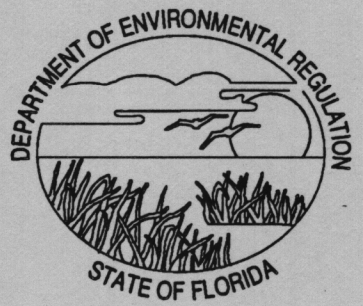
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#40



Biological Assessment of
Georgia-Pacific Corporation
Putnam County
NPDES #FL0002763
Sampled 24 July 1991

FILE COPY
DO NOT REMOVE

January 1992

Biology Section
Division of Technical Services

Department of Environmental Regulation
Results of Fifth Year Inspections

Discharger: Georgia-Pacific
County: Putnam
NPDES Number: FL0002763
State Permit Expiration Date: 1 December 1992

Toxics Sampling Inspection (XSI)

Date Sampled: 24 July 1991

Results: Aluminum (5270 µg/L), Iron (1330 µg/L), Mercury (< 0.2 µg/L), Silver (< 0.2 µg/L), and Zinc (28 µg/L). The iron concentration violates Class III Standards. Organics analysis yielded the tentative identification of aliphatic and aromatic hydrocarbons at estimated concentrations of 60 and 20 µg/L, respectively.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 22-26 July 1991

Results: Chronically toxic to *Ceriodaphnia dubia*, with an LOEC of 50%. This is a violation of 17-302.510(3)(p) FAC.

Impact Bioassessment Inspection (IBI)

Date Sampled: 21 August 1991

Results: Benthic macroinvertebrate communities were degraded at the test site. A substantial drop in the Florida Index was observed at the test site, indicating that it was less hospitable to pollution sensitive organisms. The control site population consisted of 55% ephemeropterans and 27% trichopterans, while the impact site was dominated by dipterans (82%), mostly the pollution tolerant chironomid midge, *Dicrotendipes simpsoni*. Periphyton algae also underwent community shifts, indicating extreme degradation. The control site supported a diatom-dominated assemblage represented by many taxa (39) while 17 taxa were collected at the test site, with blue-green algae in the majority. This displacement of pollution sensitive taxa by pollution tolerant forms (in both the invertebrates and algae) violated 17-302.560(19) FAC, Imbalances of Aquatic Flora and Fauna.

Water Quality Inspection (WQI)

Date Sampled: 24 July 1991

Results: Total coliform standards were violated at both stations, with counts of 8,000 and 14,000 organisms/100 ml at control and test sites, respectively. Concentrations of TKN in the effluent (2.8 mg/L) and at the test site (4.2 mg/L) were higher than 95% of all other Florida streams. TKN at the control site was also elevated. AGP and chlorophyll *a* at the test site appeared suppressed by the highly colored effluent and receiving waters.

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.

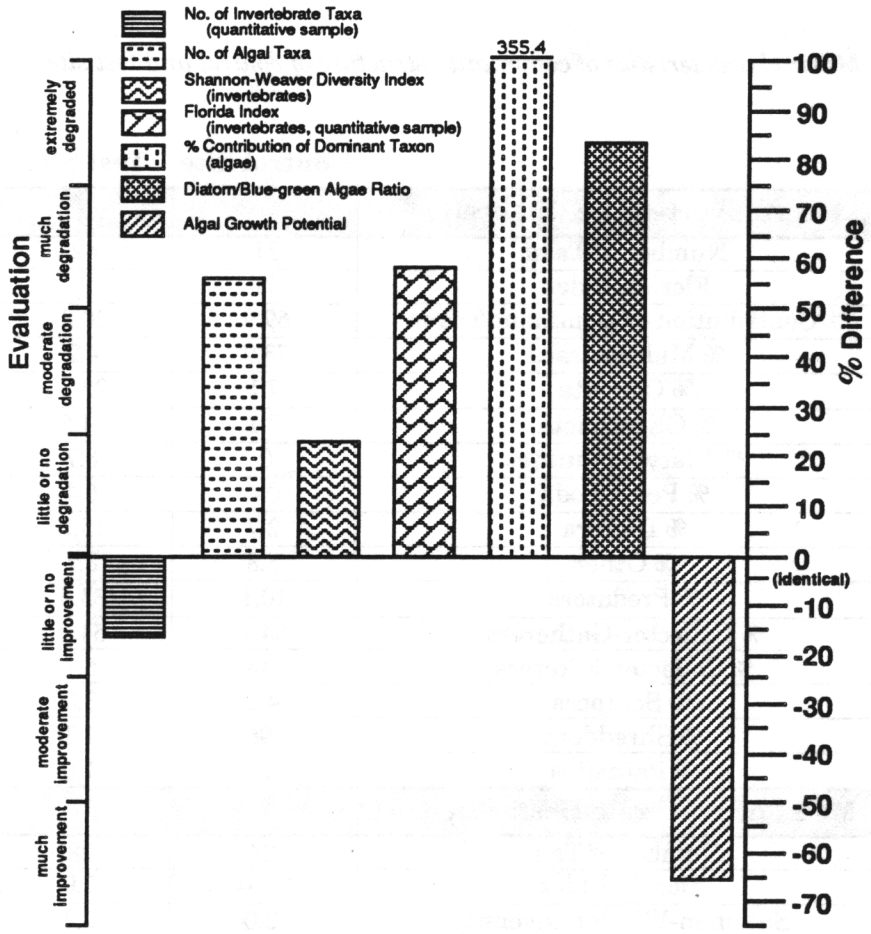
Introduction

The Georgia-Pacific Corporation, formerly Hudson Pulp and Paper, is located on State Road 216, about three miles north of Palatka in Putnam County. The mill produces 950 tons of paper products per day using both unbleached kraft and bleached pulp processes. The process wastewater comprises about one half of the effluent. Treatment prior to discharge includes primary clarification and 40 days nominal retention in more than 900 acres of anaerobic, facultative, and aerobic lagoons. Also, liquid oxygen is injected into two effluent side streams at a rate which is supposed to counteract the BOD of the discharge. The permit specifies that dissolved oxygen be maintained at 4.0 mg/L during the months of May through October, and at 5.0 mg/L from November through April. The permit limits for dissolved oxygen are consistent with Site Specific Alternative Criteria granted to this facility. Effluent is discharged at an average rate of 40 MGD to Rice Creek, a tributary of the St. Johns River.

