Bioassays of

Georgia-Pacific

Palatka, Putnum County, Florida

NPDES #FL0002763

Sampled 10/14/96

February 1997

Biology Section

Division of Administrative & Technical Services

Comprehensive Quality Assurance Plan #870346G

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Bureau of Laboratories
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Introduction

Georgia Pacific, County Road 54, Palatka, Putnum County, Florida, NPDES #FL0002763, tests performed on 15 to 17 October, 1996.

The wastewater treatment system of this pulp and paper mill has a design flow of 40 MGD and an annual mean flow of 25.8 MGD (9/95–8/96). Wastewater treatment includes primary clarification followed by secondary treatment in anaerobic, facultative (capable of anaerobic or aerobic), and aerobic lagoons. A liquid-oxygen injection system injects pure oxygen into two effluent side-streams to counteract the BOD of the effluent and to maintain a dissolved oxygen concentration of ≥ 4.0 mg/L during the summer months and ≥ 5.0 mg/L during the winter months. Effluent is discharged to the St. Johns River via Rice Creek (facility summary provided by Khalid Al-Nahdy, FDEP, Jacksonville).

The toxicity tests discussed in this report were performed in accordance with methods described by Weber, 1993, *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, 4th Edition, EPA/600/4-90/027F.

Results and Discussion

The FDEP Biology Section performed two 48-hour static acute screening toxicity bioassays on a sample of effluent from this facility. The species used for these tests were the waterflea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Cyprinella leedsi*. The test results did not show toxicity in the *Ceriodaphnia dubia* test but produced 30% mortality in the *Cyprinella leedsi* (Table 1).

Total residual chlorine was not detected in the sample. The total ammonia and unionized ammonia concentrations were 3.92 mg/L and 0.24 mg/L, respectively. Unionized ammonia concentrations as low as 0.08 mg/L and 0.5 mg/L have been found to be acutely toxic to some freshwater fish and invertebrates, respectively ((EPA *Quality Criteria for Water 1986,* EPA 44015-86-001, 1986). Further chemical analyses were performed on the sample and numerous metals were identified (Table 2).

Conclusion

The sample of effluent collected from this facility on October 14, 1996, showed toxicity to the *Cyprinella leedsi* but not the *Ceriodaphnia dubia* test organisms. We attribute the observed toxicity to the unionized ammonia concentration and/or unknown constituents of the sample.

Table 1. Data recorded during the 48-hour acute toxicity screening bioassays of a sample of effluent from the Georgia Pacific facility, Palatka, Putnam County, Florida, NPDES#FL0002763, performed on 15 to 17 October, 1996.

Facility:	**Georgia Pacific**		**NPDES #**	**FL0002763**	Facility Type: Pulp and Paper Mill
Location:	County Road 54, Palatka		Contact/District:	T. McKelvey/Northeast	
County:	Putnam		Test type:	static acute screen	
Sample Collection Date:	10/14/96	Time: 1200	# tests:	2	Receiving Water: Rice Creek to
Test Beginning Date:	10/15/96	Time: 1400	Chlorination Type:	non-chlorinated	the St. Johns River
Test Ending Date:	10/17/96	Time: 1405			Page 1 of 1

Organism: ***Ceriodaphnia dubia*** Life stage: < 24 hours old

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[A]			Dissolved Oxygen			Conductivity Uncorrected µmhos/cm	
Concentrations	Volume(mL)	0 hr	24 hr	48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control A	0/20	5	5	5	7.9	-	8.2	24.1	-	23.8	7.9	-	7.9	185	200
Control B	0/20	5	5	5	-	-	8.2	-	-	23.8	-	-	7.9	-	190
Control C	0/20	5	5	5	-	-	8.3	-	-	23.8	-	-	7.9	-	210
Control D	0/20	5	5	5	-	-	8.3	-	-	23.7	-	-	7.9	-	195
100% A	20/0	5	5	5	8.1	-	8.8	24.1	-	23.8	5.5	-	7.6	1745	1845
100% B	20/0	5	5	5	-	-	8.8	-	-	23.8	-	-	7.4	-	1920
100% C	20/0	5	5	5	-	-	8.8	-	-	23.8	-	-	7.4	-	1890
100% D	20/0	5	5	5	-	-	8.8	-	-	23.8	-	-	7.5	-	2010

[A] Temperature of test incubator was continously recorded on a strip chart recorder.
Incubator temperature range for the test period was 24.4-25.6°C.

