

Biological Assessment of

Packaging Corporation of America

(formerly Tenneco Packaging, Inc)

Hamilton

NPDES #FL0000281

Sampled June 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:	Packaging Corporation of America
County:	Hamilton County
NPDES Number:	FL0000281
Permit Expiration:	18 July 2001

Toxics Sampling Inspection (XSI)

Date Sampled: 12 June 2000

Results: Aluminum, chromium, copper, iron, and lead were detected in the effluent at levels that complied with the facility's permit limit and Class III water quality standards. No organic pollutants were detected in the effluent.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 12 June 2000

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

Impact Bioassessment Inspection (IBI)

Date Sampled: 12 June 2000

Results: The results of the quantitative Hester-Dendy samples showed similar or slightly better macroinvertebrate community health at the test site compared to the control site. Qualitative sampling showed degradation of the test site compared to the control site. This difference may be explained by increased habitat smothering at the test site reducing the amount of productive habitat sampled in the dipnet sampling. The composite SCI scores placed the test site in the "poor" category compared to the control site, which was placed in the "excellent" category. There were signs of nutrient enrichment in the algal communities at the test site (periphyton chlorophyll *a* increased 70% and algal density increased 25%), however in general the algal communities appeared comparable between the study sites.

Water Quality Inspection (WQI)

Date Sampled: 12 June 2000

Results: The effluent did not appear to contribute to nutrient enrichment at the test site. Nutrients at the control and test sites were similar to levels in other typical Florida streams. The AGP values at the control and test sites were similar and both were below the 5 mg dry wt/L "problem threshold". The effluent AGP was 6.4 mg dry wt/L. Fecal and total coliforms were within effluent limits and Class III standards at the study sites.

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 Packaging Corporation of America (PCA) formerly Tenneco Packaging, Inc. is located near Clyattville, Lowndes County, Georgia. This facility discharges its wastewater via a pipeline to the Class III Withlacoochee River in Hamilton County, Florida (see maps in Appendix). It is a pulp and paper mill, manufacturing unbleached kraft linerboard (see Facility Summary in Appendix). The wastewater treatment system at this plant includes primary treatment with settleable solids removal via a sedimentation clarifier and sludge ponds. Secondary treatment is accomplished through a series of seven ponds covering approximately 850 acres with nutrient addition to the first and fourth ponds. The first four ponds are anaerobic/facultative ponds and are followed by an aerated stabilization basin, a 350-acre facultative impoundment, and a final finishing pond. As the wastewater leaves the last pond it goes through an effluent control structure with a bar screen, aeration, defoaming chemical addition, parshall flume flow meter and pumping station prior to entering the pipeline. The effluent is pumped approximately two miles and eventually discharged via a submerged diffuser into the Withlacoochee River at the confluence with Jumping Gully Creek. The design and mean flow were reported in the Facility Summary to be 14 MGD.

State permit limits for the effluent are listed in Table 1. The facility has mixing zones for the following parameters: dissolved oxygen, specific conductivity, cadmium, copper, zinc, oil and grease, toxicity, pH, turbidity, un-ionized ammonia and lead (see Facility Summary in Appendix). In the past year, two abnormal events have been reported. The clarifier was intermittently bypassed while the plant was shut down for its annual outage from 3/20/2000 – 3/27/2000. The bypass of the clarifier resulted in wastewater being discharged into the pond system but did not violate water quality standards. On April 25, 2000, the water level in the ponds rose 10-20 inches overnight due to 5.5 inches of rainfall. As a result, flow was allowed to pass unrestricted through ponds 6 and 7. In addition, there was an unidentified one time copper exceedance reported in January 2000 (see Facility Summary in Appendix).

Methods

The purpose 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 the Withlacoochee River approximately 100 meters upstream of the discharge) and a test site (located in the Withlacoochee River approximately 600 meters downstream of the discharge). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were collected on the effluent and study sites. Data for this report were collected on June 12, 2000. The effluent was analyzed for nutrients, metals, and organic constituents (base neutral and acid extractables, and pesticide extractables). Methods used for all chemical analyses are on file at the DEP Central Chemistry Laboratory in Tallahassee.

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

Benthic macroinvertebrates were evaluated at the control and test sites using 20 qualitative discrete dip-net sweeps from multiple substrates (*e.g.*, snags, leaf packs, vegetation). Additional quantitative invertebrate collections were accomplished using Hester-Dendy multiplate samplers incubated for 28 days.

Periphyton were sampled at both control and test sites by incubating glass microscope slides in a standard periphytometer for 28 days. Phytoplankton were sampled at both control and test sites via subsurface grabs. Chlorophyll *a* was determined for both phytoplankton and periphyton communities. *Selenastrum capricornutum* was used as the test organism for algal growth potential tests. All field and laboratory biological methods follow Biology Section Standard Operating Procedures (SOP's). The SOP's can be viewed at: http://www8.myflorida.com/environment/learn/science/laboratories/index.html.

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

The following personnel were involved in this investigation: Pat O'Conner, James Lucas, and Chris Mason (DEP Northeast District), and Frank Butera, Ken Espy, Marshall Faircloth, Russell Frydenborg, Michael Heyn, Joy Jackson, Elizabeth Miller, Urania Quintana, Johnny Richardson, Julie Riley, and Steve Wolfe (DEP Central Biology Laboratory in Tallahassee). The Point Source Studies Review Committee, consisting of Wayne Magley, Chuck Ziegmont, and Michael Tanski, as well as District representatives, reviewed the report.

Results and Discussion

Test site levels of color and conductivity differed from background levels

Table 1. Effluent limits and summary of chemistry data.

