 U	ug/L

Comment (1):
(2):

Sample ID: 17909/91-APR-23-28-02 Matrix: W-FIELD-BK
Location: City Of Starke
Field ID:
Collected: 22-APR-1991 10:50 By: Scott Bulgrin
Authorized: 7-JUN-1991 By: Yuh-Hsu Pan
Type: Grab Sample
Lab Comments:
Field Comments:

17909/91-APR-23-28-02 Continued on Page 3

17909/91-APR-23-28-02 Continued from Page 2

Analysis ID: W-PEST-CL
Chlorinated pesticide in water and waste
Analyzed: 14-MAY-1991 By: Adrian Niculescu
Authorized: 7-JUN-1991 By: Yuh-Hsu Pan
Sample exceeded holding time prior to analysis.

Storet#	Analyte	Value	Units
39330	Aldrin	0.01 U	ug/L
39337	Alpha-BHC	0.01 U	ug/L
39338	Beta-BHC	0.01 U	ug/L
34259	Delta-BHC	0.01 U	ug/L
39340	Gamma-BHC	0.01 U	ug/L
39350	Chlordane	0.2 U	ug/L
39460	Chlorobenzilate	N	ug/L
39360	DDD-p,p'	0.02 U	ug/L
39365	DDE-p,p'	0.02 U	ug/L
39370	DDT-p,p'	0.05 U	ug/L
39380	Dieldrin	0.02 U	ug/L
	Endosulfan I	0.01 U	ug/L
	Endosulfan II	0.01 U	ug/L
34351	Endosulfan sulfate	0.05 U	ug/L
39390	Endrin	N	ug/L
34366	Endrin aldehyde	0.01 U	ug/L
39410	Heptachlor	0.01 U	ug/L
39420	Heptachlor epoxide	0.01 U	ug/L
39430	Isodrin	0.01 U	ug/L
39480	Methoxychlor	0.02 U	ug/L
	PCNB	0.05 U	ug/L
39400	Toxaphene	0.5 U	ug/L

Comment (1):
(2):

********** END OF REPORT **********

Sample ID: 17906/91-APR-23-27-01 Matrix: W-EFFLUENT
Location: City Of Starke WWTP
Field ID:
Collected: 22-APR-1991 10:30 By: Scott Bulgrin
Authorized: 27-MAY-1991 By: Liang T. Lin
Type: Grab Sample
Lab Comments:
Field Comments:

Analysis ID: W-BNA
base-neutral-acid water analysis
Analyzed: 1-MAY-1991 By: Laura Harrison
Authorized: 22-MAY-1991 By: Laura Harrison

Storet#	Analyte	Value	Units
34205	Acenaphthene	2 U	ug/L
34200	Acenaphthylene	2 U	ug/L
39330	Aldrin	3 U	ug/L
34220	Anthracene	2 U	ug/L
34526	Benzo(a)anthracene	2 U	ug/L
34230	Benzo(b)fluoranthene	2 U	ug/L
34242	Benzo(k)fluoranthene	2 U	ug/L
34247	Benzo(a)pyrene	4 U	ug/L
34521	Benzo(g,h,i)perylene	5 U	ug/L
34292	Benzyl butyl phthalate	2 U	ug/L
	a-BHC	3 U	ug/L
39337	b-BHC	3 U	ug/L
39340	d-BHC	3 U	ug/L
	g-BHC	3 U	ug/L
39120	Benzidine	25 U	ug/L
34273	Bis(2-chloroethyl)ether	2 U	ug/L
34278	Bis(2-chloroethoxy)methane	2 U	ug/L
34283	Bis(2-chloroisopropyl)ether	2 U	ug/L
39100	Bis(2-ethylhexyl)phthalate	2 U	ug/L
34636	4-Bromophenyl phenyl ether	2 U	ug/L
34581	2-Chloronaphthalene	2 U	ug/L
34641	4-Chlorophenyl phenyl ether	2 U	ug/L
34320	Chrysene	2 U	ug/L
39310	4,4'-DDD	3 U	ug/L
39320	4,4'-DDE	3 U	ug/L
39300	4,4'-DDT	3 U	ug/L
34556	Dibenzo(a,h)anthracene	5 U	ug/L
39110	Di-n-butyl phthalate	2 U	ug/L
34536	1,2-Dichlorobenzene	2 U	ug/L
34566	1,3-Dichlorobenzene	2 U	ug/L
34571	1,4-Dichlorobenzene	2 U	ug/L
34631	3,3'-Dichlorobenzidine	5 U	ug/L
39380	Dieldrin	3 U	ug/L
34336	Diethylphthalate	2 U	ug/L
34341	Dimethylphthalate	2 U	ug/L
34611	2,4-Dinitrotoluene	2 U	ug/L
34626	2,6-Dinitrotoluene	2 U	ug/L