Organism: ***Cyprinella leedsi*** Age: 8 days

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[B]			Dissolved Oxygen			Conductivity Uncorrected µmhos/cm	
Concentrations	Volume(mL)	0 hr	24 hr	48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control A	0/500	5	5	5	8.0	8.3	8.5	23.7	23.5	23.6	7.8	7.9	7.9	245	250
Control B	0/500	5	5	5	8.0	8.3	8.5	23.6	23.4	23.5	7.8	7.9	7.9	245	250
Control C	0/500	5	5	4	8.0	8.3	8.5	23.6	23.4	23.5	7.9	7.9	7.8	245	245
Control D	0/500	5	5	5	8.0	8.3	8.5	23.7	23.8	23.6	7.9	8.0	7.9	245	245
100% A	500/0	5	5	4	8.0	8.3	8.4	23.7	23.6	24.0	4.3	4.6	5.6	1800	1825
100% B	500/0	5	4	2	8.0	8.3	8.4	23.6	23.5	23.8	4.3	4.1	5.1	1805	1800
100% C	500/0	5	5	5	8.0	8.3	8.4	23.7	23.6	23.7	4.3	4.2	5.1	1810	1820
100% D	500/0	5	3	3	8.0	8.3	8.4	23.8	24.0	23.8	4.3	4.0	5.1	1810	1815

[B] Temperature of test room was continously recorded on a strip chart recorder.
Room temperature range for the test period was 23.0-24.0°C.

Total Residual CL2	mg/L	Method
Field:	not measured	
Lab:	<0.03	DR-100

Ammonia	Total (mg/L)	Unionized (mg/L)
Control Water (fish):	< 0.017	0.00
20% Dilute Mineral Water (cladocerans):	< 0.017	0.00
100% Sample:	3.92	0.24

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (fish):	122	125
20% Dilute Mineral Water (cladocerans):	71	84
100% Sample:	330	102

Salinity	(ppt)
Control Water:	0
100% Sample:	0

Table 2. Results of chemical analyses on the effluent from the Georgia Pacific WWTF sampled on October 14, 1996.

Metals

Aluminum	4290	µg/L
Cadmium	0.32	µg/L
Calcium	36.8	mg/L
Chromium	8	µg/L[I]
Copper	4.7	µg/L
Iron	815	µg/L
Magnesium	6.06	mg/L
Nickel	19	µg/L
Silver	0.05	µg/L[I]
Vanadium	209	µg/L
Zinc	35	µg/L

Base, Neutral, & Acid Extractable Organics

none detected

[I] Value reported is less than the minimum quantitation limit and greater than or equal to the minimum detection limit.

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Georgia Pacific
County: Putnam
Contact / District: Tim McKelvey Northeast
NPDES Permit #: FL0002763
LIMS Sample #: 156114 (10-25-96) LIMS Job #: 96-OCT-15-27
sample log
Test Type: Screening / Definitive
Static / Static Renewal / Flow-through
Test Number: 2 of 2

Sample Collection: Date 10-14-96 Time 1200
Test Beginning: Date 10-15-96 Time 1400
Test Ending: Date 10-17-96 Time 1405
Organism Batch #: 78 Diluent Batch #: well
Organism Age: 8 days
Test Organism: Cyprinella leedsi

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0	22.9 @ 23.0	8.5 @ 23.1 °C	106.4 @ 105.4
	9.0 @ 9.0			996 @ 1079 @ 24.5 °C
24 hr	7.0 @ 7.0	23.7 @ 23.8	8.3 @ 24.5 °C	115.0 @ 105.4
	9.0 @ 9.0			1010 @ 1077 @ 24.3 °C
48 hr	7.0 @ 7.0	23.4 @ 23.5	8.5 @ 23.3 °C	111.2 @ 105.4
	9.0 @ 9.0			982 @ 1079 @ 24.1 °C

Remarks:
* the DO was checked at 1600
On 100% A6 [illegible] 4, 7 in all four test vessels
sample A only
concentrations MF 10-15-96
B [illegible] = missing B MF only
D = Dead
* The DO was checked to make sure that aeration was not required.

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	A9	5	5	5	8.0	8.3	8.5	23.7	23.5	23.6	7.8	7.9	7.9	245	245	250
Control	A10	5	5	5	8.0	8.3	8.5	23.6	23.4	23.5	7.8	7.9	7.9	245	245	250
Control	A11	5	5	4(D)	8.0	8.3	8.5	23.6	23.4	23.5	7.9	7.9	7.8	245	245	245
Control	A12	5	5	5	8.0	8.3	8.5	23.7	23.8	23.6	7.9	8.0	7.9	245	245	245
100 %	A13	5	5	4(D)	8.0	8.3	8.4	23.7	23.6	24.0	4.3	4.6	5.6	1800	1790	1825
100 %	A14	5	4(D)	2(2D)	8.0	8.3	8.4	23.6	23.5	23.8	4.4	4.1	5.1	1805	1780	1800
100 %	A15	5	5	5	8.0	8.3	8.4	23.7	23.6	23.7	4.3	4.2	5.1	1810	1800	1820
100 %	A16	5	3(2D)	3	8.0	8.3	8.4	23.8	24.0	23.8	4.3	4.0	5.1	1810	1810	1815
Measured/Loaded by:		ND	ND	MF	MF	DN	ND	MF	DN	ND	MF	DN	ND	MF	DN	ND
Recorded by:		DW	ND	MF	JS	ND	JS	JS	ND	JS	JD	ND	JS	JS	ND	JD