In 1975 and 1976, the plant exceeded TSS and BOD limits, but no current permit violations have been noted. Over the last year, some high zinc values have been measured within the mixing zone. Studies to determine the zinc concentration outside the mixing zone are due to be conducted by the facility in the future. The Biology Section has run several acute static toxicity bioassays between June, 1981 and April, 1990. A variety of organisms have been used, and no toxicity was observed in any of the tests.

Major characteristics of community structure of control and test sites.

	Control Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	31	42
Florida Index	11	9
% Contribution of Dominant Taxon	69.9	20.8
% Malacostraca	73.9	4.2
% Odonata	7.1	22.3
% Oligochaeta	7.1	34.5
% Platyhelminthes	0	8.7
% Pelecypoda	0.4	6.4
% Diptera	2.7	15.2
% Other	8.8	8.7
% Predators	10.1	33.5
% Collector-Gatherers	84.1	54.0
% Collector-Filterers	.44	6.7
% Scrapers	4.2	3.0
% Shredders	.96	1.3
% Parasites	.22	1.0
Macroinvertebrate Hester-Dendy		
Number of Taxa	24	28
Florida Index	17.0	7.0
Shannon-Weaver Diversity	3.0	2.3
% Diptera	9.1	82.3
% Ephemeroptera	55.3	5.2
% Trichoptera	26.9	0.5
% Gastropoda	0	9.7
% Coleoptera	6.7	0.3
% Oligochaeta	0.5	1.0
% Other	1.5	1.0
% Predators	9.5	12.1
% Collector-Gatherers	36.1	41.7
% Collector-Filterers	16.9	32.3
% Scrapers	31.5	12.7
% Shredders	5.9	1.3
% Parasites	0	0
Periphyton Algae		
Number of Taxa	39	17
% Contribution of Dominant Taxon	14.8	67.4
Diatom/B-G Abundance Ratio	0.95	0.16
% Blue-green	4.9	81.9
% Green	2.6	1.4
% Diatoms	92.5	16.0
% Other	0	0.7
Algal Growth Potential (mg dry wt/l)	2.195	0.746



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

Methods

The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a control site (located in Rice Creek at State Road 100) and a test site (the area down gradient of the discharge) (see map in Appendix). 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. A chronic toxicity bioassay, using *Ceriodaphnia dubia* as the test organism, was performed on an effluent sample (EPA 1988). The effluent was analyzed for organic constituents (base neutrals, acid extractables, and pesticide extractables), metals, and nutrients. Additionally, nutrient analyses were performed on 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 control 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 the percent contribution of dominant taxon, 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: Mike Tanski (DER NPDES Section) , Jim Wright (DER Northeast District), and Lyn Burton, Russel Frydenborg, Kathleen Lurding, and Sandy McClure (Tallahassee Biology Laboratory).

Results and Discussion

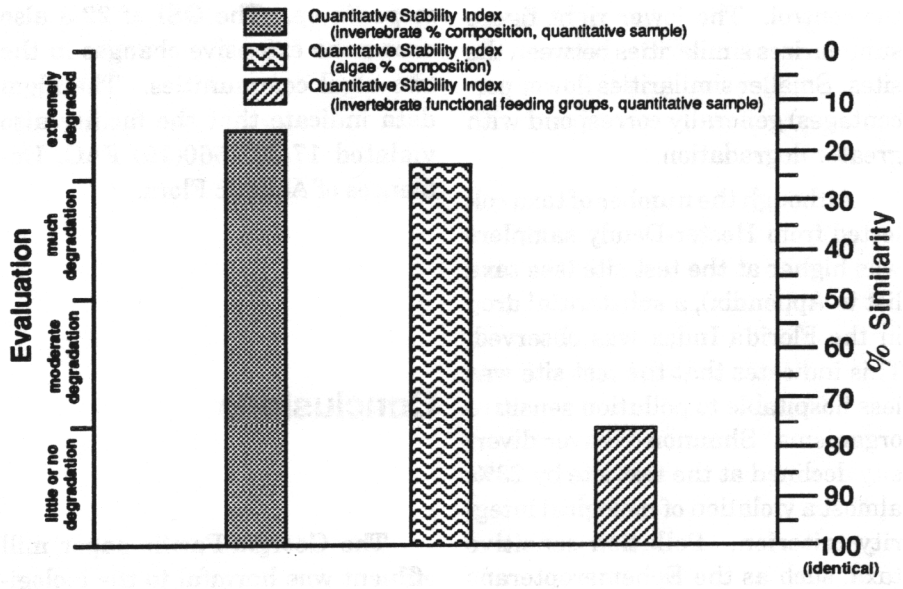
Habitat quality was considered good to excellent, with habitat scores of 77 and 80 for control and test sites, respectively (Appendix). The control site had greater water velocity, and the test site scored higher for its bottom substrate characteristics. Based on all areas of habitat assessment, both sites should be able to support a healthy and diverse macroinvertebrate community. Although both stations were located in areas surrounded primarily by forest, Rice Creek at the test site was considerably wider and deeper than the control. Also, the dissolved oxygen at the test site was 16.2 mg/L (a result of the liquid oxygen injected into the effluent), while that of the upstream site was 5.4 mg/L. Specific conductance and pH were also higher at the impact station (see chemistry summary table).

The effluent sample was chronically toxic to the water flea, *Ceriodaphnia dubia*, producing an LOEC (lowest observed effect concentration) of 50%. The NOEC was 25% (Appendix). This is a violation of 17-302.510(3)(p) FAC.

Metals analysis of the effluent yielded the following results: aluminum (5270 µg/L), iron (1330 µg/L), mercury (< 0.2 µg/L), silver (< 0.2 µg/L), and zinc (28 µg/L). The iron concentration is a violation of Class III standards. Silver and mercury detection limits were higher than their respective Class III limits. Therefore, no definitive statements regarding violations of standards for these metals can be made. Analysis of organic constituents indicated the presence of aliphatic and aromatic hydrocarbons at 60 µg/L and 20 µg/L, respectively. Although these values are low, it is possible that these hydrocarbon components of the effluent contributed to the observed chronic toxicity.