Continued on Page 3

17906/91-APR-23-27-01/W-BNA Continued from Page 2

Storet#	Analyte	Value	Units
34596	Di-n-octyl phthalate	2 U	ug/L
34361	Endosulfan-I	3 U	ug/L
34356	Endosulfan-II	3 U	ug/L
34351	Endosulfan-sulfate	3 U	ug/L
39390	Endrin	3 U	ug/L
34366	Endrin-aldehyde	3 U	ug/L
34376	Fluoranthene	2 U	ug/L
34381	Fluorene	2 U	ug/L
39410	Heptachlor	3 U	ug/L
39420	Heptachlor-epoxide	3 U	ug/L
39700	Hexachlorobenzene	2 U	ug/L
34391	Hexachlorobutadiene	2 U	ug/L
34396	Hexachloroethane	2 U	ug/L
34386	Hexachlorocyclypentadiene	5 U	ug/L
34403	Indeno(1,2,3-cd)pyrene	5 U	ug/L
34408	Isophorone	2 U	ug/L
34696	Naphthalene	2 U	ug/L
34447	Nitrobenzene	2 U	ug/L
34438	N-Nitrosodimethylamine	2 U	ug/L
34428	N-Nitrosodi-n-propylamine	2 U	ug/L
34433	N-Nitrosodiphenylamine	2 U	ug/L
34671	PCB-1016	1.0E+03 U	ug/L
39488	PCB-1221	1.0E+03 U	ug/L
39492	PCB-1232	1.0E+03 U	ug/L
39496	PCB-1242	1.0E+03 U	ug/L
39500	PCB-1248	1.0E+03 U	ug/L
39504	PCB-1254	1.0E+03 U	ug/L
39508	PCB-1260	1.0E+03 U	ug/L
	PCB-1262	1.0E+03 U	ug/L
34461	Phenanthrene	2 U	ug/L
34469	Pyrene	2 U	ug/L
39400	Toxaphene	1.0E+03 U	ug/L
34551	1,2,4-Trichlorobenzene	2 U	ug/L
34462	4-Chloro-3-methyl phenol	2 U	ug/L
34586	2-Chlorophenol	2 U	ug/L
34601	2,4-Dichlorophenol	2 U	ug/L
34606	2,4-Dimethylphenol	2 U	ug/L
34616	2,4-Dinitrophenol	15 U	ug/L
34657	2-Methyl-4,6-dinitrophenol	15 U	ug/L
34591	2-Nitrophenol	2 U	ug/L
34646	4-Nitrophenol	15 U	ug/L
39032	Pentachlorophenol	5 U	ug/L
34694	Phenol	2 U	ug/L
34621	2,4,6-Trichlorophenol	2 U	ug/L

Comments (1)
(2)
(3)
(4)
(5)
(6)

Ross Wydenboorg

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LOG NO: T1-00784

Received: 26 MAR 91

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DER-Chemistry Section
2600 Blairstone Road
Tallahassee, Florida 32399-2400

Project: T165/District 0325

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION	SAMPLED BY
00784-1	C-527	Client
00784-2	C-528	
00784-3	C-529	
00784-4	C-530	JU EFFLUENT
00784-5	C-531	STARKE EFFLUENT

LIQUID SAMPLES

PARAMETER	00784-1	00784-2	00784-3	00784-4	00784-5
Ammonia-N, mg/l	<0.030	0.047	<0.030	11	5.6
Total Kjeldahl Nitrogen-N, mg/l	1.0	0.45	0.43	15	[illegible]
Total Phosphorus, mg/l	0.28	2.3	0.11	1.1	3.1
Nitrate + Nitrite-N, mg/l	0.11	0.37	0.34	0.10	0.11

RECEIVED
DEP. ENVIRONMENTAL REG.
APR 22 1991
CHEMISTRY SECTION

Sample ID: 17902/91-APR-23-25-01 Matrix: W-EFFLUENT
Location: City Of Starke WWTP
Field ID:
Collected: 22-APR-1991 10:30 By: Scott Bulgrin
Authorized: 12-JUN-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments:

Analysis ID: W-NH3
Analysis for ammonia in water
Analyzed: 24-MAY-1991 By: John Montana
Authorized: 6-JUN-1991 By: Tim Fitzpatrick
Sample exceeded holding time prior to analysis.