Investigators' Signatures
Marshall Fairchild
Julie Shapo
Dennis Nicholson
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reviewer

form updated 4/01/96

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			NOT TAKEN		
Lab Total Residual Cl2 (mg/L):	<.03	<.03	<.03	DR-102	JS
Alkalinity (mg/L as $CaCO_3$):	122	71	330	HACH	DN
Hardness (mg/L as $CaCO_3$):	125	84	102	HACH	DN
Total ammonia (mg/L as N):	<0.017	<0.017	3.72	Orion	ND

Ammonia Meter #98136 Meter Slope: -58.9 Ammonia Blank: <0.017 Control Salinity: ____ ppt Sample Salinity: ____ ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Georgia Pacific
County: Putnam
Contact / District: Tim McKelvey Northeast
NPDES Permit #: FL0002763
LIMS Sample #: 156114 LIMS Job #: 96-OCT-15-27
sample log 10-28-96
Test Type: (Screening) / Definitive
(Static) / Static Renewal / Flow-through
Test Number: 1 of 2
Remarks:
** Salinity not adjusted on D.O. meter JS

Sample Collection: Date 10-14-96 Time 1200
Test Beginning: Date 10-15-96 Time 1400
Test Ending: Date 10-17-96 Time 1405
Organism Batch #: 46 Diluent Batch #: 44
Organism Age: < 24 hours
Test Organism: Ceriodaphnia dubia

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	22.9 @ 23.0	8.5 @ 23.1 °C	106.4 @ 105.4 996 @ 1079 @ 24.5 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.7 @ 23.5	8.3 @ 24.5 °C	115.0 @ 105.4 1010 @ 1079 @ 24.3 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	23.4 @ 23.5	8.5 @ 23.3 °C	111.2 @ 105.4 982 @ 1079 @ 24.1 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	UNCORRECTED 24 h	UNCORRECTED 48 h	48h D.O.
Control	A	5	~~4 SD~~	5	7.9		8.2	24.1		23.8	7.9		~~6.5~~ **	185		200	7.9
Control	B	5	~~4 SD~~	5			8.2			23.8			~~6.6~~			195	7.9
Control	C	5	5	5			8.3			23.8			~~6.6~~			210	7.9
Control	D	5	5	5			8.3			23.7			~~6.6~~			195	7.9
100%	A	5	5	5	8.1		8.8	24.1		23.8	5.5		~~6.2~~	1745		1845	7.6
100%	B	5	5	5			8.8			23.8			~~6.2~~			1920	7.4
100%	C	5	5	5			8.8			23.8			~~6.1~~			1840	7.4
100%	D	5	5	5			8.8			23.8			~~6.1~~			2010	7.5
Measured/Loaded by:		MF	DN	MF	MF		ND	MF		ND	MF		ND	MF		ND	
Recorded by:		DN	DN	MF	JS		JS	JS		JS	JS		JS	JS		JS	

Investigators' Signatures
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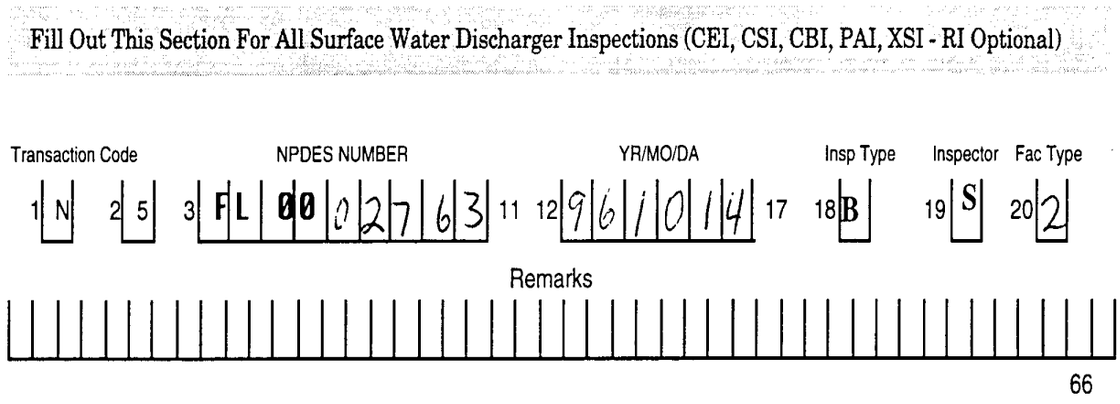
reviewer

form updated 4/01/96

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			NOT Measured		
Lab Total Residual Cl2 (mg/L):	<.03	<.03	<.03	DR-100	JS
Alkalinity (mg/L as $CaCO_3$):	122	71	330	HACH	DN
Hardness (mg/L as $CaCO_3$):	125	84	102	HACH	DN
Total ammonia (mg/L as N):	<0.017	<0.017	3.92	ORION	ND

Ammonia Meter #98136 Meter Slope: -58.9 Ammonia Blank: <0.017 Control Salinity: ____ ppt Sample Salinity: ____ ppt

The Bioassay of the Georgia Pacific effluent sampled on October 14, 1996, NPDES #FL0002763.



The Priority Pollutants Analysis for the Bioassay of the Georgia Pacific effluent sampled on October 14, 1996, NPDES #FL0002763.