Packaging Corporation of America	Effluent Limits	Effluent Samples	Control Site	Test Site
Organic Constituents (µg/L)				
None Detected	-	-	-	-
Metals (µg/L)				
Aluminum	1500 **	680 A	-	-
Arsenic	50 **	4.0 U	-	-
Cadmium	1.4 *	0.040 U	-	-
Chromium	309.4 *a	1.5 I	-	-
Copper	14.0 *	3.3 I	-	-
Iron	1000 **	125 A	-	-
Lead	9.6 *	0.50 I	-	-
Nickel	238.8 *a	1.3 U	-	-
Selenium	5.0 **	1.2 U	-	-
Silver	0.07 **	0.030 U	-	-
Zinc	571.0 *	4.1 U	-	-
Nutrients (mg/L)				
Ortho-phosphate	-	0.32 J	0.067 J	0.089 J
Total phosphorus	-	0.63	0.13	0.13 A
Ammonia	-	0.17	0.017 I	0.025
Un-ionized ammonia	0.134	0.016	-	-
Nitrate+nitrite	-	0.004 U	0.052	0.045
TKN	-	3.1	0.69	0.43 A
Organic Nitrogen	-	2.93	0.67	0.41
Total Nitrogen	-	3.1	0.74	0.48
General Phys-Chem Parameters				
Habitat Assessment	-	-	123	120
Color (PCU)	Δ 50 *	500	30	60
DO (mg/L)	> 1.5 *	5.3	5.0	5.8
pH (SU)	6.0-9.0 *	8.1	7.4	7.7
Conductivity (µmhos/cm)	3,300 *	2,165	257	403
Temperature (C)	-	28.8	24.8	25.5
TSS (lbs/day)	16,140 *b	11 (mg/L)	1 (mg/L)	1 (mg/L)
BOD, 5 day (lbs/day)	12,869 *b	182 c	2 K	2 K
Flow (MGD)	< 15% *RWC	14	-	-
Hardness (mg $CaCO_3$)	-	163.34	-	-
Turbidity (NTU)	80 *	25.0	1.1	2.0
Oil and Grease (mg/L)	< 12 *	5.0 U	-	-
AGP (mg dry wt/L)	-	6.4	3.3	3.1 A
Toxicity (48-hour static, screening bioassay)				
Bioassay - Fish	NOEC	Not Toxic	-	-
Bioassay - Invertebrate	NOEC	Not Toxic	-	-
Microbiology (# counts/100ml)				
Fecal Coliforms	800 **	40 B	3 K	3 K
Total Coliforms	2,400 **	600 B	30 B	67

A - Value is the mean of two or more determinations
B - Colony counts outside the acceptable range
I - Value is < the MQL, and greater than or equal to the MDL
J - Estimated value
K - Actual value is less than value given
U - Material not detected; value is the MDL
NOEC - No Observable Effect Concentration

* Permit limit
** Class III water quality standard
a - Based on hardness
b - Daily maximum
c - Estimate based on mean flow
RWC - Receiving Water Concentration

(Table 1). Color increased 30 PCU from the control site (30 PCU) to the test site (60 PCU) and complied with the facility's permit. The effluent conductivity (2,165 µmhos/cm) complied with the facility's permit limit (3,300 µmhos/cm). Conductivity increased 63% at the test site (403 µmhos/cm) compared to the control site (257 µmhos/cm), these values were within the facility's permit limits and Class III water quality standards.

Aluminum, chromium, copper, iron, and lead were detected in the effluent at levels that complied with the facility's permit limit and Class III water quality standards (Table 1). No organic pollutants were detected in the effluent.

The effluent sample was not toxic to the fish, *Cyprinella leedsi*, or to the invertebrate, *Ceriodaphnia dubia*, during the 48-hour bioassay (Appendix). Fecal and total coliforms complied with Class III water quality standards (Table 1).

The effluent did not appear to contribute to nutrient enrichment at the test site (Table 1). Nutrients at the control and test sites were at levels similar to those typically found in other Florida streams (see *Typical Values of Selected Parameters in Florida*).

The AGP values at the control and test sites were similar and fell below the 5 mg dry wt/L "problem threshold" (Raschke and Shultz 1987) (Table 1). The effluent AGP was 6.4 mg dry wt/L.

Although nutrient levels were similar at the study sites, differences in the periphyton community suggest a trend toward eutrophication at the test site (Table 2). Periphyton chlorophyll *a* values at the control and test sites were greater than 60% and 80% of other Florida streams, respectively. The test site level was 70% higher than the control site (Table 2). There was also a 25% increase in algal density and a 41% increase in % blue-green algae at the test site compared to the control site. Perhaps in response to the nutrient enrichment, taxa richness increased 21% and diversity increased slightly at the test site compared to the control site. Overall, the discharge did not appear to be having a negative effect on the algal communities at the test site.

Table 2. Community structure of control and test sites.

Packaging Corporation of America	Control Site	Test Site
Phytoplankton Algae		
Number of Taxa	28	38
Shannon-Weaver diversity	4.41	4.33
Chlorophyll *a* (µg/L)	5.8	7.1
Algal Density (#/mL)	137	248.41
% Blue-green	10.5	22.6
% Green	15.8	16.8
% Diatoms	71.0	48.2
Periphyton Algae		
Number of Taxa	29	35
Shannon-Weaver diversity	3.48	3.62
Chlorophyll *a* (mg/m2)	10A	17A
Algal Density (#/cm2)	499,747	624,518
Diatom/Diatom + B-G Ratio	1.02	1.02
%Blue-green	1.7	2.4
% Diatoms	96.1	95.6
AGP (mg dry wt/L)	3.3	3.1

A-Value is the mean of two or more determinations

Habitat quality was "optimal" at the two study sites, with 123 points at the control site and 120 points at the test site. Habitat smothering at the test site was noted during the field sampling and may help explain the results of the dipnet samples. There was a 42% decline in taxa richness, a 50% decrease in the EPT Index, a 512% increase in % dominant taxon, and a 58% decline in the Florida Index at the test site compared to the control site (Table 3). The composite SCI scores reflect these changes in macroinvertebrate community structure and function between the study sites. The test site was considered "poor" with 15 SCI points, while the control site was considered "excellent" with 27 SCI points (see SCI Worksheet in the Appendix). Although these results indicate an impaired macroinvertebrate community downstream of the discharge, it is not clear to what extent the facility is responsible.

Results of the Hester-Dendy samplers support the idea that differences in habitat availability may be responsible for the changes seen in the qualitative macroinvertebrate samples. With the addition of the artificial substrates, there was some improvement at the test site compared to the control site (Table 3). For example, taxa richness increased by 13% and the Florida Index improved 90% at the test site compared to the control site. However, the EPT Index still showed a 22% decline at the test site compared to the control site. Additional macroinvertebrate sampling may be necessary to determine the extent, if any, of the facility's effect on the receiving water biological communities.