With the exception of TKN, nutrients were not unusually elevated, either in the effluent, the control site, or the test site (see Chemistry table in Appendix)., Concentrations of TKN in the effluent (2.8 mg/L) and at the test site (4.2 mg/L) were higher than 95% of all other Florida streams. TKN at the control site (2.6 mg/L) was above 90% of other stream systems. Abundant leaf litter is one source of TKN to Rice Creek. It is possible that the elevated TKN found at the downstream site was due to sediment inputs, as considerable detritus was observed there.

Algal growth potential (AGP) was typically low at the control site, 2.195 mg dry wt/L. Based on the nutrient concentrations, the AGP below the outfall would be expected to be similar or slightly higher. Instead, algal dry weight downstream was 0.746 mg dry wt/L, probably due



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

to inhibition of algal growth by the highly colored water. It is thought that the extreme color of the effluent also interfered with chlorophyll *a* readings at the test site (from 14.9 mg/m^2 at the control to unreadable at the test site).

Total and fecal coliform bacteria were analyzed by the Dept. Health and Rehabilitative Services on waters from the control and test sites. Total coliform standards were violated at both stations, with counts of 8,000 and 14,000 organisms/100 ml at control and test sites, respectively. Fecal coliform levels were within the legal limit at both sites (Appendix).

Quantitative measures of benthic macroinvertebrate community health indicated moderate degradation at the test site (see table and figures). The upper left figure 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 lower right figure summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation.

Although the number of taxa collected from Hester-Dendy samplers was higher at the test site (see taxa list in Appendix), a substantial drop in the Florida Index was observed. This indicates that the test site was less hospitable to pollution sensitive organisms. Shannon-Weaver diversity declined at the test site by 23%, almost a violation of biological integrity criterion. Pollution sensitive taxa, such as the Ephemeropterans and Trichopterans, were abundant at the control site but decreased by an order of magnitude downstream. The test site was dominated by Dipterans (82.3%). The dominant taxon, *Dicrotendipes simpsoni*, is known to be tolerant of organic enrichment and toxic wastes (Hudson *et al.* 1990). This may be interpreted as a violation of 17-302.560(19) FAC, Imbalances of Aquatic Fauna. The Qualitative Stability Index (QSI) for percent composition (16.6%) further emphasizes the extreme disparity between these two macroinvertebrate populations.

The periphyton community was highly degraded below the paper mill outfall. Species richness decreased by 56%, and the percent contribution of dominant taxon was more than three-fold higher downstream. The upstream community was dominated by diatoms (see taxa list in appendix). The most common taxa, *Eunotia pectinalis* and *Navicula viridula*, are cosmopolitan in distribution. At the test site, diatoms were displaced by cyanophytes, particularly *Merismopedia* sp. The QSI of 22.3 also shows the extensive changes in the two algal communities. The algal data indicate that the facility also violated 17-302.560(19) FAC, Imblances of Aquatic Flora.

Conclusions

The Georgia-Pacific paper mill effluent was harmful to the biological communities in Rice Creek. Chronic toxicity to the water flea, *Ceriodaphnia dubia*, was demonstrated with an LOEC of 50%. The concentration of iron measured in the effluent (1330 µg/L) was also in violation of ambient standards.

Total coliform standards were violated at both stations, with counts of 8,000 and 14,000 organisms/100 ml at control and test sites, respectively. Concentrations of TKN in the effluent (2.8 mg/L) and at the test site (4.2 mg/L) were higher than 95% of all other Florida streams.

Benthic macroinvertebrate communities were highly altered due to the discharge, changing from a pollution sensitive assemblage (trichopterans and ephemeropterans) to one dominated by the organic enrichment and toxic waste-tolerant dipteran, *Dicrotendipes simpsoni*. Decreases in the Florida Index and diversity below the discharge also indicated water quality degradation. Likewise, the response of the periphyton community to effluent inputs was striking. Above the outfall, many species of diatoms made up the attached algal population. Downstream, species richness was severely reduced, and the diatom fraction was displaced by cyanophytes. These substantial community shifts clearly demonstrate the detrimental effects of Georgia Pacific's waste on Rice Creek, a violation of the standard prohibiting imbalances in aquatic flora and fauna.

Literature Cited

American Public Health Assoc., American Water Works Assoc., and Water Pollution Control Federation. 1989. Standard Methods for the Examination of Water and Wastewater, 17th ed. New York, N.Y. 1268 p.

