

Biological Assessment of

Buckeye Pulp and Paper Mill

Taylor County

NPDES #FL0000876

Sampled April 2000

June 2001

Biology Section

Bureau of Laboratories

Division of Resource Assessment and Management

Comprehensive Quality Assurance Plan No. 870346G

Florida Department of Environmental Protection
Fifth Year Inspection Summary

Discharger:	Buckeye Pulp and Paper Mill
County:	Taylor
NPDES Permit Number:	FL0000876
Permit Expiration:	June 30,1997 (Administratively Extended)

Toxics Sampling Inspection (**XSI**)

Date Sampled: April 10, 2000

Results: Aluminum, cadmium, chromium, copper, iron, lead, nickel, silver and zinc were all detected in the effluent at levels that complied with Class III water quality standards. No organic constituents were detected in the effluent.

Compliance Biomonitoring Inspection (**CBI**)

Date Sampled: April 10, 2000

Results: The effluent sample did not indicate toxicity using the fish *Cyprinella leedsi* and the invertebrate *Ceriodaphnia dubia,* during the 48-hour acute bioassay test.

Impact Bioassessment Inspection (**IBI**)

Date Sampled: April 10, 2000

Results: There was a major shift in the periphyton community from one dominated by diatoms at the control site (98% contribution) to one dominated by blue-green algae at the test site (56% contribution). Further, there was a 76% decline in taxa richness and a 26% decline in diversity at the test site compared to the control site, a violation of the Biological Integrity Criterion (Rule 62-302.530(11) FAC) and an imbalance of the natural populations of aquatic flora (Rule 62-302.530(48)(b) FAC). Quantitative measures of macroinvertebrate communities also showed extreme degradation at the test site compared to the control site: significant decreases in number of taxa (73% decline), Florida Index score (100% decline), EPT Index and diversity (100% and 84%, respectively) and the percent dominant taxon increased by 65%. These changes represent violations of biological integrity, an imbalance of aquatic fauna and conditions favorable for the dominance of nuisance taxa (Rules 62-302.530(11), (48)(b) and (47), FAC respectively). AGP values at the control site (8.2 mg dry wt/L) and test site (67.7 mg dry wt/L) exceeded the 5 mg dry wt/L 'problem threshold'. The effluent AGP was 58.4 mg dry wt/L.

Water Quality Inspection (**WQI**)

Date Sampled: April 10, 2000

Results: Elevated effluent nutrients contributed to increases at the test site compared to the control site. Test site nutrients were significantly greater than 95% of other typical Florida streams. The effluent un-ionized ammonia (0.03 mg/L) exceeded Class III water quality standards (Rule 62-302.530 (3) FAC). The test site conductivity (2,160 µmhos/cm) was greater than the control site (341 µmhos/cm) and failed to comply with the Class III standard of 1,275 µmhos/cm, or not greater than 50% above background levels (Rule 62-302.530(23) FAC). Effluent conductivity (2,244 µmhos/cm) was elevated but was below the facility permit daily maximum (4000 µmhos/cm). The dissolved oxygen decreased from 7.2 mg/L at the control site to 1.8 mg/L at the test site. Although this level failed to meet the Class III limit (5.0 mg/L), it nevertheless complied with the facility's mixing zone permit limit. The effluent dissolved oxygen level was 2.9 mg/L. Total coliforms violated the Class III standard at the test site (3,500 count/100ml) (Rule 62-302.530(7) FAC). All other values complied with Class III standards and permit limits.

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

Introduction

The Buckeye Pulp and Paper Mill is a 58 MGD pulp and paper mill located in Taylor County, Florida (see map in Appendix). Treatment of industrial wastewater at the Buckeye facility involves a lift station, bar racks, 320-foot diameter primary clarifier with skimming pond, sludge pumps, 225 acres of sludge storage lagoons with conveyance structures and a 30-acre aerated lagoon followed by a 120-acre aerated lagoon. The effluent is a continuous discharge into the Class III Fenholloway River. The mean flow from 12/98-12/99 was 62.58 MGD, exceeding design capacity.

A mixing zone has been established for chronic toxicity and other parameters. The mixing zone is 22.1 miles in length, which is the entire length of the Fenholloway River from the Buckeye Mill Point of Discharge (POD) to the river's confluence with the Gulf of Mexico (see Facility Summary in Appendix).

State permit limits for the effluent are listed in Table 1. The last impact bioassessment was completed on February 8, 1999 (FDEP 1999). The results showed that the discharge had an adverse effect on both the invertebrate and algal communities.

Methods

The purpose of this investigation was to determine the effects of the Buckeye Florida Mill wastewater discharge on the Fenholloway River. To establish discharge effects, a comparison of biological community health was made between two field designated sites: the control site, located in the Fenholloway River at US 27 and the test site, in the Fenholloway River at Carlton Bridge Road. A habitat assessment was performed in situ establishing comparability between sites. Supplemental physical and chemical data were also collected from the effluent and field sites. Effluent from the Buckeye Mill was analyzed for nutrients, metals, volatile organics, and semi-volatile organics. Data for this report was collected on April 10 & 11, 2000.

Using the invertebrate, *Ceriodaphnia dubia*, and the fish, *Cyprinella leedsi*, as test organisms, acute screening toxicity bioassays were conducted on an effluent sample. Bacterial populations were analyzed for total and fecal coliforms.

Benthic macroinvertebrate communities from all field sites were evaluated. Quantitative invertebrate collections were done using Hester-Dendy multiplate samplers incubated for 28 days. For qualitative measurements, the invertebrates were collected from different substrate types such as snags, leaf packs and aquatic vegetation using 20 discrete dip-net sweeps.

Sampling for periphyton was conducted at the two sites by incubating glass microscope slides in a standard periphytometer for 28 days. Phytoplankton samples were collected by subsurface grabs. Chlorophyll *a* was determined for both phytoplankton and periphyton communities using laboratory spectrophotometer analyses. Algal growth potential (AGP) was measured via algal response of the test organism *Selenastrum capricornutum*. All field and laboratory methods followed the Bureau of Laboratory's Standard Operating Procedures (SOP's), which may be viewed at http://www8.myflorida.com/environment/search/science/laboratories/index.html.

Several measures of macroinvertebrate and algal community health have been used to determine the effects of the discharge on those community assemblages in the receiving water. These are: algal biomass; community composition; functional feeding groups; habitat assessment; taxa richness; Ephemeroptera-Plecoptera-Trichoptera (EPT) Index; Florida Index; Stream Condition Index (SCI); and Shannon-Weaver Diversity Index. For a brief review of each of these measurements, see *Explanation of Measurements of Community Health* in the Appendix.