Literature Cited

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

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

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

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

Weber, C. I. 1993. Methods for measuring the acute toxicity of effluents to freshwater and marine organisms. 4th edition. EPA/600/4-90/027. U. S. EPA, Cincinnati, Ohio. 216 pp.

Table 3. Community structure of control and test sites.

Packaging Corporation of America	Control Site	Test Site
Macroinvertebrate Qualitative		
% Dominant Taxon	9.4	57.5
EPT Index	4	2
Florida Index	12	5
Number of Taxa	36	21
SCI	27	15
Community Composition		
% Amphipoda	7.7	57.5
% Coleoptera	4.3	1.4
% Diptera	47.0	14.9
% Ephemeroptera	6.8	7.1
% Gastropoda	6.8	9.2
% Oligochaeta	6.8	7.1
% Pelecypoda	5.1	1.4
% Trichoptera	4.3	0.7
% Trombidiformes	6.8	0.7
% Other	4.7	0.0
Functional Feeding Groups		
% Burrowing Deposit Feeders	4.3	5.7
% Predators	19.7	3.9
% Surface Deposit Feeders	45.3	49.3
% Suspension Feeders/Filterers	6.0	2.1
% Scrapers	9.0	6.4
% Shredders	9.0	31.2
Macroinvertebrate Hester-Dendy		
Number of Taxa	31	35
Florida Index	10	19
Shannon-Weaver Diversity	3.60	3.61
EPT Index	9	7
Community Composition		
% Amphipoda	4.3	1.4
% Diptera	65.8	65.8
% Ephemeroptera	16.6	3.6
% Trichoptera	9.6	26.3
% Other	3.7	2.9
Functional Feeding Groups		
% Predators	18.6	12.7
% Surface Deposit Feeders	63.4	53.5
% Suspension Feeders/Filterers	7.8	26.3
% Scrapers	4.1	2.7
% Shredders	4.3	4.5

Typical Values for Selected Parameters in Florida Waters

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

Parameter	Percentile Distribution 5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%
STREAMS (1617 stations)											
Phytoplankton Chlorophyll *a*	0.22	0.52	0.94	1.60	3.02	4.63	6.72	9.87	14.68	27.35	48.70
Periphyton Chlorophyll *a*	0.31	0.43	0.77	1.04	2.16	2.94	6.45	10.51	17.00	39.51	60.85
H-D Diversity	0.84	2.12	2.48	2.74	2.88	3.09	3.25	3.40	3.52	3.76	3.90
Qualitative Taxa Richness	9.00	12.00	17.00	20.00	22.00	24.50	26.00	28.00	31.00	37.00	53.00
H-D Taxa Richness	6.00	6.50	9.00	11.50	13.00	15.00	17.00	21.50	26.00	29.00	32.00
TKN	0.30	0.39	0.56	0.73	0.87	1.00	1.11	1.26	1.49	1.93	2.80
Ammonia	0.02	0.02	0.04	0.05	0.06	0.08	0.11	0.14	0.20	0.34	0.60
NO2-NO3	0.01	0.01	0.03	0.05	0.07	0.10	0.14	0.20	0.32	0.64	1.05
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	0.18	0.25	0.39	0.74	1.51
Ortho Phosphate	0.01	0.01	0.03	0.04	0.05	0.08	0.11	0.17	0.27	0.59	1.37
Turbidity	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	10.45	16.30

Units:

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

Explanation of Measurements of Community Health

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

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

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

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

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

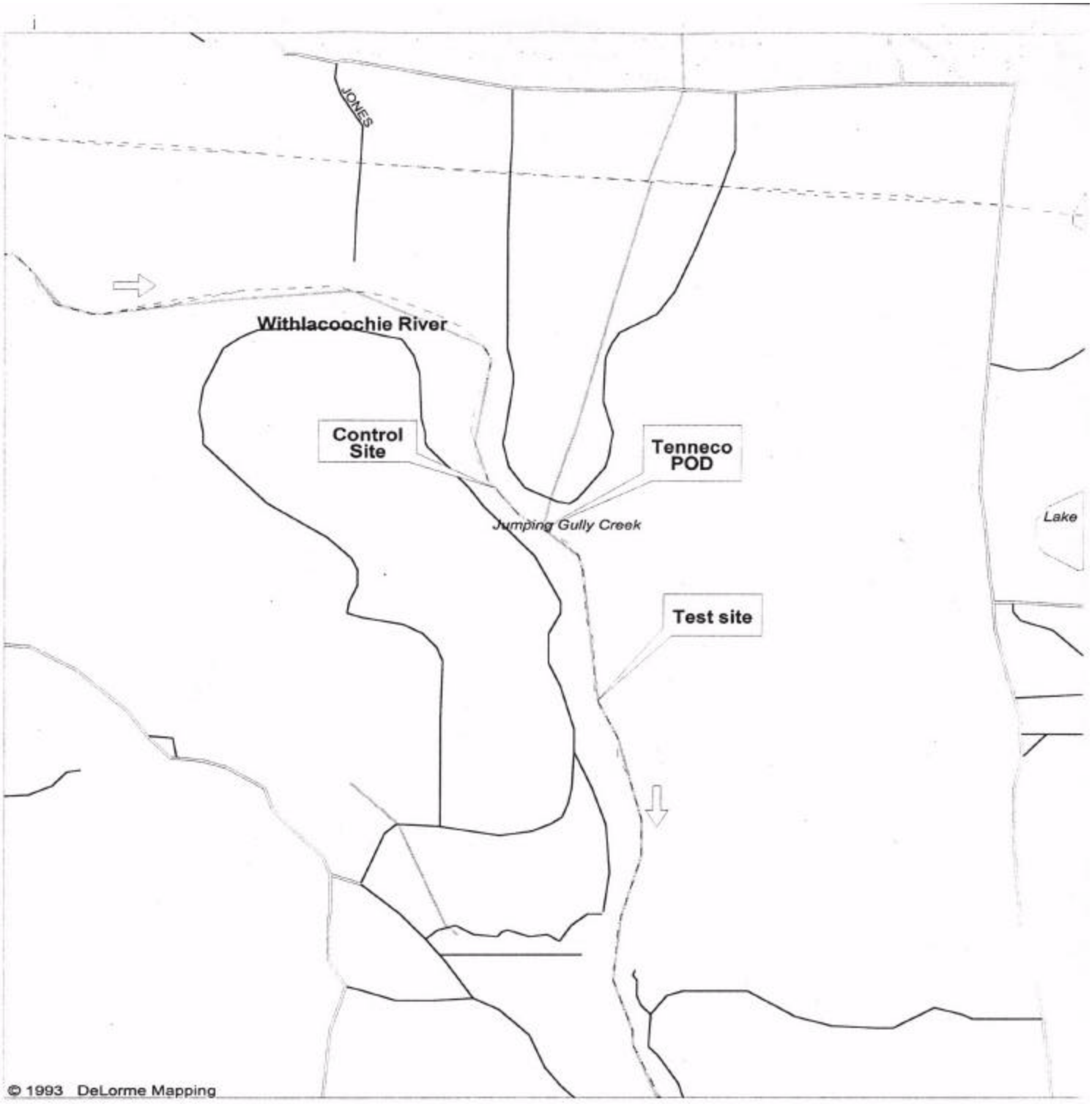
Ephemeroptera/Plecoptera/Trichoptera (EPT) Index: This index is the sum of the number of EPT taxa present. Higher EPT values are associated with healthier systems.