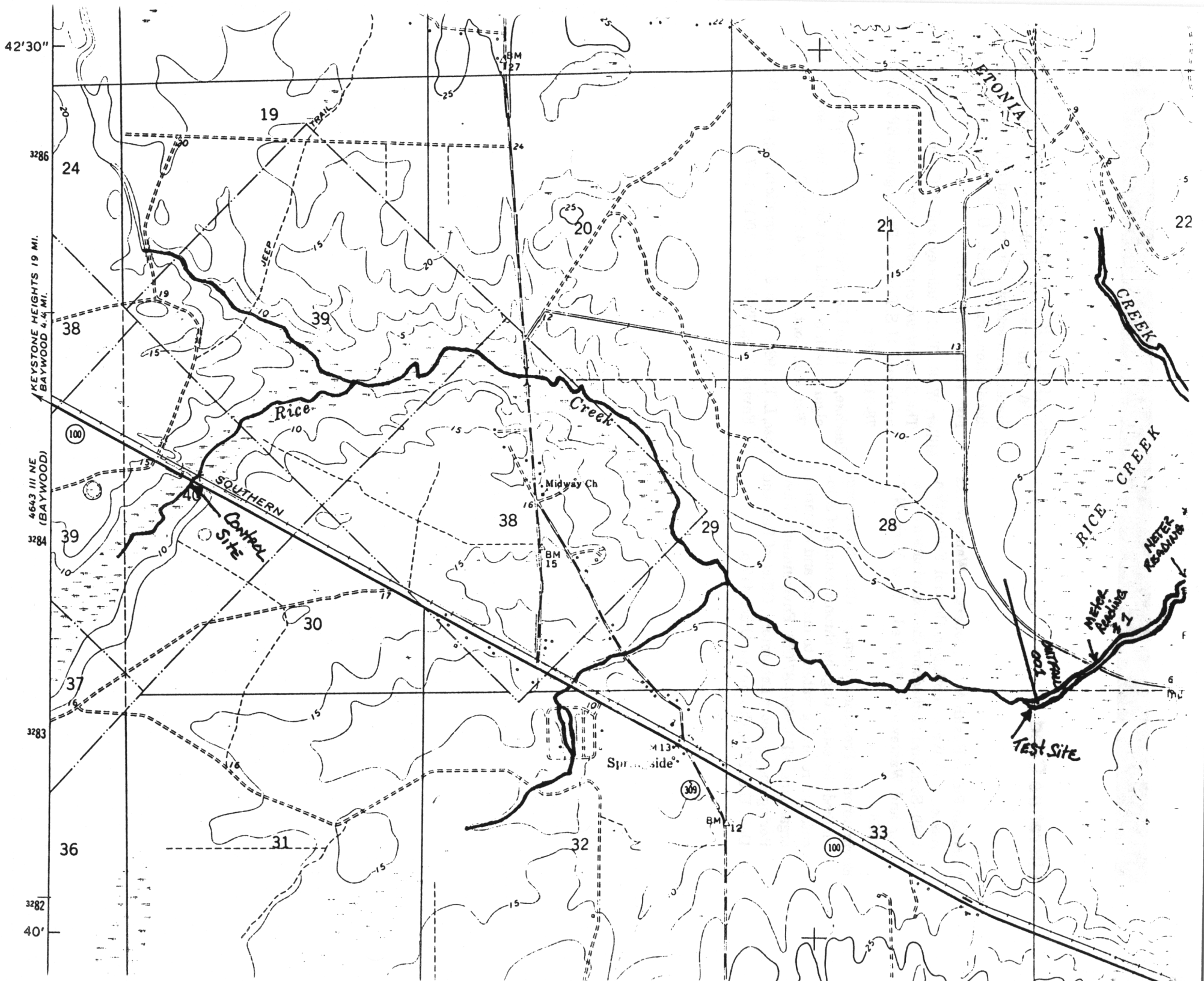
Environmental Protection Agency. 1988. Short-term methods for estimating the chronic toxicity of effluents and receiving waters to marine and estuarine organisms. EPA/600/4-87/028. Environmental Monitoring and Support Laboratory, Office of Res. and Dev., U.S. EPA, Cincinnati, Ohio. 417 p.

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 p.

Miller, W. E., T. E. Maloney, and J. C. Greene. 1978. The *Selenastrum capricornutum* Printz algal assay bottle test. U. S. Environ. Prot. Agency, EPA-600/9-78-018. 126 p.

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

Ross, L. T. 1990. Methods for aquatic biology. Fla. Dept. Environ. Reg. Tech. Ser. 10(1): 1-47.


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KEYSTONE HEIGHTS 19 MI.
BAYWOOD 4.4 MI.
4643 III NE
(BAYWOOD)
Rice Creek
SOUTHERN
Control Site
Midway Ch
BM 15
BM 127
BM 12
TRAIL
JEEP
ETONIA
CREEK
RICE CREEK
Meter Reading #1
Meter Reading #2
Test Site
100
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STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: Georgia Pacific Corporation
Prepared by: Mike Tanish
Date: 7/19/91

Location (attach detailed map): SR 216 Near Palatka
County: Putnam
District: Northeast

Federal Permit # FL0002763 and expiration date:
State GMS # and 3154P01424
State expiration date: 12/1/92
Facility Type: (Industrial) Municipal Federal Agricultural Other (list):

Function of facility:
Pulp and Paper Mill.

Description of treatment process:
primary clarification to seconday treatment consisting of 900 ± acres of anerobic, Facultative and Aerobic Lagoons. Also a Liquid oxygen injection systen into two side streams to counteract BOD in the Effluent and to maintain a 4.0 mg/L DO during the months of May through October. 5.0 mg/L November through April.

Receiving waters: Rice Creek to St Johns R.
Classification: III

Design Flow: 40 MGD
Actual Mean Flow:

Discharge is: Continuous Intermittent Seasonal Raintall dependent
Other (describe)

therefore, the best time to sample is:

If facility has a mixing zone, give details (size, parameters affected, etc.):

C. Mixing zones for zinc have been established for the effluent and side stream discharges to Rice Creek. The zinc [illegible] 0.03 mg/l shall not be exceeded outside an area of 100 longitudinal feet about the discharge at milepoint 2.4, nor beyond an area of 600 longitudinal feet about the combined discharge points at milepoint 3.4.

Also mixing zones for Total disolved gases

List effluent limits:

Parameter	Limit (units)
Flow MGD	Report
BOD5 16/0	D/Avg May - Oct 3,500 Max 7000 D/Avg Nov - Apr 7,170 Max 14,340
TSS2	D/Avg May - Oct 5000 Max 10,000 D/Avg Nov - Apr 10,000 Max 20,000
Fecals	1000/100mL
T. Settleable Solids	.1 mg/L
Temperature	90 °F
DO	5.0 mg/L min
pH	6 to 8.5

Describe special permit conditions and permit modifications:

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Description of permitted outfall(s):

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: NO current MOR data violations. High zinc values within mixing zone (see attachment and "Additional Information").

4/23/91 - High wind storm causing damage to Mill. Power lost and Oxygen Injection system inoperative. Therefore there was a release of untreated water with D.O. being most likely low. BOD5 was likely. No samples Taken

6/12/91 Discharge to Rice Creek from Clarifier Sump. Possible high BOD & TSS.

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

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set: FDER conducted a CSI in 4/25/90. Results compare to MOR results for the month.