Storet#	Analyte	Value	Units
00610	Ammonia-N	2.24	mg N/L

Analysis ID: W-NO2NO3
Analysis for nitrite+nitrate in water
Analyzed: 13-MAY-1991 By: Jin-Chaun Liu
Authorized: 12-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00630	NO2NO3-N	0.79 A	mg N/L

Analysis ID: W-TKN
TKN for water sample
Analyzed: 10-MAY-1991 By: John Montana
Authorized: 12-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00625	N_KJEL_TOT	3.24	mg N/L

Analysis ID: W-TP
Analysis for total phosphorus in water
Analyzed: 24-MAY-1991 By: John Montana
Authorized: 6-JUN-1991 By: Tim Fitzpatrick
Sample exceeded holding time prior to analysis.

Storet#	Analyte	Value	Units
00665	Total-P	0.4 U	mg P/L

Sample ID: 17900/91-APR-23-24-01 Matrix: W-EFFLUENT
Location: City Of Starke WWTP
Field ID:
Collected: 22-APR-1991 10:30 By: Scott Bulgrin
Authorized: 12-JUN-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments:

Analysis ID: W-CL
Analysis for chloride in water
Analyzed: 17-MAY-1991 By: Jin-Chaun Liu
Authorized: 12-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00940	Chloride	35 A	mg Cl/L

Analysis ID: W-F
Analysis for fluoride in water
Analyzed: 15-MAY-1991 By: John Montana
Authorized: 30-MAY-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00951	Fluoride	0.23	mg F/L

Analysis ID: W-PO4
Orthophosphate analysis for water samples
Analyzed: 3-JAN-1980 By: Tim Fitzpatrick
Authorized: 12-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
70507	O-Phosphate-P	0.24 A	mg P/L

Analysis ID: W-SO4
Analysis for sulfate in water
Analyzed: 17-MAY-1991 By: Jin-Chaun Liu
Authorized: 12-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00945	Sulfate	22 J	mg SO4/L

Sample ID: 17912/91-APR-23-30-01 Matrix: W-SURF-FRH
Location: Alligator Creek Upstream of City of Starke
Field ID:
Collected: 22-APR-1991 12:30 By: Scott Bulgrin
Authorized: 8-JUL-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments:

Analysis ID: W-NH3
Analysis for ammonia in water
Analyzed: 15-MAY-1991 By: John Montana
Authorized: 8-JUL-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00610	Ammonia-N	0.08	mg N/L

Analysis ID: W-NO2NO3
Analysis for nitrite+nitrate in water
Analyzed: 14-MAY-1991 By: Tim Fitzpatrick
Authorized: 8-JUL-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00630	NO2NO3-N	0.04 U	mg N/L

Analysis ID: W-TKN
TKN for water sample
Analyzed: 23-MAY-1991 By: John Montana
Authorized: 8-JUL-1991 By: Tim Fitzpatrick
Sample exceeded holding time prior to analysis.

Storet#	Analyte	Value	Units
00625	N_KJEL_TOT	0.74	mg N/L

Analysis ID: W-TP
Analysis for total phosphorus in water
Analyzed: 24-MAY-1991 By: John Montana
Authorized: 6-JUN-1991 By: Tim Fitzpatrick
Sample exceeded holding time prior to analysis.

Storet#	Analyte	Value	Units
00665	Total-P	0.2 U	mg P/L

Sample ID: 17910/91-APR-23-29-01 Matrix: W-SURF-FRH
Location: Alligator Creek Upstream of City of Starke
Field ID:
Collected: 22-APR-1991 12:30 By: Scott Bulgrin
Authorized: 17-JUN-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments:

Analysis ID: W-CL
Analysis for chloride in water
Analyzed: 17-MAY-1991 By: Jin-Chaun Liu
Authorized: 17-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00940	Chloride	42 A	mg Cl/L

Analysis ID: W-F
Analysis for fluoride in water
Analyzed: 15-MAY-1991 By: John Montana
Authorized: 30-MAY-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00951	Fluoride	0.1 U	mg F/L

Analysis ID: W-PO4
Orthophosphate analysis for water samples
Analyzed: 3-JAN-1980 By: Tim Fitzpatrick
Authorized: 17-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
70507	O-Phosphate-P	0.045 A	mg P/L

Analysis ID: W-SO4
Analysis for sulfate in water
Analyzed: 17-MAY-1991 By: Jin-Chaun Liu
Authorized: 17-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00945	Sulfate	19 J	mg SO4/L