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

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

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

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



LEGEND

- County Boundary
- Street, Road
- Major Street/Road
- River
- Open Water

Scale 1:15,625 (at center)

1000 Feet

500 Meters

Mag 15.00
Wed Jul 19 14:51:01 2000

State of Florida
Department of Environmental Protection
Facility Summary

Facility Name: Packaging Corporation of America (PCA) formerly Tenneco Packaging, Inc.	**Prepared By:** James M. Lucas **Date:** 05/24/00	
Location: (See Attached Map) 5495 Lake Park / Clyattville Clyattville, Ga.	**County:** Hamilton	**District:** Northeast
Federal Permit No.: FL0000281 **Expiration Date:** 7/18/01	**State GMS #:**3124P00101 **State Expiration Date:** N/A	**Facility Type:** Industrial

Function of Facility: Unbleached Kraft Liner Board

Description of treatment process: Wastewater at the facility receives primary and secondary treatment. Solids are removed in a sedimentation clarifier and associated sludge pond. Next, the water flows through a series of seven ponds (with a combined surface area of approximately 850 acres) with nutrient addition at the first and fourth ponds to enhance microbial growth. There are four anaerobic / facultative ponds, followed by an aerated stabilization basin, a 350 acre facultative impoundment, and a polishing pond. Wastewater then flows through a concrete effluent control structure with a mechanical bar screen, Parshall Flume, and flow meter, into a final aeration basin. Finally, the effluent is pumped approximately two miles through a 48-inch diameter transmission pipe, through a submerged diffuser, and into the Withlacoochee River at the confluence with Jumping Gully Creek.

Receiving Waters: Withlacoochee River	**Classification:** Class III - Fresh	
Design Flow: 14 MGD	**Mean Flow:** 14 MGD	**Flow during survey:**

Discharge is: *Continuous* Intermittent Seasonal Rainfall Dependent Other

Facility Mixing Zone Details: Mixing zones have been established for the following parameters:

Dissolved Oxygen	1,171 ft.
Specific Conductance	198 ft.
Cadmium	98 ft.
Copper	113 ft.
Zinc	1,171 ft.
Oil & Grease	362 ft.
Toxicity	1,171 ft.
pH	1,171 ft.
Turbidity	360 ft.
Unionized Ammonia	369 ft.
Lead	1,171 ft.

List effluent limits:

Parameter	Limit	Describe special permit conditions and permit modifications:
Flow (MGD)	**< 15% RWC**	RWC (Receiving Water Concentration) is the percent effluent in the receiving water. The RWC is calculated by the average daily effluent flow divided by the daily receiving water flow downstream from the outfall at the confluence with Jumping Gully Creek.
BOD_5 (lbs./day)	Monthly Average <6,434 lbs/day	*The maximum allowable loading of BOD_5 (lb/day) in any one day shall not exceed 12.0 lb/day for each cfs of river flow.
	Daily Maximum	*If the upstream dissolved oxygen is less than 4.6

	<12,869 lbs/day Annual Average <5,550 lbs/day	mg/l, then the following loading shall apply to BOD_5. Upstream D.O. (mg/l) — Loading lb/day/river cfs 4.5 — 10 4.4 — 8 4.3 — 6 4.2 — 4 <4.1 — 2 Effluent BOD_5, upstream flow, BOD_5 lb/day/cfs and appropriate BOD_5 / cfs limits shall be tabulated for each month and submitted with the monthly MOR.
Total Suspended Solids (lbs./day)	Monthly Average <10,760 Daily Maximum <16,140	
pH (S.U.)	Daily Minimum 6.0 Daily Maximum 9.0	
Specific Conductance (umhos/cm)	2,210	
Temperature (°F)	See 62-302.520 FAC	
Ammonia as N (unionized)(mg/l)	.134	
Color (True) (PCU)	Variable	The discharge shall not cause greater than 50 color unit (PCU) in crease from natural background conditions: The maximum allowable effluent color limit is to be calculated as follows: Ce = (50/RWC)+Cu
Oil and Grease (mg/l)	Daily Maximum 12.0	
Turbidity (NTU)	80	
Cadmium (ug/L)	1.4	
Copper (ug/l)	14.0	

Dissolved Oxygen (mg/l)	>1.5	
Lead (ug/l)	9.6	
Zinc (ug/l)	571	
Fecal Coliform (#/100ml)	800	
Acute Toxicity		96-hour definitive static acute toxicity test on test species Ceriodaphnia dubia and Cyprinella leedsi
Chronic Toxicity		15% effluent for daphnid (Ceriodaphnia dubia) Survival and Reproductive Test and a short-term fathead minnow (Pinephales Promelas) Lrval Survival and Growth Test.