	Flow	BOD	TSS	Fecal	D.O	pH	Zn.
DER:	25.2 MGD	20 mg/L	19 mg/L	<10	5.6	7.02	0.04 mg/L
G.P. MOR *	27.0 MGD	21 mg/L	21 mg/L	0	6.6	7.5	0.02 mg/L

BioAssay Samples collected for June 91 and this study. Compliance samples also collected, but not split with facility

Additional information:
There have been several high zinc values for the past 6 months within the mixing zone (see attached 36 report). The Compliance point is outside the mixing zone. Dilutions to determine the zinc concentration outside the mixing zone will be conducted by the facility in the future

* See attached 36 report

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME: DER	STORET STATION NUMBER:	DATE (M/D/Y): 7/24/91	RECEIVING BODY OF WATER: Rice Creek
REMARKS: Georgia Pacific	LOCATION: PALATKA		FIELD ID/NAME: Control Site

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover **23**	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 **19**	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 **15**	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 **10**	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	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	TOTAL SCORE **77**

COMMENTS:

ANALYSIS DATE: 7/24/91	ANALYST: Mike Tawski	SIGNATURE: Michael Tawski

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

SUBMITTING AGENCY CODE / SUBMITTING AGENCY NAME	STORET STATION NUMBER	DATE (M/D/Y)	RECEIVING BODY OF WATER
PER		7/24/91	Rice Creek

REMARKS	LOCATION	FIELD ID/NAME
Georgia Pacific	Palatka	Test Site

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover [30]	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 [15]	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 [15]	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 [10]	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 [ ] Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.

TOTAL SCORE [80]

COMMENTS:

ANALYSIS DATE	ANALYST	SIGNATURE
7/24/91	Mike Tanski	Michael Tanski

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME: DER	STORET STATION NUMBER:	DATE (M/D/Y): 7/24/91	RECEIVING BODY OF WATER: Rice Creek

REMARKS:	LOCATION:	FIELD ID/NAME:
Georgia Pacific	Palatka	Control site

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
95			5			

Local Watershed Erosion (check box): None [X] Moderate [ ] Heavy [ ]

Local Watershed NPS Pollution (check box): No evidence [X] Some potential sources [ ] Obvious sources [ ]

Point-Source Pollution (list location and describe):

Estimated Stream Width (range, m): 5-7m	Estimated Stream Depth (range, m): 2 m	yes	
High Water Mark (m above bed):	Velocity (range, m/s): .1 to .2 m/s	Impounded [ ]	
		Channelized [ ]	

Canopy Cover % (check box): Open: [ ] Lightly Shaded: [ ] Moderately Shaded: [X] Heavily Shaded: [ ]

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: [X] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Anaerobic: [ ] Other: [ ] ____

Sediment Oils: Absent: [X] Slight: [ ] Moderate: [ ] Profuse: [ ]

Sediment Deposits: Sludge: [ ] Paper Fiber: [ ] Mud: [X] Sand: [X] Shell: [ ] Other: [ ]

Substrate Types (estimated % surface coverage):

Limestone:		Sand/Silt/Clay Mix:	
Consolidated Clay:		Clay/Silt (inorganic):	20
Gravel/Shell		Coarse Organic Debris:	
Sand:	35	Mud/Muck (organic):	45

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top	24	5.4	Secchi Depth (m):	
Mid-depth			pH (SU):	5.96
Bottom			Conductivity (µmho/cm):	140
			Other Parameters:	

Stream Type (check box): Blackwater: [X] Deep Aquifer Fed: [ ] Surficial Aquifer Fed: [ ] Alluvial: [ ] Other: [ ] ____

Water Odors (check box): Normal: [X] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Other: [ ] ____

Water Surface Oils (check box): Slick: [ ] Sheen: [ ] Globs: [ ] None: [X]

Clarity (check box): Clear: [X] Slightly turbid: [ ] Turbid: [ ] Opaque: [ ]

Color (check box): Tannic: [X] Green (algae): [ ] Clear: [ ] Other: [ ] ____

Weather Conditions: Partly Cloudy, Hot / Humid

Abundance:	Absent	Rare	Common	Abundant
Periphyton	[ ]	[ ]	[ ]	[ ]
Fish	[ ]	[ ]	[ ]	[X]
Aquatic Macrophytes	[ ]	[ ]	[ ]	[ ]
Iron/sulfur Bacteria	[ ]	[X]	[ ]	[ ]

ANALYSIS DATE:	ANALYST:	SIGNATURE:
7/24/91	Mike Tanski	Michael Tanski

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME: DER	STORET STATION NUMBER:	DATE (M/D/Y): 7/24/91	RECEIVING BODY OF WATER: Rice Creek
REMARKS: Georgia Pacific	LOCATION: Palatka	FIELD ID/NAME: TEST SITE	

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
90					10	

Local Watershed Erosion (check box): None [X] Moderate [ ] Heavy [ ]

Local Watershed NPS Pollution (check box): No evidence [X] Some potential sources [ ] Obvious sources [ ]

Point-Source Pollution (list location and describe):

Georgia Pacific

Estimated Stream Width (range, m): 10-15m	Estimated Stream Depth (range, m): 3 to 4m		yes
High Water Mark (m above bed):	Velocity (range, m/s): .05 to .1 m/s	Impounded [ ] Channelized [ ]	

Canopy Cover % (check box): Open: [ ] Lightly Shaded: [ ] Moderately Shaded: [ ] Heavily Shaded: [X]

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: [ ] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Anaerobic: [ ] Other: [X] _____

Sediment Oils: Absent: [X] Slight: [ ] Moderate: [ ] Profuse: [ ]

Sediment Deposits: Sludge: [ ] Paper Fiber: [ ] Mud: [ ] Sand: [X] Shell: [ ] Other: [X] Detritus

Substrate Types (estimated % surface coverage):

Limestone:		Sand/Silt/Clay Mix:	
Consolidated Clay:		Clay/Silt (inorganic):	
Gravel/Shell		Coarse Organic Debris:	25
Sand:	70	Mud/Muck (organic):	5

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top	27.5	10.2	Secchi Depth (m):	
Mid-depth			pH (SU):	7.14
Bottom			Conductivity (µmho/cm):	700
			Other Parameters:	

Stream Type (check box): Blackwater: [X] Deep Aquifer Fed: [ ] Surficial Aquifer Fed: [ ] Alluvial: [ ] Other: [ ] _____

Water Odors (check box): Normal: [ ] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Other: [X] _____

Water Surface Oils (check box): Slick: [ ] Sheen: [ ] Globs: [ ] None: [X]

Clarity (check box): Clear: [X] Slightly turbid: [ ] Turbid: [ ] Opaque: [ ]