The Florida Department of Environmental Protection personnel involved in this investigation: Patrick O'Connor, Chris Mason and Jessica Lippincott (Northeast District), and Scott Bryan, Rob Buda, Melva Campos, Maosen Chen, Meiqin Chen, Darlene Ellis, Ken Espy, Marshall Faircloth, Shannon Gerardi, Mike Heyn, Joy Jackson, Isaura Lorenzo-Perez, Edwin Loschi, Elizabeth Miller, Chelsea Paparigian, Della Parker-Hanson, Urania Quintana, Johnny Richardson, Julie Riley, Gitta Schmitt, Karla Whiddon, and Steve Wolfe (Biology Laboratory in Tallahassee). The Point Source Studies Review Committee reviewed this report: Dr. Wayne Magley, Michael Tanski, Chuck Ziegmont, and District representatives.

Results and Discussion

Aluminum, cadmium, chromium, copper, iron, lead, nickel, silver and zinc were all detected in the effluent at levels that complied with Class III water quality standards (Table 1). No organic constituents were detected in the effluent.

Several of the physical/chemical parameters at the control and test sites were significantly different from one another. The test site conductivity (2,160 µmhos/cm) was much higher than the control site level (341 µmhos/cm) and exceeded the Class III water quality standard (Rule 62-302.530(23) FAC). This elevation appears to be a result of the elevated effluent conductivity (2,244 µmhos/cm). The effluent conductivity complied with

Table 1. Effluent limits and summary of chemistry data.

Buckeye Florida Mill	Effluent Limits	Effluent Samples	Control Site	Test Site
Organic Constituents (µg/L)				
TCDD (pg/L)	0.014 *d	None Detected	-	-
Metals (µg/L)				
Aluminum	≤ 1500 **	470	-	-
Arsenic	≤ 50 **	4.0 U	-	-
Cadmium	≤ 1.89 **b	0.16	-	-
Chromium	≤ 352.33 **b	5.2	-	-
Copper	≤ 20.60 **b	9.61	-	-
Iron	≤ 1000 **	430	-	-
Lead	≤7.27 **b	0.79	-	-
Nickel	≤ 273.13 **b	10.3	-	-
Selenium	≤ 5.0 **	1.2 U	-	-
Silver	≤ 0.07 **	0.06 I	-	-
Zinc	≤ 183.77 **b	17.6	-	-
Nutrients (mg/L)				
Ortho-phosphate	-	1.3	0.10	1.5
Total phosphorus	Report	2.2	0.17	2.2
Ammonia	Report	4.6	0.05	4.6
Un-ionized Ammonia	≤ 0.02 **	0.03	0.00	0.01
Nitrate+Nitrite	-	0.02	0.05	0.13
TKN	-	7.8	0.76	7.3
Organic Nitrogen	-	3.2 c	0.71 c	2.7 c
Total Nitrogen	-	7.82 c	0.81 c	7.43 c
General Phys-Chem Parameters				
Habitat Assessment	-	-	128	123
DO (mg/L)	Varies *	2.9	7.2	1.8
pH (SU)	6.0-8.5 *	7.3	7.0	7.1
Temperature (°C)	Report	25.9	13.4	23.3
Conductivity (µmhos/cm)	≤ 4,000 *e	2244	341	2160
Color (PCU)	-	1250	180	1250
Turbidity (NTU)	29 **	7.5	1.6	7.3
TSS (mg/L)	< 50,000 lbs/day	8.0	6.0	7.0
CBOD, 5 day (mg/L)	-	10	2 K	8
Oil and Grease (mg/L)	10.0 e	5.0 K	-	-
Flow (MGD)	Report	62.58	-	-
Hardness (mg $CaCO_3$)	-	191.5 c	-	-
AGP (mg dry wt/L)	-	58.4	8.2	67.7
Toxicity (48-hour static, screening bioassay)				
Bioassay - Fish	NOEC	100 L	-	-
Bioassay - Invertebrate	NOEC	100 L	-	-
Microbiology (# counts/100ml)				
Fecal Coliforms	800 **	40	10	20
Total Coliforms	≤ 2400 **	200	14	3500

* Permit limit
** Class III water quality standard
I - Value reported is < the MQL, and ≥ the MDL
K - Actual value is known to be less than value given
L - Actual value is known to be greater than value given
U -Not detected; value is the MDL
a - Annual average
b - Hardness based
c - Calculated
d - Daily average
e - Daily Maximum
NOEC - No observed effect concentration <100% effluent will constitute a violation of this permit

the facility's permit limit (4,000 µmhos/cm). Water temperature at the test site (23.3°C) was 9.9 °C warmer than the control site (13.4°C) an effect apparently due to the effluent (25.9°C) (see Physical/Chemical Characterization Field Data sheets in the Appendix). The dissolved oxygen decreased from 7.2 mg/L at the control site to 1.8 mg/L at the test site. This level complied with the facility's mixing zone (see Facility Summary in Appendix). The color value at the control site (180 PCU) was relatively clearer than water from the test site (1250 PCU) or the effluent (1250 PCU).

Carbonaceous Biological Oxygen Demand (CBOD) results of the effluent samples and test site samples showed an increased CBOD value at the test site (8 mg/L) compared to the control site (<2 mg/L) which appears to be an effluent effect (CBOD 10 mg/L). The effluent sample did not indicate toxicity to the fish *Cyprinella leedsi* or the invertebrate *Ceriodaphnia dubia,* during the 48-hour acute bioassay test (Appendix).

Total coliforms at the test site (3,500 counts/100m1) exceeded Class III water quality standards (Rule 62-302.530(7) FAC). All other bacteria results from the effluent, control and test sites complied with Class III standards (Table 1).

The effluent un-ionized ammonia value (0.03 mg/L) failed to comply with Class III standards (0.02 mg/L), a violation of Rule 62-302.530(3) FAC. The effluent total nitrogen (7.82 mg/L), total phosphorus (2.2 mg/L), ortho-phosphate (1.3 mg/L), ammonia (4.6 mg/L), and TKN (7.8 mg/L) concentrations were elevated and contributed to extreme nutrient enrichment at the test site (Table 1). Test site levels of these nutrients were significantly greater than values typically found in over 95% of Florida's streams (see *Typical Values for Selected Parameters in Florida Estuaries* in Appendix). Control site levels of these nutrients were between the 30th-60th percentile of other typical streams.

Table 2. Community structure of control and test sites.