Description of permitted outfall: Wastewater flows through a concrete control structure with a mechanical bar screen, Parshall Flume, and a flow meter, into a final aeration basin. The effluent is pumped approximately two miles through a 48-inch transmission pipe, through a submerged diffuser, and into the Withlacoochee River at the confluence with Jumping Gully Creek.

List permit violations (DMR data) and plant upsets that occurred at the plant within the past year: In the past year, two abnormal events have been reported. On ~~1/17/00~~ 3/17/00, the plant shutdown from 3/20 – 3/27 was reported that it would be shutdown and clarifier was off line for repairs. The bypass resulting from the repairs to the clarifier resulted in wastewater being discharged in to the pond system and did not violate water quality standards. On 4/25/00 due to 5.5 in of rainfall the water level in the ponds rose 10-20 inches overnight. As a result flow was allowed to pass unrestricted through pond 6 and 7. 2/24/01
Unidentified one time copper exceedance. 1/2000 was reported (Pees. Comm James Lee cats)

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions: PCA has been operating under consent order number 91-2109. The case included a variance to water quality standards during the installation of color reduction technology that would meet the class III water quality standards in the Withlacoochee River. The case also included the construction and operation of an alternate conveyance system that removes the discharge point from Jumping Gully Creek to the Withlacoochee River.

An impact bioassessment inspection was conducted to qualify the biological integrity of the receiving water. The results of the departments study showed that the facilities effluent did not significantly impact the stream biota. However, further studies conducted by PCA and the DEP show that the Shannon-Weaver Diversity Index (SWDI) indicated depressed biological diversity due to a naturally occurring dominate species Rheotanytarsus. The Hester-Dendy substrate and the selected diversity index have also been identified as possible causes of the irregular data.

Discuss MOR trends to prior data; is the trend improving or declining: Trends appear to be seasonal and dependent upon the receiving water depth. Ex. Low dissolved oxygen levels under low flow conditions.

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:
	21010030	6/12/00	1130	WITHLACOOCHEE R.

REMARKS:	COUNTY:	LOCATION:	FIELD NAME:
	HAMILTON	WITHLACOOCHEE RIVER 600 m below TENNECO POD	TEST SITE

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commericial	Industrial	Other (specif
15%	15%		5%	1%		1%	3%

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 m

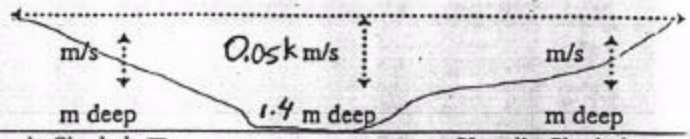
List & map dominant vegetation on back

Artificially Channelized ☒ NO ☐ YES — none

Artificially Impounded

High Water Mark: 6.0 + 1.4 = 7.4
(m above present water level) (present depth in m) (m above bed)

Typical Width (m)/Depth (m)/Velocity (m/sec) Transect: 25-30 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: ☒ HEAVY ALGAL MAT COVERING SNAGS & ROCK SUBSTRATE

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	2	1	DIPNET	Sand	30	3	DIPNET
Leaf Packs or Mats				Mud/Muck/Silt			
Aquatic Vegetation				Other: Rock Outcrops	58	3	DIP NET
Rock or Shell Rubble				Other:			
Undercut banks/Roots	10	1	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	0.7	25.51	7.70	5.8	403	1130		1.4 L
Bottom								

System Type: Stream: ☒ RIVER 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: P/C Hot

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

Sampling Team: MASON, O'CONNOR

Signature: Patrick W O'Connor

Date: 6/12/00

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:
	21010030	6/12/00	WITHLACOOCHEE RIVER

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
	HAMILTON	WITHLACOOCHEE RIVER GOOM BELOW TENNECO POD	TEST SITE

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components				
Substrate Diversity [10]	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 [10]	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 [15]	Less than 20% of habitats affected by sand or silt accumulation	20%-50% of habitats affected by sand or silt accumulation	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent
Primary Score [40]	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
Secondary Habitat Components				
Artificial Channelization [20]	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Bank Stability: Right Bank [10] / Left Bank [10]	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 [80]				

[120] TOTAL SCORE

ANALYSIS DATE:	ANALYST:	SIGNATURE:
6/12/00	O'CONNOR	Patrick W 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:
	21010029	6/12/00	1000	WITHLACOOCHEE RIVER

REMARKS:	COUNTY:	LOCATION:	FIELD NAME:
	HAMILTON	WITHLACOOCHEE RIVER 100M ABOVE TENNECO POD	CONTROL SITE

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commericial	Industrial	Other (specif)
15%	75%		5%	1%		1%	3

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

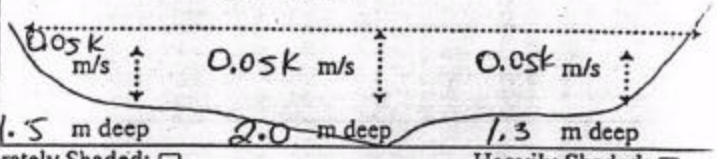
Local Watershed NPS Pollution: No evidence: ☐ Slight: ☒ Moderate potential: ☐ Obvious sources:

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

20-25 m wide



Artificially Channelized ☒ NO ☐ YES Artificially Impounded — none

High Water Mark: 6 + 2.0 = 8.0 (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

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

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

Sediment Deposition: Sludge: ☐ Sand smothering: none Silt smothering: none Other: ☒ HEAVY ALGAL MAT COVERING SNAGS & ROCK OUTCROP

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	2	1	DIPNET	Sand	31	3	DIPNET
Leaf Packs or Mats				Mud/Muck/Silt			
Aquatic Vegetation				Other: Rock	60	3	DIPNET
Rock or Shell Rubble				Other:			
Undercut banks/Roots	1	1	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	0.8	24.76	7.41	5.0	257	1000		1.5L
Bottom								

System Type: Stream: ☒ RIVER 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: P/C Hot

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

Sampling Team: O'CONNOR, MASON Signature: Date:

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:
	21010029	6/12/00	WITH LACOOCHEE RIVER