Color (check box): Tannic: [X] Green (algae): [ ] Clear: [ ] Other: [ ] _____

Weather Conditions: Partly Cloudy, Hot Humid

Abundance:	Absent	Rare	Common	Abundant
Periphyton	[ ]	[X]	[ ]	[ ]
Fish	[ ]	[X]	[ ]	[ ]
Aquatic Macrophytes	[ ]	[X]	[ ]	[ ]
Iron/sulfur Bacteria	[X]	[ ]	[ ]	[ ]

ANALYSIS DATE:	ANALYST:	SIGNATURE:
7/24/91	Mike Tanski	Michael Tanski

Sample Source: GEORGIA - PACIFIC
NPDES Permit #: _____ **Outfall #:** _____
Log #: 140 **Chow Batch #:** 8 **Algae Batch #:** 1
CHEM ID 20809

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
BIOLOGY LABORATORY CHRONIC BIOASSAY
Ceriodaphnia dubia BENCH SHEET

Sample Collection	A: Date 7/22/91	Time 1015
	B: Date 7/24/91	Time 1120
	C: Date 7/26/91	Time 1330
Begin Test:	Date 7/23/91	Time 1130
End Test:	Date 7/30/91	Time 1400

Conc.	Day	Replicate Number 1	2	3	4	5	6	7	8	9	10	# Young	# Adults	Young / Adult
Control	1											0	10	
	2											0	10	
	3											0	10	
	4											0	10	
	5	3	5	4	3	4	4	4	3	4	3	37	10	3.7
	6	0	10	0	0	0	0	7	0	OX	0	17	9	1.9
	7	8	0	9	8	9	9	4	9	–	8	64	9	7.1
	8	14	17	15	17	15	17	16	16	–	16	143	9	15.9
	Total	25	32	28	28	28	30	31	28	–	25	266	9	28.6
6.25%	1											0	10	
	2											0	10	
	3											0	10	
	4											0	10	
	5	6	6	5	6	6	6	5	0	5	5	50	10	5.0
	6	0	9	0	0	0	0	0	4	0	0	13	10	1.3
	7	12	0	10	10	10	8	10	9	10	11	90	10	9.0
	8	14	15	16	19	20	15	17	0	16	14	146	10	14.6
	Total	32	30	31	35	36	29	32	13	31	30	299	10	29.9
12.5%	1											0	10	
	2											0	10	
	3											0	10	
	4											0	10	
	5	5	4	5	4	5	6	3	4	2	4	42	10	4.2
	6	0	11	0	0	0	0	0	0	0	0	11	10	1.1
	7	11	0	10	10	12	11	10	10	9	11	94	10	9.4
	8	14	17	19	17	17	16	14	15	14	17	160	10	16.0
	Total	30	32	34	31	34	33	27	29	25	32	307	10	30.7
NOEC = 25%	1											0	10	
	2											0	10	
	3											0	10	
	4											0	10	
	5	3	4	5	4	4	4	6	0	3	4	37	10	3.7
	6	0	10	0	0	0	0	0	6	0	0	16	10	1.6
	7	8	0	9	12	7	9	10	1	8	7	71	10	7.1
	8	13	13	19	13	15	16	15	0	11	15	130	10	13.0
	Total	24	27	33	29	27	29	31	7	22	26	254	10	25.4
LOEC = 50%	1											0	10	
	2											0	10	
	3											0	10	
	4											0	10	
	5	1	4	4	4	5	6	5	5	4	4	42	10	4.2
	6	0	8	0	0	0	0	0	0	0	0	8	10	0.8
	7	1	11	3	10	10	6	3	3	3	5	55	10	5.5
	8	5	0	9	11	12	12	14	11	4	10	88	10	8.8
	Total	7	23	16	25	27	24	22	19	11	19	193	10	19.3
100%	1											0	10	
	2											0	10	
	3											0	10	
	4											0	10	
	5	3	2	3	3	3	4	6	3	0	0	27	10	2.7
	6	0	6	0	0	0	0	0	0	0	0	6	10	0.6
	7	2	3	1	5	4	8	1	1	2	0	27	10	2.7
	8	12	0	12	3	7	4	10	2	2	5	57	10	5.7
	Total	17	11	16	11	14	16	17	6	4	5	117	10	11.7

Day:	0	1	2	3	4	5	6	7	8
Counted by:	MF	MF	MF	MF	MF	MF	AJ/MF	MF	
	7-23	7/24	7/25	7/26	7/27	7/28	7/29	7/30	

Instrument Calibrations:

	Day 0	Day 5
pH	7@7, 9@9	9@9, 7@7
DO	9.2 @ 20.0	9.1@20.5°C
Cond	1327@22.4	1340 @ 22.6°C
Temp	19.7@22.3	20.2@23.7°C

	Day 1	Day 6
pH	7@7, 9@9	7@7, 9@9
DO	9.2@20°	9.1@20.0
Cond	1323@22.4	1331@22.5
Temp	19.2@21.9	20.0@22.6

	Day 2	Day 7
pH	7@7, 9@9	7@7, 9@9
DO	9.2@20°	9.0@21°
Cond	1326@22.9	1344@23.2@ 135
Temp	20.0@22.5	21.0 @ 23.6°

	Day 3	Day 8
pH	7@7, 9@9	
DO	9.0@21°C	
Cond	1350@23°C@1356	
Temp	20.3°C@22.7°C	

	Day 4
pH	7@7, 9@9
DO	9.0@21°C
Cond	1347@22.8°C@1350
Temp	20.8@23.3°C

Remarks:

Investigators' Signatures

Marshall Hardcastle — Jason Jordan

Kim Pearce — Reviewer

Sample Source: GEORGIA-PACIFIC

NPDES Permit #: _____ Outfall #: _____

Log #: 140 Start Date: 7/23/91

CHEM ID 20829

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
BIOLOGY LABORATORY CHRONIC BIOASSAY
Ceriodaphnia dubia CHEMISTRY BENCH SHEET