Buckeye Florida Mill	Control Site	Test Site
Phytoplankton Algae		
Number of Taxa	27	20
Shannon-Weaver diversity	3.79	2.69
Chlorophyll *a* (µg/L)	1.0 U	1.0 U
Algal Density (#/mL)	305	3,698
% Blue-green	6.6	56.8
% Green	25.6	32.1
% Diatoms	64.3	7.3
Periphyton Algae		
Number of Taxa	17	4
Shannon-Weaver Diversity	2.51	1.84
Chlorophyll *a* (mg/m2)	17 A	0.4 U
Algal Density (#/cm2)	623,927	7,523
Diatom/Diatom + B-G Ratio	0.99	0.44
%Blue-green	1.0	55.6
% Diatoms	97.5	44.4
AGP (mg dry wt/L)	8.2	67.7

A - Value reported is the mean of two or more determinations
U - Not detected; value is the MDL

Algal Growth Potential (AGP) measures the bioavailable nutrients in a system. Raschke and Shultz (1987) found that AGP values above 5 mg dry wt/L create a 'problem threshold' in freshwater systems and indicate nutrient enrichment. Although the control site AGP (8.2 mg dry wt/L) exceeded the 'problem threshold', it was significantly lower than the test site value (67.7 mg dry wt/L). The effluent AGP (58.4 mg dry wt/L) also indicated significant nutrient enrichment.

There was a major shift in the periphyton community from one dominated by diatoms at the control site (98% contribution) to one dominated by blue-green algae at the test site (56% contribution) (Table 2). There was a 76% decline in taxa richness and a 26% decline in Shannon Weaver diversity at the test site compared to the control site (Table 2). These changes are probably due to the different color and nutrient levels between the study sites and represent an imbalance in the natural populations of aquatic flora (Rule 62-302.530 (48)(b) FAC). A decrease in chlorophyll *a* and algal density of the test site compared to the control site may be a result of the elevated un-ionized ammonia and color concentrations(Table 2).

Phytoplankton algal samples also showed significant shifts in algal density and dominant algal groups (Table 2). Control site samples had an algal density of 305 #/ml and were dominated by diatoms (64%), while test site samples had an algal density of 3,698 #/ml and were dominated by blue-green algae (57%).

Habitat assessment scores placed both the control site (128 points) and the test site (123 points) in the 'suboptimal' category. Qualitative macroinvertebrate sampling showed degradation at the test site compared to the control site (Table 3). The control site had 5 EPT taxa while none were collected at the test site. The control site received 23 Florida Index points and the test site did not receive any. The number of taxa decreased 95% from the control site to the test site. The percent contribution of the dominant taxon rose 41% from the control site (11%

Table 3. Community structure of control and test sites.

Buckeye Florida Mill	Control Site	Test Site
Macroinvertebrate Qualitative - Dipnet Sweeps		
% Dominant Taxon	11.0	52.0
EPT Index	5	0
Florida Index	23	0
Number of Taxa	37	2
Stream Condition Index	29	11
Community Composition		
% Coleoptera	13.0	0.0
% Diptera	53.0	48.0
% Ephemeroptera	2.0	0.0
% Gastropoda	3.0	0.0
% Odonata	5.0	0.0
% Oligochaeta	11.0	52.0
% Pelecypoda	8.0	0.0
% Trichoptera	5.0	0.0
Functional Feeding Groups		
% Burrowing Deposit Feeders	8.0	52.0
% Predators	19.0	0.0
% Surface Deposit Feeders	27.0	48.0
% Suspension Feeders/Filterers	24.0	0.0
% Scrapers	10.0	0.0
% Shredders	8.0	0.0
Macroinvertebrate Quantitative - Hester-Dendy		
% Dominant Taxon	25.3	89.9
EPT Index	2	0
Florida Index	13	0
Number of Taxa	22	6
Shannon-Weaver Diversity	3.47	0.56
Community Composition		
% Diptera	79.0	99.0
% Ephemeroptera	2.0	0.0
% Gastropoda	14.0	0.0
% Trichoptera	1.0	0.0
% Other	5.0	1.0
Functional Feeding Groups		
% Predators	10.0	0.0
% Surface Deposit Feeders	52.0	90.0
% Suspension Feeders/Filterers	5.0	0.0
% Scrapers	16.0	0.0
% Shredders	14.0	0.0

contribution) to the test site (52% contribution). The control site SCI score (29 points) placed it in the 'excellent' category while the test site SCI score (11 points) placed it in the 'severely degraded' category (see SCI worksheet in Appendix.) These results suggest severe degradation of the benthic community at the test site due to the facility's effluent and represent imbalances in the natural populations of aquatic fauna (Rule 62-302.530 (48)(b) FAC).

Quantitative measures of macroinvertebrate community health also showed extreme degradation at the test site compared to the control site (Table 3). The Hester-Dendy samples showed significant decreases in all community measures at the test site compared to the control site. For example, the number of taxa declined 73% from the control site (22 taxa) to the test site (6 taxa). The Florida Index decreased 100% from the control site (13 points) to the test site (0 points). Although the EPT Index was low at the control site (2 taxa), no EPT taxa were recovered from the test site. The Shannon-Weaver diversity decreased 84% at the test site compared to the control site and failed to comply with the Class III Biological Integrity Criterion (Rule 62-302.530(11) FAC) and further suggests an imbalance of natural aquatic flora and fauna. The percent dominant taxon increased 65% and represents conditions favorable for the dominance of nuisance species, a violation of Rule 62-302.530 (47) FAC.