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
	Hamil/Hsb	WITH LACOOCHEE RIVER 100 M ABOVE TENNECO POD	CONTROL SITE

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components Substrate Diversity [10]	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 [8]	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 [20]	Less than 20% of habitats affected by sand or silt accumulation	20%-50% of habitats affected by sand or silt accumulation	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent
Primary Score [43]	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
Secondary Habitat Components Artificial Channelization [20]	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Bank Stability Right Bank [10] Left Bank [10]	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 [80]				

[123] TOTAL SCORE

ANALYSIS DATE:	ANALYST:	SIGNATURE:
6/12/00	O'CONNOR	Patrick O'Connor

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Tenneco
County: 17AMELDN
Contact / District: Michael Tanski / NE-Dist
NPDES Permit #: FL00 00281
LIMS Sample #: 461025 LIMS Job #: TLH-20000613-11-01
sample log
Test Type: (Screening) / Definitive
(Static) / Static Renewal / Flow-through
Test Number: 2 of 2

Sample Collection: Date 6/12/00 Time 1545
Test Beginning: Date 6-13-00 Time 14:00
Test Ending: Date 6-15-00 Time 13:45
Organism Batch #: 44 Diluent Batch #: Well
Organism Age: 11days SRT toxicant batch #: na
Test organism: Cyprinella leedsi

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
Control A	C1	5	5	5	7.8	8.2	8.4	24.9	24.3	24.3	7.8	7.7	7.9	300	250	260
Control B	C2	5	5	5	7.8	8.2	8.4	24.7	24.0	24.1	7.8	7.8	7.9	260	255	260
Control C	C3	5	5	5	7.9	8.2	8.4	24.6	24.0	24.5	7.8	7.8	8.0	250	250	260
Control D	C4	5	5	5	7.9	8.2	8.4	24.5	24.0	24.4	7.9	7.8	8.2	255	255	265
100% A	C5	5	5	5	8.2	8.6	8.8	24.7	24.5	24.2	5.8	7.1	7.4	2130	2160	2270
100% B	C6	5	5	5	8.3	8.6	8.8	24.8	24.5	24.3	5.8	7.1	7.0	2200	2190	2250
100% C	C7	5	5	5	8.2	8.6	8.8	24.8	24.2	24.5	5.7	6.8	7.1	2210	2170	2270
100% D	C8	5	5	5	8.3	8.6	8.8	24.9	24.2	24.4	5.6	6.6	7.2	2220	2150	2230
measured by:		AW	DPH	SG	DPH	SG	SG	DPH	SG	SG	DPH	SG	SG	DPH	SG	JB
recorded by:		DPH	DPH	JB	AW	DPH	SG	AW	DPH	JB	AW	DPH	JB	AW	DPH	JB

(A) DPH 6/19/00 Wrong place

Investigators' Signatures
Maybell Faublett
Della Hudelson
Jessica Williams
Shannon Gerard

Temperature Range °C
Incubator # 3 24.5 - 26.5°C
Room B246 25.0 - 26.0°C

Water Quality Parameters	Salt Water: Well Water	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):			N/A	N/A	N/A	SH
Lab Total Residual Cl2 (mg/L):	<0.03		0.04	DR-100	SG/JA	DPH
Alkalinity (mg/L as $CaCO_3$):	135		700	HACH	DPH/SG	DPH
Hardness (mg/L as $CaCO_3$):	132		256	HACH	DPH/SG	DPH
Total ammonia (mg/L as N):	<0.017		<0.017	Amm	DPH	DPH
Salinity: ~~Salt~~	~~0~~		~1.1	451	DPH	DPH

reviewer

form updated 3/3/99

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Tenneco
County: HAMILTON
Contact / District: Michael Tanski / NE-Dist
NPDES Permit #: FL0002281
LIMS Sample #: 466025 LIMS Job #: THH-2000-06-13-11-01
sample log
Test Type: (Screening) / Definitive
(Static) / Static Renewal / Flow-through
Test Number: 1 of 2

Remarks:

Sample Collection: Date 6-12-00 Time 15 45
Test Beginning: Date 6-13-00 Time 13:45
Test Ending: Date 6-15-00 Time 13:45
Organism Batch #: 31 Diluent Batch #: 17
Organism Age: <24 hours SRT toxicant batch #: NA
Test organism: Ceriodaphnia Dubia

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) 0 hr	UNCORRECTED Cond. (mmhos/cm) 24 h	UNCORRECTED Cond. (mmhos/cm) 48 h
Cntrl A	A	5	5	5	8.2	—	8.2	25.0	—	24.4	7.8	—	8.3	200	—	216
Cntrl B	B	5	5	5	—	—	8.3	—	—	24.3	—	—	8.2	—	—	200
Cntrl C	C	5	5	5	—	—	8.3	—	—	24.1	—	—	8.3	—	—	190
Cntrl D	D	5	5	5	—	—	8.3	—	—	24.1	—	—	8.3	—	—	200
100% A	A	5	5	5	8.3	—	9.1	25.0	—	24.2	6.0	—	8.3	2110	—	2520
100% B	B	5	5	5	—	—	9.1	—	—	24.2	—	—	8.2	—	—	2420
100% C	C	5	5	5	—	—	9.1	—	—	24.1	—	—	8.2	—	—	2500
100% D	D	5	5	5	—	—	9.1	—	—	24.1	—	—	8.3	—	—	2570
measured by:		MF	DPH	SG	DPH	—	SG	DPH	—	SG	DPH	—	SG	DPH	—	SG
recorded by:		DPH	DPH	SG	AW	—	KL	AW	—	KL	AW	—	KL	AW	—	KL