Sample ID: 17913/91-APR-23-30-02 Matrix: W-SURF-FRH
Location: Alligator Creek Downstream City of Starke
Field ID:
Collected: 22-APR-1991 11:20 By: Scott Bulgrin
Authorized: 8-JUL-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments:

Analysis ID: W-NH3
Analysis for ammonia in water
Analyzed: 15-MAY-1991 By: John Montana
Authorized: 8-JUL-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00610	Ammonia-N	0.18	mg N/L

Analysis ID: W-NO2NO3
Analysis for nitrite+nitrate in water
Analyzed: 14-MAY-1991 By: Tim Fitzpatrick
Authorized: 8-JUL-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00630	NO2NO3-N	0.04 U	mg N/L

Analysis ID: W-TKN
TKN for water sample
Analyzed: 29-MAY-1991 By: John Montana
Authorized: 2-JUL-1991 By: Tim Fitzpatrick
Sample exceeded holding time prior to analysis.

Storet#	Analyte	Value	Units
00625	N_KJEL_TOT	2.2	mg N/L

17913/91-APR-23-30-02 Continued on Page 4

17913/91-APR-23-30-02 Continued from Page 3

Analysis ID: W-TP
Analysis for total phosphorus in water
Analyzed: 5-JUL-1991 By: John Montana
Authorized: 8-JUL-1991 By: Tim Fitzpatrick
Sample exceeded holding time prior to analysis.

Storet#	Analyte	Value	Units
00665	Total-P	0.10	mg P/L

********** END OF REPORT **********

Sample ID: 17911/91-APR-23-29-02 Matrix: W-SURF-FRH
Location: Alligator Creek Downstream City of Starke
Field ID:
Collected: 22-APR-1991 11:20 By: Scott Bulgrin
Authorized: 17-JUN-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments:

Analysis ID: W-CL
Analysis for chloride in water
Analyzed: 17-MAY-1991 By: Jin-Chaun Liu
Authorized: 17-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00940	Chloride	39 A	mg Cl/L

Analysis ID: W-F
Analysis for fluoride in water
Analyzed: 15-MAY-1991 By: John Montana
Authorized: 30-MAY-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00951	Fluoride	0.1 U	mg F/L

Analysis ID: W-PO4
Orthophosphate analysis for water samples
Analyzed: 3-JAN-1980 By: Tim Fitzpatrick
Authorized: 17-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
70507	O-Phosphate-P	0.055 A	mg P/L

17911/91-APR-23-29-02 Continued on Page 4

17911/91-APR-23-29-02 Continued from Page 3

Analysis ID: W-SO4
Analysis for sulfate in water
Analyzed: 17-MAY-1991 By: Jin-Chaun Liu
Authorized: 17-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00945	Sulfate	19 J	mg SO4/L

********** END OF REPORT **********

Periphyton taxa list and abundances for Starke WWTP, Bradford County, Florida, collected 28 May 1991.

	Control Site	Test Site
Diatoms		
Achnanthes exigua	12	–
A. lanceolata	4	–
A. linearis	4	–
Cocconeis placentula	766	3
Eunotia flexuosa	–	3
E. pectinalis	88	98
Gomphonema angustatum	4	8
G. gracile	–	3
Melosira italica	–	3
Navicula exigua v. *capitata*	4	3
N. pupula v. *rectangularis*	–	3
N. radiosa	28	5
Neidium affine	–	3
Nitzschia palea	–	3
Chlorophyta		
Characium sp.	–	278
Protoderma sp.	–	27
Spirogyra sp.	8	–
Cyanophyta		
Anabaena sp.	8	–
Chroococcus sp.	–	3
Lyngbya sp.	–	3
Microcystis sp.	12	–
Plectonema sp.	124	27
Stigonema sp.	24	–

Macroinvertebrate taxa list for Starke WWTP, Bradford County, Florida, collected via timed qualitative methods (dip net, ponar, etc.) at a control station (upstream) and a test site (downstream of the outfall) in Alligator Creek on 3 June, 1991.