Literature Cited

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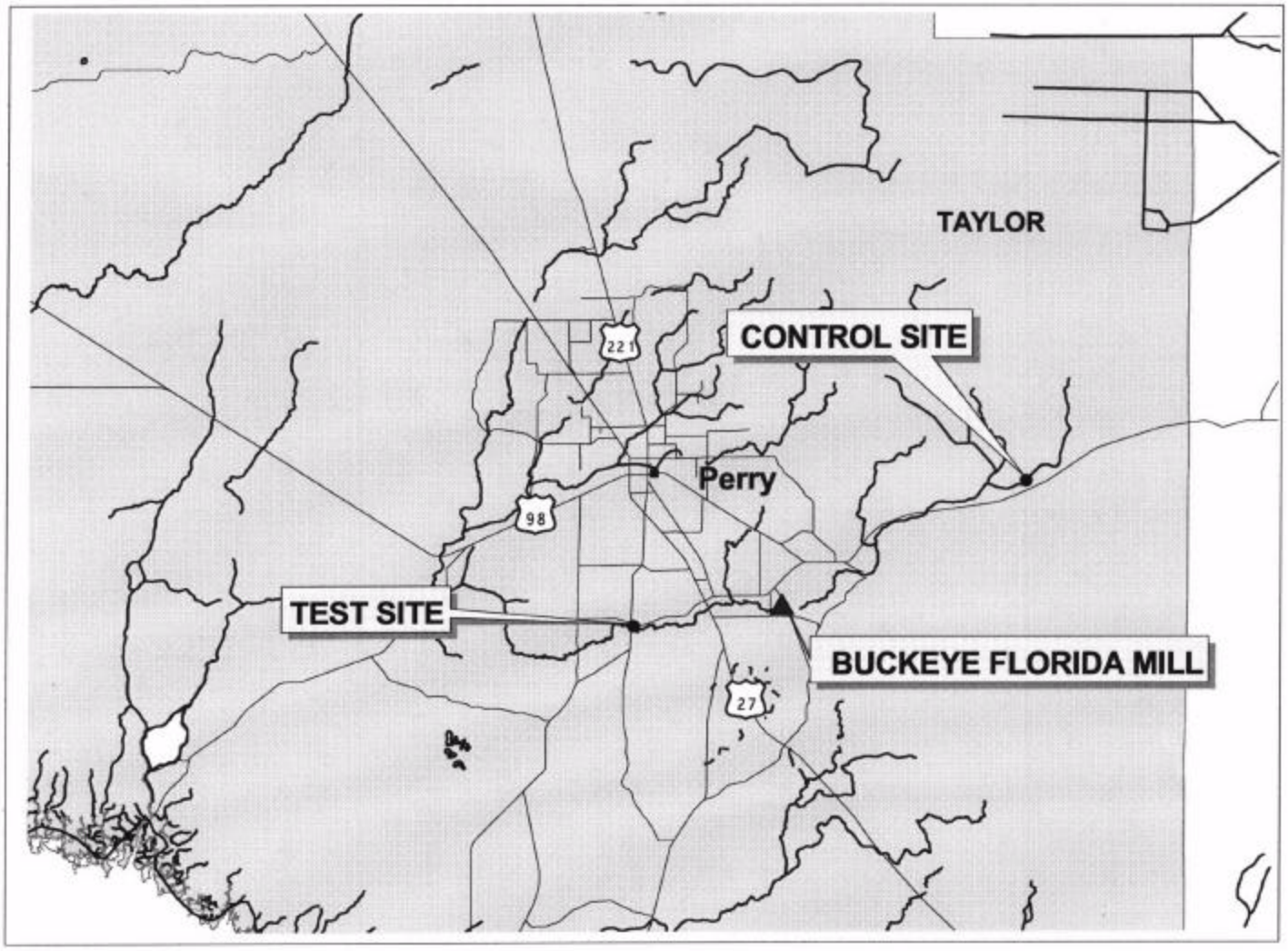
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Buckeye Pulp & Paper Mill





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Explanation of Measurements of Community Health

Different measurements of macroinvertebrate and algal community health are used to determine the biotic effects of a discharge. The measurements are briefly discussed here, (**MN**, marine, **FW**, freshwater).

MN/FW Taxa richness: Environmental stressors tend 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.

MN/FW Shannon-Weaver diversity: This index is specified in the Florida Administrative Code as a measure of biological integrity. Low diversity scores are undesirable representing conditions where only a few organisms are abundant, to the exclusion of other taxa. Excessive numerical dominance of a single type of organism (a high % contribution of the dominant taxon) is a related measure that is also associated with disturbance.

MN/FW Numbers of pollution sensitive taxa: Some organisms become rare or absent as the intensity or duration of disturbance increases. Species sensitivity data from other sources, such as Chang *et al.* (1992), Farrell (1992), Hudson *et al.* (1990), Hulbert (1990), Lenat (1993), and Whitmore (1989), are used as appropriate.

MN/FW Community structure: Substantial shifts in proportions of major groups of organisms, compared to control conditions, may indicate degradation. In marine systems, an increase in the % tubificid oligochaetes, a decrease in the % pelecypods, and a decrease in the number of polychaete taxa are all considered indicators of disturbance.

MN/FW Functional feeding groups/feeding guilds: 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).

MN/FW Algal Growth Potential: Evaluates nutrient conditions based on the premise that "maximum yield is proportional to the amount of a nutrient available" (RL Raschke and Schultz, 1987) using *Duniella tertiolecta* for marine water systems and *Selenastrum capricornutum* Printz for freshwater systems.

MN/FW 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) often indicates nutrient enriched conditions in flowing streams.

FW Habitat Assessment: Seven attributes known to have potential effects on the stream biota were 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 (160-129 points), Suboptimal (128-86 points), Marginal (85-49 points), and Poor (48-0 points).

FW The Florida Index: Some organisms become rare or absent as the intensity or duration of disturbance increases. This index, assigns points to stream-dwelling macroinvertebrates based on their sensitivity to pollution (see Ross 1990). A high Florida Index score is considered healthy.

FW Ephemeroptera-Plecoptera-Trichoptera (EPT) Index: This index sums the number of EPT taxa present. Higher EPT values are associated with healthier systems.

FW Stream Condition Index (SCI): The SCI is a composite macroinvertebrate metric developed for Florida (Barbour *et al.* 1996). This index 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

Buckeye Pulp and Paper Mill **STREAMS Percentile Distribution** (1617 stations)

Test Site

Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%	Measured
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	**3.47**
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	**37**
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	**22**
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	**1.0**
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	**17**
TKN	0.30	0.39	0.56	0.73	0.87	1.00	1.11	1.26	1.49	1.93	**>2.80**	**7.3**
Ammonia	0.02	0.02	0.04	0.05	0.06	0.08	0.11	0.14	0.20	0.34	**>0.60**	**4.6**
NO2-NO3	0.01	0.01	0.03	0.05	0.07	**0.10**	**0.14**	0.20	0.32	0.64	1.05	**0.13**
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	0.18	0.25	0.39	0.74	**>1.51**	**2.2**
Ortho Phosphate	0.01	0.01	0.03	0.04	0.05	0.08	0.11	0.17	0.27	0.59	**>1.37**	**1.5**
Turbidity	0.60	0.90	1.20	**1.45**	**2.10**	2.80	3.60	4.50	6.65	10.45	16.30	**1.6**

Control Site

H-D Diversity	**<0.84**	2.12	2.48	2.74	2.88	3.09	3.25	3.40	3.52	3.76	3.90	**0.56**
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	**2**
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	**6**
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	**1.0**
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	**0.4**
TKN	0.30	0.39	0.56	**0.73**	**0.87**	1.00	1.11	1.26	1.49	1.93	2.80	**0.76**
Ammonia	0.02	0.02	0.04	**0.05**	0.06	0.08	0.11	0.14	0.20	0.34	0.60	**0.05**
NO2-NO3	0.01	0.01	0.03	**0.05**	0.07	0.10	0.14	0.20	0.32	0.64	1.05	**0.05**
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	**0.13**	**0.18**	0.25	0.39	0.74	1.51	**0.17**
Ortho Phosphate	0.01	0.01	0.03	0.04	0.05	**0.08**	**0.11**	0.17	0.27	0.59	1.37	**0.10**
Turbidity	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	**6.65**	**10.45**	16.30	**7.3**

Units: Phytoplankton Chlorophyll *a* (µg/L), Periphyton Chlorophyll *a* (mg/m^2), Nutrients (mg/L), Turbidity (NTU), Taxa richness and diversity values are for macroinvertebrates. A percentile rank increase for parameters above the bold line indicates healthy conditions. A percentile rank increase for parameters below the bold line indicates unhealthy conditions. Adapted from Joe Hand, FDER, personal communication, 1991, (Data was collected between 1980 and 1989).