* Wrong Place 6/13/00 DPH

Investigators' Signatures

Temperature Range °C
Incubator # 3 24.5 - 26.5°C
Room B246 25.0 - 26.0°C

	Salt Water / Well Water	Water Quality Parameters: 20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):			N/A	N/A	N/A	JA
Lab Total Residual Cl2 (mg/L):		~~<0.03~~ 0.017 DPH	~~0.04~~ DPH <0.017	DR-100 Dennis	~~SG~~ DPH/JA	DPH
Alkalinity (mg/L as $CaCO_3$):		82	700	HACH	SG DPH	DPH
Hardness (mg/L as $CaCO_3$):		83	256	HACH	SG DPH	DPH
Total ammonia (mg/L as N):		<0.017	<0.07	Dennis	DPH/JA	DPH
Salinity:		0 <1	~1.1	YSI	DPH	DPH

reviewer form updated 3/3/99

Packaging Corporation of America – Control Site

Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	Value	5	3	1	Score
Total Number of Taxa	36	≥31	30-16	<16	5
EPT Index	4	≥7	6-4	<4	3
# Chironomid Taxa	14	≥9	8-5	<5	5
% Contribution of Dominant Taxon	9	≤22	23-61	>61	5
% Diptera	47	-	≤50	>50	3
Florida Index	12	≥16	15-8	<8	3
% Suspension feeders/Filterers	6	≥12	11-6	<6	3
Total Score		**Panhandle**			**27**
Interpretation of Scores		**Excellent**			**27-33**
		Good			21-26
		Poor			14-20
		Severely Degraded			7-13

Summer Index Period: Stream Condition Index (SCI) for Florida Panhandle (April1996)

Packaging Corporation of America – Test Site

Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	Value	5	3	1	Score
Total Number of Taxa	21	≥31	30-16	<16	3
EPT Index	2	≥7	6-4	<4	1
# Chironomid Taxa	8	≥9	8-5	<5	3
% Contribution of Dominant Taxon	58	≤22	23-61	>61	3
% Diptera	15	-	≤50	>50	3
Florida Index	5	≥16	15-8	<8	1
% Suspension feeders/Filterers	2	≥12	11-6	<6	1
Total Score		**Panhandle**			**15**
Interpretation of Scores		**Excellent**			27-33
		Good			21-26
		Poor			**14-20**
		Severely Degraded			7-13

Summer Index Period: Stream Condition Index (SCI) for Florida Panhandle (April1996)

Phytoplankton taxa list and densities (#/cm^2) for Packaging Corporation of America, collected via glass microscope slides in the Withlacoochee River, on 12 July, 2000 .

	Control Site	Test Site
Bacillariophyceae		
Achnanthes exigua	7	2
Achnanthes lanceolata	2	3
Achnanthes minutissima	–	1
Bacillaria paradoxa	11	27
Cocconeis disculus disculus	4	1
Cocconeis placentula	–	1
Cyclotella sp.	–	1
Cymbella minuta pseudogracilis	–	1
Cymbella minuta silesiaca	1	1
Cymbella tumida tumida	–	1
Diatomaceae	–	1
Eunotia sp.	1	6
Gomphonema parvulum	1	–
Gyrosigma sp.	1	1
Melosira sp.	2	1
Navicula constans	–	1
Navicula cryptocephala	–	1
Navicula cryptotenella	2	1
Navicula elginensis	–	1
Navicula minima	1	1
Navicula mutica stigma	2	–
Navicula peregrina	–	1
Navicula pupula	2	1
Navicula viridula	1	–
Nitzschia amphibia	2	1
Nitzschia constricta	2	–
Nitzschia gracilis	2	3
Nitzschia palea	2	1
Nitzschia sp.	3	4
Pinnularia sp.	2	–
Synedra rumpens familaris	–	1
Synedra sp.	3	1
Chlorophyceae		
Ankistrodesmus falcatus	–	1
Chlamydomonas sp.	1	1
Chlorella sp.	3	5
Scenedesmus bijuga	1	–
Selenastrum sp.	–	6

Staurastrum sp.	–	2
Undetermined Chlorophyceae	7	8
Chrysophyceae		
Stipitococcus sp.	–	1
Cryptophyceae		
Undetermined Cryptophyceae	–	6
Cyanophyceae		
Anabaena sp.	–	1
Chroococcaceae	1	–
Dactylococcopsis sp.	2	19
Lyngbya sp.	1	–
Merismopedia minima	–	1
Oscillatoria sp.	4	9
Spirulina laxa	–	1
Dinophyceae		
Glenodinium sp.	1	–
Euglenophyceae		
Euglena sp.	1	8
Lepocinclis sp.	–	2

Periphyton taxa list and densities (#/cm^2) for Packaging Corporation of America, collected via glass microscope slides in the Withlacoochee River, on 12 July, 2000 .

	Control Site	Test Site
Bacillariophyceae		
Achnanthes exigua	56362	55410
Achnanthes lanceolata	121179	33477
Bacillaria paradoxa	38514	110820
Capartogramma crucicula	1879	–
Cocconeis placentula	36636	9235
Cyclotella sp.	3758	11544
Cymbella tumida	–	6926
Eunotia sp.	46029	21933
Gomphonema affine	–	17316
Gomphonema intricatum intricatum	–	2309
Gomphonema intricatum vibrio	1879	–
Gomphonema parvulum	1879	9235
Gomphonema sp.	1879	9235
Gyrosigma spenceri	–	11544
Gyrosigma sp.	3758	–
Melosira sp.	98634	204325
Navicula constans	9394	11544
Navicula cryptocephala	–	2309
Navicula cryptotenella	1879	6926
Navicula minima	1879	2309
Navicula peregrina	1879	–
Navicula pupula	3758	–
Navicula sp.	1879	–
Nitzschia amphibia	5636	11544
Nitzschia constricta	13151	11544
Nitzschia gracilis	3758	4618
Nitzschia nana	–	2309
Nitzschia palea	–	4618
Nitzschia sp.	7515	2309
Pinnularia sp.	–	4618
Surirella sp.	–	11544
Synedra ulna	1879	–
Synedra sp.	15030	17316
Chlorophyceae		
Characium sp.	939	1154
Chlamydomonas sp.	939	–
Chlorella sp.	939	2309
Closterium dianae brevius	939	–
Cosmarium sp.	–	1154
Scenedesmus acuminatus	–	1154

Scenedesmus bijuga	1879	3463
Scenedesmus quadricauda	939	1154
Staurastrum sp.	–	1154
Undetermined Chlorophyceae	4697	–
Chrysophyceae		
Kephyrion sp.	–	1154
Cyanophyceae		
Anabaena sp.	1879	3463
Chroococcaceae	1879	–
Lyngbya sp.	–	4618
Oscillatoria sp.	4697	6926

Benthic macroinvertebrate taxa list for Packaging Corporation of America, collected via Hester-Dendy artificial substrates in receiving water, on 12 July, 2000. Densities, in number/m^2, represent the mean of three replicates.