		New Sample				Old Sample	
	Conc.	pH (SU)	Temp (°C)	DO (mg/l)	Cond (µmhos/cm)	pH (SU)	DO (mg/l)
Day 0 Sample A Meas. by AJ Record. by KP	Control	8.1	19.5	8.7	160		
	6.25%	8.1			185		
	12.5%	8.0			207		
	25%	7.9			247		
	50%	7.7			329		
	100%	7.5	19.5	12.0	495		
Day 1 Sample A Meas. by AJ Record. by KP	Control	8.0	19.9	8.7	180	8.1	8.8
	6.25%	7.9			209	8.2	8.6
	12.5%	7.9			253	8.2	8.6
	25%	7.8			251	8.2	8.7
	50%	7.7			341	8.2	8.7
	100%	7.6	19.9	10.8	514	8.2	8.7
Day 2 Sample B Meas. by MF Record. by AJ	Control	8.1	20.0	8.7	162	8.1	8.7
	6.25%	8.1			195	8.2	8.7
	12.5%	8.0			227	8.2	8.6
	25%	7.9			285	8.2	8.6
	50%	7.8			398	8.2	8.6
	100%	7.7	19.8	11.8	625	8.3	8.6
Day 3 Sample B Meas. by KP Record. by KP	Control	8.2	19.5	8.9	163	8.2	8.3
	6.25%	8.1			190	8.2	8.7
	12.5%	8.1			219	8.2	8.7
	25%	8.0			292	8.3	8.7
	50%	7.9			393	8.3	8.7
	100%	7.7	19.5	10.1	632	8.3	8.6
Day 4 Sample B Meas. by KP Record. by KP	Control	8.1	20.0	8.9	153	8.1	8.9
	6.25%	8.1			189	8.1	9.0
	12.5%	8.1			221	8.2	9.0
	25%	8.1			278	8.2	9.0
	50%	8.0			394	8.3	9.0
	100%	7.9	20.0	9.6	631	8.3	8.8

		New Sample				Old Sample	
	Conc.	pH (SU)	Temp (°C)	DO (mg/l)	Cond (µmhos/cm)	pH (SU)	DO (mg/l)
Day 5 Sample B Meas. by KP Record. by KP	Control	8.2	20.0	9.0	158	8.1	8.7
	6.25%	8.2			188	8.1	8.7
	12.5%	8.2			222	8.1	8.7
	25%	8.1			279	8.2	8.7
	50%	8.1			388	8.2	8.7
	100%	8.0	20.0	9.6	618	8.3	8.6
Day 6 Sample C Meas. by AJ Record. by AJ	Control	8.1	20.0	8.7	161	8.1	9.0
	6.25%	8.1			177	8.1	8.9
	12.5%	8.0			188	8.2	8.8
	25%	7.9			214	8.3	8.7
	50%	7.8			263	8.3	8.4
	100%	7.6	20.2	9.0	360	8.4	8.4
Day 7 Sample old Meas. by MF Record. by MF	Control					8.0	8.7
	6.25%					8.0	8.9
	12.5%					8.0	8.7
	25%					8.0	8.7
	50%					8.0	8.7
	100%					8.0	8.6
Day 8 Meas. by ____ Record. by ____	Control						
	6.25%						
	12.5%						
	25%						
	50%						
	100%						

Remarks: control water alkalinity = 70
hardness = 90

Water-quality Parameters

	Field Cl2	Lab Cl2	Alkalinity	Hardness	NH3+NH4
Sample A:	n/m	0.0	120	80	3.84
Method		Hach	Hach	Hach	Hach
Measured by		KWP	AJ	AJ	MF

Cl2 blank: 0.0 Ammonia meter slope: _____

Sample B:	n/m	0.0	140	135	1.92
Method		Hach	Hach	Hach	Hach
Measured by		mf	mf	mf	mf

Cl2 blank: 0.0 Ammonia meter slope: _____

control water
alkalinity = 165
hardness = 90

Sample C:		0.0	75	75	3.36
Method		Hach	Hach	Hach	Hach
Measured by		RJ	RJ	RJ	RJ

Cl2 blank: 0.0 Ammonia meter slope: _____

Investigators' Signatures

Marshall Fairbell
Kim Pearce

Alison Jordan
Reviewer

Diluent batch # 38 Days Used: 0-

Diluent batch # _____ Days Used: _____

STATE OF FLORIDA
DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES

NORTHEAST DISTRICT
RECEIVED
AUG 1991
FDER-JACKSONVILLE

Bacteriological Analysis of Environmental Waters*

County Putnam CHD Address 2801 Kennedy Street, Palatka, Florida 32077

Collector Wright Location FDER/Jacksonville

Date Collected 7/25/91 Date Rec'd 7/25/91 Date Reported 7/31/91

Lab. No.	Station No.	Total Coliform MPN/MF**	Fecal Coliform MPN/MF**	Fecal Strep. MPN/MF**	Entero-cocci MF	E. Coli. MF
3055	Ga. Pacific Control A	8,000	230			
3056	Control B	8,000	700			
3057	Impacted Test 1	3,000	170			
3058	Impacted Test 2	14,000	140			

*All results reported as MPN or MF value per 100 ml.
**Method used is that which is circled.

Macroinvertebrate taxa list for Georgia-Pacific Corporation, collected via Hester-Dendy samplers, on 21, August 1991, in Rice Creek, Putnam County, Florida.

	Control Site	Test Site
Acarina		
Atractides sp.	1	–
Coleoptera		
Ancyronyx variegata	–	1
Dineutus sp.	–	1
Macronychus glabratus	13	–
Stenelmis sp.	1	–
Diptera		
Ablabesmyia janta	–	33
A. rhamphe grp.	2	40
Chironomus decorus grp.	–	4
Dicrotendipes nervosus	–	12
D. simpsoni	6	472
Nanocladius sp.	–	34
Palpomyia grp. sp.	–	4
Pentaneura inconspicua	7	–
Polypedilum illinoense	–	20
P. trigonus	–	4
Undetermined Dipteran pupa	2	26
Tanytarsus sp.	1	–
Tribelos fuscicorne	1	–
Ephemeroptera		
Acerpenna pygmaeus	3	–
Caenis sp.	–	12
Eurylophella temporalis	–	1
Heptagenia flavescens	2	13
Stenonema sp.	1	–
S. exiguum	99	–
S. floridense	11	12
Stenacron interpunctatum	–	3
Gastropoda		
Hebetancyclus excentricus	–	65
Laevapex fuscus	–	4
Micromenetus dilatus	–	1
Physella sp.	–	3
Planorbella sp.	–	3
Megaloptera		
Nigronia sp.	1	–
Odonata		
Argia sedula	–	1
Calopteryx diminuta	1	–
Enallagma sp.	–	2

E. cardenium	–	2
E. pollutum	–	1
Ischnura ramburii	–	2
Oligochaeta		
Bratislava unidentata	1	8
Trichoptera		
Cheumatopsyche sp.	23	–
Chimarra sp.	2	–
Cyrnellus fraternus	–	4
Nectopsyche sp.	2	–
Neureclipsis sp.	17	–
Nyctiophalax sp.	2	–
Oecetis cinerascens	9	–
Polycentropus sp.	1	–

Macroinvertebrate taxa list for Georgia Pacific Corporation, collected via timed qualitative method on 24, July 1991, in Rice Creek, Putnam County, Florida.