State of Florida
Department of Environmental Protection
Facility Summary

Facility Name: Buckeye Florida		**Prepared By:** Jessica Lippincott **Date:** 04/04/00
Location: (See Attached Map)	**County:** 62- Taylor	**District:** Northeast
Federal Permit No.: FL0000876 **Expiration Date:** June 1989	**State GMS #:** 3162P03219 **State Permit #:** IO62-158779 **State Expiration Date:** Administratively Extended	**Facility Type:** Industrial
Function of Facility: Dissolved Kraft Pulp and Paper Mill		
Description of treatment process: The wastewater treatment facility consists of a lift station, bar racks, 320 foot diameter primary clarifier with skimming pond, sludge pumps, 225 acres of sludge storage lagoons with conveyance structures, and a 30 acre aerated lagoon followed by a 120 acre aerated lagoon.		
Receiving Waters: Fenholloway River		**Classification:** Class III - Fresh
Design Flow: 58 MGD	**Mean Flow:** 62.58 MGD (12/98-12/99)	**Flow during survey:**
Discharge is: *Continuous* Intermittent Seasonal Rainfall Dependent Other		
Facility Mixing Zone Details: A mixing zone is established for chronic toxicity. The mixing zone is 22.1 miles in length (the entire length from the point of discharge to the Fenholloway River to the confluence of the river with the Gulf of Mexico).		

List effluent limits:

Parameter	Limit	Describe special permit conditions and permit modifications:
Flow (MGD)	Report	
BOD_5 (lbs./day)	Monthly Average <13,200	
	Daily Maximum <19,800	
Total Suspended Solids (lbs./day)	Monthly Average <25,000	
	Daily Maximum <50,000	
pH (S.U.)	Daily Minimum 6.0	
	Daily Maximum 8.5	
Oil and Grease (mg/l)	Daily Maximum 10.0	
Specific Conductance (umhos/cm)	Daily Maximum 4,000	
Temperature (°F)	Report Only	
Phenolic Compounds (mg/l)	Daily Maximum 0.2	

Total Phosphorous (mg/l)	Report Only	
Ammonia Nitrogen (mg/l)	Report Only	
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) (pg/L)	Daily Average 0.014	
Dissolved Oxygen (mg/l)	Varies	The DO criteria for the Fenholloway River at the SR 356 Bridge shall be 0.3 mg/l or greater more than 50% of the time on an annual basis when the flow at the bridge is 250 cfs or greater. The DO at the SR 356 Bridge shall be 0.1 mg/l or greater 99% of the time on an annual basis regardless of flow.
Toxicity		**Type of test**: 7-Day Chronic/ Single. **Concentration Species**: Ceriodaphnia dubia and Pimephales Promelas. **Effluent concentrations**:0% and 100% sampling protocol: For each set of tests, a minimum of three different 24-hour composite samples of final effluent should be collected and used per sampling schedule. **Toxicity triggers**: NOEC<100% for either species **Follow up**: Initiate two additional chronic toxicity tests based on the species indicating unacceptable toxicity and the limitations referenced above. These tests will be conducted using 0%, 6.25%, 12.5%, 25%, 50%, and 100% effluent concentrations. The first test should begin within two weeks of the end of the "routine" test and the second test should be conducted two weeks later. If either or both of the additional tests are invalid, additional tests are to be conducted every two weeks until two valid tests are completed. **Type of test**: 96-hour static acute toxicity test. **Species**: Ceriodaphnia dubia and Pimephales Promelas. **Toxicity triggers**: Mortality >20% in the 100% effluent. **Follow up**: Initiate a definitive acute static renewal toxicity tests using grab samples at 0%, 6.25%, 12.5%, 25%, 50%, and 100% effluent concentrations. A minimum of three (3) 96-hour additional definitive tests are required to be conducted within 30 days from the date that any acute toxicity test indicates toxicity. The first test should begin within 7 days of the "routine" test. The second and third test should be conducted 7 days after the first additional test. Permittee must submit a POS within 60 days and will implement the POS within 30 days of approval.

Description of permitted outfall: The outfall discharges to the Fenholloway River at mile point 24.6

upstream of the river mouth.

List permit violations (DMR data) and plant upsets that occurred at the plant within the past year: From the abnormal event log, two instances have occurred. On 1/26/99, the power supply panel at the outfall flow meter was replaced due to shortages. Again on 11/30/99 and 12/1/99, the oil and grease samples taken on 11/8/99 were reading 830 mg/l. A duplicate sample was evaluated at 240 mg/l. From these high values, a different method, Method 413.2 (Infrared), was used and results were 1.8 mg/l. All samples were from the Fenholloway river.

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions: The last impact bioassessment was completed on February 8, 1999. The results show that the discharge had an adverse effect on both the benthic and algal communities. Both the Hester-Dendy and ponar samples showed extreme degradation of the macroinvertebrate communities health at the test site compared to the control site. The periphyton algae shifted from one dominated by diatoms at the control site to one dominated by blue-green algae at the test site.

Discuss MOR trends to prior data; is the trend improving or declining: The trend appears to be relatively consistent.

Additional Information: N/A

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5/21/98)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE:	TIME:	RECEIVING BODY OF WATER:
	22050001	4/10/00	1035	

REMARKS:	COUNTY:	LOCATION:	FIELD NAME:
	TAYLOR	FENHollowAY River @ US 27	Control Site

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commericial	Industrial	Other (speci
15%	81%		1%	1%		1%	1%

Local Watershed Erosion: None: ☐ Slight: ☒ Moderate: ☐ Heavy

Local Watershed NPS Pollution: No evidence: ☐ Slight: ☐ Moderate potential: ☐ Obvious sources

Width of riparian vegetation (m) on least buffered side: >18

List & map dominant vegetation on back

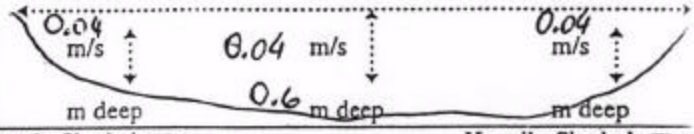
Artificially Channelized ☒ NO ☐ YES — none

Artificially Impounded

High Water Mark: 1.0 + 0.6 = 1.6 (m above present water level) (present depth in m) (m above bed)

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

1-5 m wide



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 Silt smothering: none Other: ☐

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	5	4	DipNet	Sand	80	4	DipNet
Leaf Packs or Mats	5	4	DipNet	Mud/Muck/Silt			
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots	10	4	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):	Time		Secchi (m
Top								
Mid-depth	0.3	13.38	6.97	7.24	341	1035		0.6L
Bottom								

System Type: Stream: ☒ 1st - 2nd order Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☐