	Control Site	Test Site
Acariformes		
Arrenurus sp.	–	5
Frontipoda sp.	–	3
Torrenticola sp.	3	–
Amphipoda		
Hyalella azteca	21	11
Coleoptera		
Dineutus sp.	–	3
Dubiraphia vittata	3	–
Gyrinidae	3	–
Microvelia sp.	3	–
Stenelmis sp.	3	–
Decapoda		
Procambarus sp.	–	3
Diptera		
Ablabesmyia mallochi	74	34
Ablabesmyia rhamphe grp.	24	48
Ablabesmyia sp.	–	3
Chironomidae	11	26
Chironomus sp.	–	13
Cladopelma sp.	–	3
Cladotanytarsus sp.	3	–
Cricotopus bicinctus	13	37
Cryptotendipes sp.	–	58
Dicrotendipes modestus	–	3
Dicrotendipes simpsoni	5	16
Dicrotendipes sp.	3	–
Glyptotendipes sp.	–	3
Goeldichironomus sp.	–	5
Labrundinia becki	13	3
Labrundinia johannseni	–	3
Labrundinia neopilosella	3	–
Labrundinia pilosella	–	3
Nanocladius sp.	3	–
Palpomyia/Bezzia grp.	11	13
Parachironomus carinatus	5	3
Parachironomus sp.	3	–
Paratanytarsus sp. B Epler	3	–
Polypedilum fallax	8	8

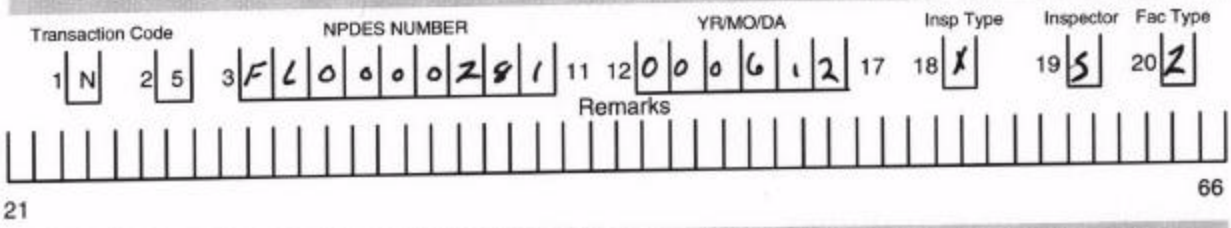
Polypedilum halterale grp.	–	3
Polypedilum scalaenum grp.	–	5
Procladius sp.	3	3
Tanytarsus sp. L Epler	–	8
Tribelos fuscicornis	143	185
Ephemeroptera		
Caenis sp.	8	3
Callibaetis sp.	3	–
Heptageniidae	–	3
Pseudocloeon sp.	3	–
Stenacron sp.	3	11
Tricorythodes albilineatus	61	11
Undetermined Ephemeroptera	5	–
Gastropoda		
Ancylidae	3	–
Eupera cubensis	–	3
Sphaeriidae(mollusca)	–	3
Odonata		
Argia sp.	–	3
Corduliidae	3	–
Trichoptera		
Cyrnellus fraternus	21	167
Cyrnellus sp.	8	–
Hydroptilidae	–	5
Mayatrichia sp.	3	–
Neotrichia sp.	5	8
Orthotrichia sp.	8	–
Oxyethira sp.	–	3
Polycentropodidae	3	5
Polycentropus sp.	–	5

Benthic macroinvertebrate taxa list for Packaging Corporation of America, collected via 20 discrete dip net sweeps in the Withlacoochee River, on 12 July, 2000.

	Control Site	Test Site
Acariformes		
Arrenurus sp.	2	–
Geayia sp.	2	–
Hydrodroma sp.	1	–
Mideopsis sp.	–	1
Piona sp.	1	–
Torrenticola sp.	2	–
Amphipoda		
Hyalella azteca	9	81
Coleoptera		
Dubiraphia vittata	1	1
Microcylloepus pusillus	–	1
Stenelmis sp.	4	–
Decapoda		
Palaemonetes sp.	1	–
Diptera		
Ablabesmyia mallochi	7	1
Ablabesmyia rhamphe grp.	1	–
Ceratopogonidae	1	2
Chironomidae	5	4
Chironomus sp.	–	1
Cladotanytarsus	–	1
Cricotopus bicinctus	9	5
Cryptotendipes sp.	3	2
Endochironomus sp.	–	1
Labrundinia becki	3	–
Nanocladius sp.	7	1
Palpomyia/bezzia grp.	3	2
Parachironomus carinatus	3	–
Polypedilum halterale grp.	2	–
Procladius sp.	1	–
Pseudochironomus sp.	2	–
Stempellina sp.	3	–
Stenochironomus sp.	1	–
Tanytarsus sp. O Epler	1	–
Tanytarsus sp. S Epler	–	1
Tribelos fuscicornis	3	–
Ephemeroptera		
Caenis sp.	4	–
Tricorythodes albilineatus	4	10

Gastropoda		
Ancylidae	–	1
Hydrobiidae	6	5
Micromenetus dilatatus	–	6
Micromenetus sp.	2	–
Undetermined Gastropoda	–	1
Isopoda		
Caecidotea sp.	2	–
Odonata		
Corduliidae	1	–
Undetermined Odonata	1	–
Oligochaeta		
Bratislavia unidentata	4	8
Haber speciosus	3	–
Limnodrilus hoffmeisteri	1	–
Nais communis complex	–	2
Pelecypoda		
Corbicula fluminea	2	–
Eupera cubensis	–	1
Undetermined Pelecypoda	4	1
Trichoptera		
Hydroptilidae	1	–
Nectopsyche sp.	–	1
Neotrichia sp.	3	–
Polycentropus sp.	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)