	Control Site	Test Site
Coleoptera		
Agasicles hygrophila	1	–
Dineutes discolor	3	–
Stenelmis sp.	–	9
S. convexula	1	–
Undetermined chrysomelidae	25	–
Diptera		
Ablabesmyia mallochi	36	15
A. rhamphe grp.	–	3
Chironomus decorus grp.	–	9
Cladotanytarsus sp.	3	–
Cricotopus bicinctus	16	–
Cryptochironomus sp.	7	9
Hemerodromia sp.	12	69
Labrundinia sp.	2	–
Nanocladius sp.	2	–
Palpomyia grp.	2	6
Pentaneura inconspicua	2	–
Paralauterborniella nigrohalteralis	2	–
Paratanytarsus sp.	20	9
Polypedilum convictum grp.	6	–
P. fallax grp.	3	–
P. illinoense	60	234
P. scalaenum	6	12
Pseudochironomus sp.	3	–
Rheocricotopus robacki	5	–
Rheotanytarsus distinctissimus grp.	18	–
R. exiguus grp.	26	6
Stenochironomus sp.	–	3
Tanytarsus sp.	95	3
Thienemanniella xena	8	–
Tribelos fuscicorne	–	3
Undetermined dipteran pupae	18	36
Ephemeroptera		
Baetis frondalis	2	–
Caenis sp.	2	3
Callibaetis floridanus	3	–
Centroptilum sp.	1	–
Lepidoptera		
Undetermined lepidopteran	1	–
Malacostraca		
Palaemonetes paludosus	2	–
Procambarus sp.	3	–
Procambarus paeninsulanus	1	–

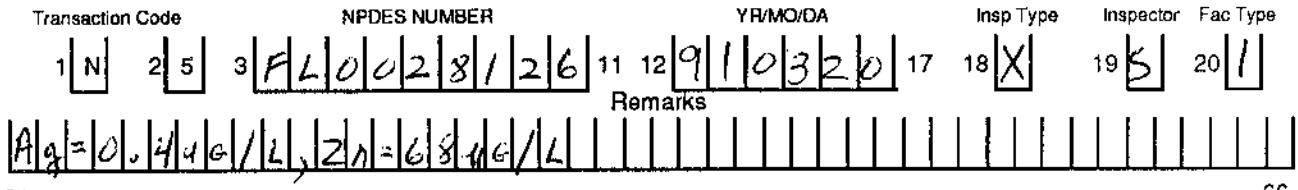
Megaloptera		
Corydalus cornutus	–	3
Odonata		
Argia sedula	1	–
Enallagma cardenium	20	15
Ischnura sp.	2	–
I. posita	1	–
Progomphus sp.	3	–
Oligochaeta		
Limnodrilus hoffmeisteri	–	9
Lumbriculus inconstans	1	–
Pelecypoda		
Undetermined sphaeriid	1	–
Trichoptera		
Cheumatopsyche sp.	–	6
Polycentropus sp.	–	3

Macroinvertebrate taxa list for Starke WWTP, Bradford County, Florida, collected via Hester-Dendy samplers at a control station (upstream) and a test site (downstream of the outfall) in Alligator Creek on 28 May, 1991.

	Control Site	Test Site
Coleoptera		
Dineutus sp.	–	1
Stenelmis sp.	1	30
S. convexula	–	2
Diptera		
Ablabesmyia mallochi	8	20
A. rhamphe grp.	1	12
Chironomus decorus grp.	–	10
Conchapelopia sp.	2	4
Cryptochironomus sp.	4	10
Dicrotendipes neomodestus	1	–
Goeldichironomus holoprasinus	–	2
Helopelopia sp.	1	–
Hemerodromia sp.	–	15
Kiefferulus dux	1	–
Labrundinia pilosella	1	–
Meropelopia sp.	–	2
Palpomyia grp.	1	–
Paralauterborniella nigrohalteralis	1	–
Paratanytarsus sp.	–	2
Polypedilum convictum grp.	–	2
P. fallax grp.	2	8
P. halterale grp.	1	4
P. illinoense	16	273
P. scalaenum	3	6
Pseudochironomus sp.	1	–
Rheocricotopus robacki	1	42
Rheotanytarsus distictissimus grp.	–	14
Stenochironomus sp.	1	–
Tanytarsus sp.	8	38
Thienemaniella fusca	–	2
T. xena	–	2
Tribelos fuscicorne	5	4
Undetermined dipteran pupae	3	36
Ephemeroptera		
Acerpenna pygmaeus	1	–
Baetis propinquus	1	–
Gastropoda		
Amnicola dalli johnseni	–	1

Odonata		
Argia sp.	–	1
Enallagma cardenium	–	2
Oligochaeta		
Limnodrilus hoffmeisteri	1	8
Limnodrilus udekemianus	2	–
L.inconstans	2	–
Undetermined tubificid w/o capilliform setae	–	1
Trichoptera		
Polycentropus sp.	2	1

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)