Water Odors: Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☐

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

Clarity: Clear: ☒ Slightly Turbid: ☐ Turbid: ☐ Opaque: ☐

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

Weather Conditions/Notes:
Cool Clear AM. TEMPS 40's
Recent RAIN EVENT

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

Sampling Team: O'CONNOR, MASON

Signature: Patrick W O'Connor

Date: 4/10/

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
	22050001	4/10/00	

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
Cool clear, Recent RAIN EVENT 40° AM TEMP	TAYLOR	FENHOLLOWAY RIVER @ US 27	Control Site

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components				
Substrate Diversity [15]	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 [13]	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 [5]	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 [13]	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent 5 4 3 2 1
Primary Score [46]				
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 Right Bank [9] Left Bank [9]	Stable. No evidence of erosion or bank failure. Little potential for future problems. 10 9	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 8 7 6	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 5 4	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 3 2 1
Riparian Buffer Zone Width Right Bank [10] Left Bank [10]	Width of native vegetation (least buffered side) greater than 18 m 10 9	Width of native vegetation (least buffered side) 12 m to 18 m 8 7 6	Width of native vegetation 6 to 12 m, human activities still close to system 5 4	Less than 6 m of native buffer zone due to intensive human activities 3 2 1
Riparian Zone Vegetation Quality Right Bank [10] Left Bank [10]	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions. 10 9	50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 8 7 6	25% to 50% of riparian zone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 5 4	Less than 25% of 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. 3 2 1
Secondary Score [78]				

[128] TOTAL SCORE

ANALYSIS DATE:	ANALYST:	SIGNATURE:
4/10/00	O'CONNOR	Patrick O'Connor

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5/21/98)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE:	TIME:	RECEIVING BODY OF WATER:
	22050003	4/10/00	1400	

REMARKS:	COUNTY:	LOCATION:	FIELD NAME:
	TAYLOR	FENHOLLOW RIVER @ CARLTON BRIDGE RD	TEST SITE

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commericial	Industrial	Other (specif
3%	80%			12%	1%	4%	

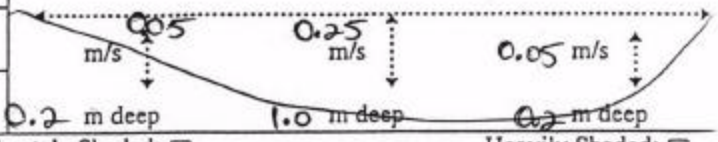
Local Watershed Erosion: None: ☐ Slight: ☒ Moderate: ☐ Heavy:

Local Watershed NPS Pollution: No evidence: ☐ Slight: ☐ Moderate potential: ☒ Obvious sources:

Width of riparian vegetation (m) on least buffered side: >18M

List & map dominant vegetation on back

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



Artificially Channelized ☐ NO none
Artificially Impounded ☐ YES

High Water Mark: 1.0 + 1.0 = 2.0
(m above present water level) (present depth in m) (m above bed)

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

SEDIMENT SUBSTRATE

Pulp Mill Effluent

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

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

Sediment Deposition: Sludge: ☐ Sand smothering: none ~~Silt smothering~~ none Other: ☐

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	5	7	DIPNET	Sand	88	3	DIPNE
Leaf Packs or Mats	2	7	DIPNET	Mud/Muck/Silt			
Aquatic Vegetation				Other: clay	5	3	DIPNET
Rock or Shell Rubble				Other:			
Undercut banks/Roots				Draw aerial view sketch of habitats found in 100 m section.			

Water Quality	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):	Time		Secchi (m)
Top								
Mid-depth	0.5	23.32	7.10	1.84	2160	1400		0.1
Bottom								

System Type: Stream: ☒ 1st - 2nd order Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☐

Pulp Mill Effluent od

Water Odors: Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☒ Other: ☒

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

Clarity: Clear: ☐ Slightly Turbid: ☐ Turbid: ☐ Opaque: ☒

Color: Tannic: ☒ Green (algae): ☐ Clear: ☐ Other: ☒ Extremely High Co

Weather Conditions/Notes:
Cool Clear Am 40°s
RECENT RAINFALL EVENT

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

Sampling Team: MASON, O'CONNOR

Signature: Patrick W O'Conn

Date: 4/10/00

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
	22050003	4/10/00	

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
Cool Clear AM TEMP 40°S RECENT RAIN EVENT	TAYLOR	FEN HOLLOWAY RIVER @ CARLTON BRIDGE RD.	TEST SITE

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components **Substrate Diversity** [9]	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 [6]	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 [15]	Max. observed at typical transect: >0.25 m/sec. but < 1 m/sec 20 19 18 17 16	Max. observed at typical transect: 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed at typical transect: 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed at typical transect <0.05 m/sec, or spate occurring; > 1 m/sec 5 4 3 2 1
Habitat Smothering [10]	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent 5 4 3 2 1
Primary Score [40]				
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 Right Bank [9] Left Bank [9]	Stable. No evidence of erosion or bank failure. Little potential for future problems. 10 9	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 8 7 6	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 5 4	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 3 2 1
Riparian Buffer Zone Width Right Bank [10] Left Bank [10]	Width of native vegetation (least buffered side) greater than 18 m 10 9	Width of native vegetation (least buffered side) 12 m to 18 m 8 7 6	Width of native vegetation 6 to 12 m, human activities still close to system 5 4	Less than 6 m of native buffer zone due to intensive human activities 3 2 1
Riparian Zone Vegetation Quality Right Bank [8] Left Bank [8]	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions. 10 9	50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 8 7 6	25% to 50% of riparian zone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 5 4	Less than 25% of 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. 3 2 1
Secondary Score [74]				

TOTAL SCORE [123]

ANALYSIS DATE:	ANALYST:	SIGNATURE:
4/10/00	O'CONNOR	Patrick W O'Connor

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Buckeye
County: Taylor
Contact / District: Jim Maher / Northeast-JAX
NPDES Permit #: FL0000876
LIMS Sample #: 446601 **LIMS Job #:** TLH-2000-04-11-2401
sample log 5-2-00
Test Type: Screening I Definitive
Static I Static Renewal I Flow-through
Test Number: 2 of 2

Sample Collection: Date 4/10/00 Time 15:00
Test Beginning: Date 4/11/00 Time 10:30
Test Ending: Date 4/13/00 Time 11:15
Organism Batch #: 26 **Diluent Batch #:** Well
Organism Age: ~~12~~ days SRT toxicant batch #: —
4th brood Purchased 11
Test organism: C. dubia

Remarks:

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
CTRL A	B9	5	5	5	8.0	8.3	8.5	25.4	24.5	25.3	7.8	8.0	8.4	240	280	275
B	B10	5	5	5	8.0	8.3	8.5	25.3	24.1	24.3	8.0	7.9	8.4	250	260	260
C	B11	5	5	5	8.0	8.4	8.5	25.0	24.0	23.8	8.0	7.9	8.2	255	250	260
D	B12	5	5	5	8.0	8.4	8.5	24.8	23.9	23.8	8.1	8.1	8.6	255	250	255
100% A	B13	5	5	5	7.5	7.9	8.0	24.8	24.5	24.2	6.2	6.6	6.9	1960	1990	2120
B	B14	5	5	5	7.5	7.9	8.0	24.8	24.5	24.9	6.1	6.4	6.8	1990	2140	2220
C	B15	5	5	5	7.5	7.9	8.0	24.7	24.3	23.8	6.1	6.4	6.6	2070	2170	2230
D	B16	5	5	5	7.5	7.9	8.0	24.7	24.3	23.5	6.0	6.2	6.5	2130	2130	2210
measured by:		SG	KL	DPH	DPH	DPH	DPH	DPH	DPH	DPH	DPH	DPH	DPH	DPH	DPH	DPH
recorded by:		DPH	KL	DPH	SG	KL	SG	SG	KL	SG	SG	KL	SG	SG	KL	SG

*152
24.1
23.9
24.5
DPH 4/11/00 FO

FO - further observation

Investigators' Signatures
Shannon Gerardi
Marshall Faircloth

Temperature Range °C
Incubator # 3 24.5°-25.5°C
Room B246 24.5°-26.5°C

Salt Water (Well Water) | 20% Min Water

Water Quality Parameters	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):	NOT Measured			MF
Lab Total Residual Cl2 (mg/L):	<0.03	DR100	DPH	DPH
Alkalinity (mg/L as $CaCO_3$):	180	Hach	MF	SG
Hardness (mg/L as $CaCO_3$):	200	Hach	MF	SG
Total ammonia (mg/L as N):	5.00	Nessler	DPH	DPH
Salinity:	21	4561	MF	DPH

reviewer form updated 3/3/99

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Buckeye
County: Taylor
Contact / District: Jim maher
NPDES Permit #: FL0000876
LIMS Sample #: 446601 LIMS Job #: TLH-20002004-11-21-01
sample log 5-2.00
Test Type: (Screening) / Definitive
(Static) / Static Renewal / Flow-through
Test Number: 1 of 2

Sample Collection: Date 4/10/00 Time 15:00
Test Beginning: Date 4/11/00 Time 10:30
Test Ending: Date 4/13/00 Time 11:05
Organism Batch #: #20 Diluent Batch #: 10
Organism Age: <24 hrs SRT toxicant batch #:
Test organism: Cerio Dia
Remarks:

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
CTRL A	A	5	5	5	8.3	—	8.3	24.6	—	24.6	8.1	—	8.1	170	—	230
B	B	5	5	5	—	—	8.3	—	—	24.3	—	—	8.3	—	—	230
C	C	5	5	5	—	—	8.3	—	—	24.3	—	—	8.2	—	—	235
D	D	5	5	5	—	—	8.4	—	—	24.3	—	—	8.3	—	—	240
100% A	A	5	5	5	7.5	—	8.4	24.5	—	24.6	6.0	—	7.5	1830	—	2080
B	B	5	5	5	—	—	8.4	—	—	24.7	—	—	7.7	—	—	2370
C	C	5	5	5	—	—	8.4	—	—	24.8	—	—	7.6	—	—	2440
D	D	5	5	5	—	—	8.4	—	—	24.8	—	—	7.7	—	—	2480
measured by:		DPH	DPH	SG	DPH	—	DPH	DPH	—	DPH	DPH	—	DPH	DPH	—	DPH
recorded by:		SG	SG	SG	SG	—	SG	SG	—	SG	SG	—	SG	SG	—	SG

Investigators' Signatures
D. McPherson Hasa
Shannon Gerard
Tracy Peterson
Christopher Fairbrother

Temperature Range °C
Incubator # 2 25.5°–26.5°C
Room 3246 24.5°–26.5°C

Water Quality Parameters	Well Water	20% Min Water	Sample	Method	Measured by	Verified by
Salt Water						
Field Total Residual Cl2 (mg/L):			NOT MEASURED			MF
Lab Total Residual Cl2 (mg/L):		<0.03	<0.03	DR 100	DPH	DPH
Alkalinity (mg/L as $CaCO_3$):		74	180	Hach	MF	SG
Hardness (mg/L as $CaCO_3$):		85	200	Hach	MF	SG
Total ammonia (mg/L as N):		<0.017	5.00	Nessler	DPH	DPH
Salinity:		0	≈1	YSI	MF	DPH

reviewer

Form updated 3/3/99

Stream Condition Index

Buckeye Florida Mill

Control Site

Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	Value	5	3	1	Score
Total Number of Taxa	**37**	≥27	26-14	<14	**5**
EPT Index	**5**	≥6	5-3	<3	**3**
# Chironomid Taxa	**16**	≥9	8-5	<5	**5**
% Contribution of Dominant Taxon	**11**	≤25	26-62	>62	**5**
% Diptera	**79**	-	≤60	>60	**1**
Florida Index	**23**	≥13	12-7	<7	**5**
% Suspension feeders/Filterers	**24**	≥13	12-7	<7	**5**
Total Score		**Panhandle**			**29**
Interpretation of Scores		**Excellent**			**27-33**
		Good			21-26
		Poor			14-20
		Severely Degraded			7-13

Test Site

Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	Value	5	3	1	Score
Total Number of Taxa	**2**	≥27	26-14	<14	**1**
EPT Index	**0**	≥6	5-3	<3	**1**
# Chironomid Taxa	**1**	≥9	8-5	<5	**1**
% Contribution of Dominant Taxon	**52**	≤25	26-62	>62	**3**
% Diptera	**48**	-	≤60	>60	**3**
Florida Index	**0**	≥13	12-7	<7	**1**
% Suspension feeders/Filterers	**0**	≥13	12-7	<7	**1**
Total Score		**Panhandle**			**11**
Interpretation of Scores		Excellent			27-33
		Good			21-26
		Poor			14-20
		Severely Degraded			**7-13**

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

Periphyton taxa list and densities (#/cm^2) for Buckeye Pulp and Paper Mill, collected via glass microscope slides in the Fenholloway River, on 11 April 2000.

	Control Site	Test Site
Bacillariophyceae		
Achnanthes sp.	–	418
Achnanthes exigua	13148	–
Achnanthes lanceolata	80083	–
Eunotia sp.	63947	–
Eunotia flexuosa	61556	–
Eunotia glacialis	2391	–
Gomphonema parvulum	16734	–
Melosira sp.	2391	–
Navicula cryptocephala	1196	–
Navicula minima	1196	–
Navicula placentula	17929	–
Nitzschia gracilis	1196	–
Synedra sp.	42432	–
Undetermined *Pennales* sp.	–	1254
Chlorophyceae		
Characium sp.	1196	–
Cosmarium sp.	1196	–
Undetermined Chlorophyceae	2391	–
Cyanophyceae		
Anabaena sp.	598	–
Dactylococcopsis sp.	–	836
Lyngbya sp.	1196	418
Oscillatoria sp.	598	836
Synechococcus sp.	598	–

Phytoplankton taxa list and densities (#/mL) for Buckeye Pulp and Paper Mill, collected via water bottle grabs from the Fenholloway River, on 11 April 2000.