	Control Site	Test Site
Coleoptera		
Dineutus sp.	1	1
Dubiraphia sp.	1	–
Hydrocanthus iricolor	–	2
Diptera		
Ablabesmyia hauberi	1	–
A. janta	–	5
A. rhamphe grp.	–	1
Cryptochironomus sp.	–	1
Dicrotendipes simpsoni	–	3
Undetermined Empididae	1	–
Hemerodromia sp.	–	1
Labrundinia pilosella	–	1
Nanocladius sp.	–	3
Parachironomus schneideri	–	6
Phaenopsectra sp.	1	–
Polypedilum fallax grp.	1	–
P. illinoense	1	5
Undetermined Dipteran pupa	1	11
Stenochironomus sp.	–	3
Ephemeroptera		
Caenis sp.	1	1
Callibaetis floridanus	1	–
Gastropoda		
Campeloma floridense	3	–
Hebetancyclus excentricus	–	3
Physella sp.	–	1
Planorbella duryi	–	3
Viviparus georgianus	5	–
Hemiptera		
Belostoma flumineum	2	–
B. testaceum	–	7
Undetermined Gerridae	–	2
Hydrometra sp.	–	1
Mesovelia mulsanti	–	1
Hirudinea		
Helobdella triserialis	–	1
Placobdella papillifera	1	–
Malacostraca		
Gammarus sp.	1	–
Hyalella azteca	–	8
Palaemonetes paludosus	158	1
Procambarus sp.	8	2

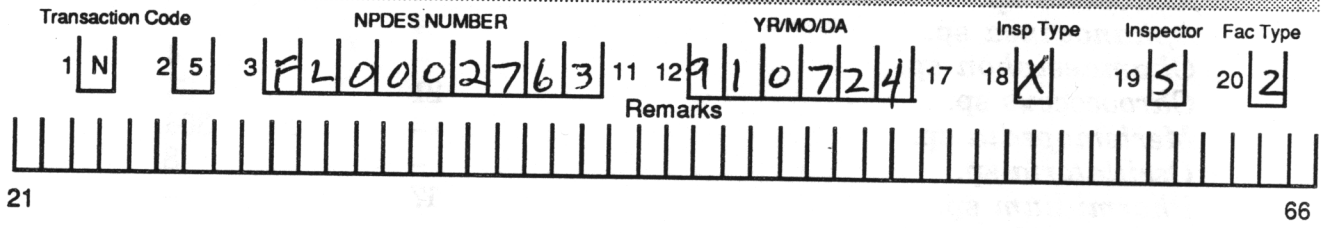
Odonata		
Boyeria vinosa	–	1
Calopteryx diminuta	6	–
Dromogomphus spinosus	2	–
Enallagma signatum	4	55
Gomphus minutus	2	–
Ischnura ramburii	–	2
Undetermined Libellulidae	–	1
Macromia taeniolata	2	–
Oligochaeta		
Aulodrilus pigueti	–	9
Bratislava unidentata	–	1
Dero lodeni	–	1
D. nivea	1	41
D. trifida	1	–
D. vaga	1	7
Eclipidrilus palustris	–	1
Undetermined Enchytraeidae	1	–
Haemonais waldvogeli	–	1
Ilyodrilus templetoni	–	1
Limnodrilus hoffmeisteri	12	22
Nais communis	–	3
Pristinella jenkinae	–	3
Stylaria lacustrus	–	1
Pelecypoda		
Sphaerium/Musculium group sp.	1	17
Platyhelminthes		
Dugesia tigrina	–	23
Rhynchocoela		
Prostoma rubra	3	–
Trichoptera		
Oecetis sp.	1	–
Triaenodes tardus	1	–

Periphyton taxa list and abundances for Georgia-Pacific Corporation, Putnam County, collected in Rice Creek on 21 August, 1991.

	Control Site	Test Site
Diatoms		
Achnanthes hauckiana	17	–
A. lanceolata v. *apiculata*	4	–
Bacillaria paradoxa	–	4
Cocconeis placentula	13	–
Cyclotella sp.	–	8
Diploneis ovalis	–	4
D. puella	17	–
Eunotia curvata	51	–
E. pectinalis	191	4
E. rabenhorstii v. *monodon*	4	–
Frustulia rhomboides	13	–
Gomphonema sp.	4	–
G. augur	–	4
G. parvulum	–	4
Gyrosigma sp.	4	–
Navicula capitata	17	–
N. confervacea	–	45
N. contenta	4	–
N. gastrum	30	–
N. minima	38	–
N. protracta	114	–
N. pupula	42	–
N. radiosa	30	4
N. seminulum	89	–
N. viridula	187	–
Neidium affine	13	–
Nitzschia sp.	13	–
N. acicularis	4	–
N. amphibia	89	8
N. fasciculata	38	–
N. palea	81	4
N. stagnorum	13	–
N. tryblionella	13	–
Pinnularia sp.	13	–
Stauroneis smithii	25	–
Stenopterobia intermedia	13	–
Synedra sp.	13	–
Chlorophyta		
Characium sp.	17	–
Cladophora sp.	–	4
Gloeocystis sp.	–	4
Oocystis sp.	8	–
Protoderma sp.	4	–
Unknown Chlorophyte filament	4	–

Cyanophyta		
Anabaena sp.	21	–
Aphanocapsa sp.	4	–
Chamaesiphon sp.	–	4
Chroococcus sp.	21	68
Merismopedia sp.	–	366
Oscillatoria sp.	–	8
Phormidium sp.	17	–
Euglenophyta		
Phacus sp.	–	4

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)