	Control Site	Test Site
Bacillariophyceae		
Achnanthes exigua	2	7
Achnanthes lanceolata	6	–
Aulacoseira granulata angustissima	4	–
Caloneis sp.	–	7
Cocconeis placentula	–	7
Cyclotella sp.	2	13
Diatomaceae	–	7
Eunotia sp.	9	–
Eunotia glacialis	1	–
Gomphonema parvulum	–	26
Melosira sp.	10	–
Navicula capitata capitata	1	–
Navicula constans constans	9	–
Navicula cryptocephala	4	–
Navicula cryptotenella	1	–
Navicula minima	1	–
Navicula pupula	1	–
Nitzschia sp.	10	32
Nitzschia amphibia	1	–
Nitzschia gracilis	15	–
Nitzschia palea	2	13
Nitzschia reversa	19	–
Pinnularia sp.	3	–
Stauroneis anceps	–	20
Synedra sp.	–	7
Chlorophyceae		
Ankistrodesmus falcatus	–	464
Chlamydomonas sp.	12	7
Chlorella sp.	–	20
Chlorococcum sp.	1	20
Coelastrum sp.	–	13
Micractinium sp.	–	52
Scenedesmus sp.	1	–
Undetermined Chlorophyceae	26	20

Chrysophyceae		
Mallomonas sp.	–	71
Cryptophyceae		
Chroomonas sp.	1	–
Cryptomonas sp.	2	–
Cyanophyceae		
Anabaena sp.	2	–
Chroococcaceae	–	13
Lyngbya sp.	3	–
Merismopedia minima	–	644
Microcystis sp.	–	13
Oscillatoria sp.	3	335
Spirulina sp.	–	13
Synechococcus sp.	3	32
Euglenophyceae		
Euglena sp.	1	–
Trachelomonas sp.	2	–

Benthic macroinvertebrate taxa list for Buckeye Pulp and Paper Mill, collected via Hester-Dendy artificial substrates in the Fenholloway River, on 11 April 2000. Densities, in number/m^2, represent the mean of three replicates.

	Control Site	Test Site
Coleoptera		
Ancyronyx variegatus	4	–
Dineutus sp.	–	3
Diptera		
Ablabesmyia mallochi	11	–
Ablabesmyia rhamphe grp.	4	–
Chironomidae	2	41
Chironomus sp.	8	424
Corynoneura sp.	3	–
Corynoneura sp. C Epler	2	–
Dicrotendipes sp.	2	–
Dicrotendipes modestus	4	–
Glyptotendipes sp.	2	–
Goeldichironomus sp.	–	2
Kiefferulus sp.	2	–
Labrundinia sp.	3	–
Labrundinia pilosella	8	–
Nanocladius sp.	2	–
Polypedilum fallax	57	–
Tanytarsus sp.	2	–
Tanytarsus sp. A Epler	2	–
Tanytarsus sp. G Epler	2	–
Tanytarsus sp. L Epler	7	–
Tanytarsus sp. M Epler	8	–
Tribelos fuscicornis	10	–
Tribelos jucundum	45	2
Ephemeroptera		
Stenonema sp.	3	–
Stenonema exiguum	2	–
Gastropoda		
Ancylidae	12	–
Ferrissia sp.	7	–
Ferrissia hendersoni	13	–
Odonata		

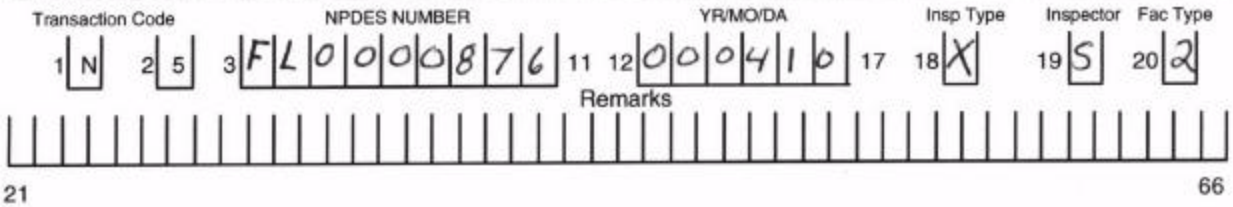
Argia sp.	3	–
Argia tibialis	2	–
Oligochaeta		
Dero digitata complex	2	–
Oligochaeta		
Limnodrilus hoffmeisteri	–	2
Trichoptera		
Pycnopsyche sp.	3	–

Benthic macroinvertebrate taxa list for Buckeye Pulp and Paper Mill, collected via 20 discrete dip net sweeps in the Fenholloway River, on 11 April 2000.

	Control Site	Test Site
Coleoptera		
Ancyronyx variegatus	1	–
Dubiraphia vittata	3	–
Elmidae	3	–
Microcylloepus pusillus	2	–
Scirtes sp.	1	–
Stenelmis sp.	3	–
Diptera		
Ablabesmyia mallochi	1	–
Ablabesmyia rhamphe grp.	2	–
Ceratopogonidae	1	–
Chironomidae	1	–
Chironomus sp.	–	40
Clinohelea sp.	1	–
Corynoneura sp.	2	–
Culicoides sp.	1	–
Dicrotendipes modestus	1	–
Labrundinia pilosella	7	–
Paratanytarsus dissimilis	1	–
Polypedilum fallax	2	–
Procladius sp.	1	–
Rheocricotopus robacki	1	–
Rheotanytarsus exiguus grp.	9	–
Simulium sp.	1	–
Stenochironomus sp.	2	–
Tanytarsus sp. L Epler	1	–
Tanytarsus sp. M Epler	5	–
Tribelos fuscicornis	4	–
Tribelos jucundum	4	–
Xenochironomus xenolabis	2	–
Ephemeroptera		
Acerpenna pygmaea	1	–
Heptageniidae	1	–
Gastropoda		

Ancylidae	2	–
Odonata		
Argia sp.	2	–
Argia tibialis	1	–
Gomphus sp.	1	–
Macromia georgina	1	–
Pelecypoda		
Undetermined Pelecypoda	7	–
Oligochaeta		
Aulodrilus pigueti	2	–
Dero digitata complex	2	–
Limnodrilus hoffmeisteri	5	43
Naididae	1	–
Trichoptera		
Pycnopsyche sp.	2	–
Triaenodes sp.	1	–
Triaenodes perna	1	–
Triaenodes sp. A	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)

