

# Low Effluent Pulping/Bleaching Technologies

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# Low Effluent Pulping/Bleaching Technologies

## Research Objectives

Develop a fundamental understanding of the types and amounts of nonprocess elements present in Georgia's wood furnish and how pulping and bleaching operations can minimize their impact on mill operations.

# Low Effluent Pulping/Bleaching Technologies

## Research Driver

Reduced access to fresh water supplies for Georgia's pulping and bleaching operations will encourage minimum effluent mill practices.

Non process elements in the kraft fiber line will impact mill operations unless their fate can be predicted and controlled

# Low Effluent Pulping/Bleaching Technologies

## Research Program

Develop an inventory of NPEs present in Georgia's SW and HW wood chips.

Investigate the changes in NPE's for a given fiber source during pulping and bleaching.

# Low Effluent Pulping/Bleaching Technologies

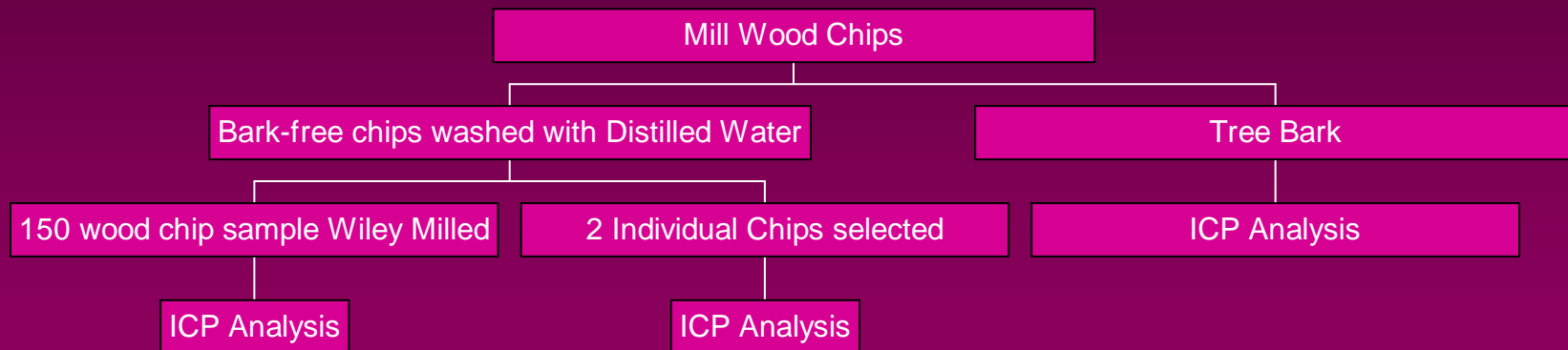
## Wood NPEs:

In most cases, we have received mill chipped and commercial wood chip samples

Fresh and 'old' 1997 wood chips

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## NPE Analysis Procedure



ICP metals analysis: Na, K, Si, Co, Cr, Ni  
Ca, K, Al,  
Mn, Fe

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## Selected NPE Wood Chip Studies: Mill A

	Cr	Mn	Fe	Co	Ni	Cu	Al	Si	Ba	Na	Mg	K	Ca
HW 99	<0.35	69.1	1.61	<0.37	<0.65	0.58	2.60	21.0	19.8	13.1	190	454	827
99	<0.35	44.6	4.56	<0.37	<0.65	0.91	5.86	17.0	10.9	8.6	232	1430	864
99	<0.35	73.6	2.66	<0.36	<0.63	0.92	2.60	13.2	21.6	7.13	247	640	863
97	<0.35	75.2	4.82	<0.37	<0.64	1.0	10.5	15.9	21.5	14.8	386	799	1200
SW 97	<0.32	75.3	1.87	<0.36	<0.64	0.39	10.8	16.2	12.5	7.6	195	246	652
SW 99	<0.35	90.8	2.93	<0.34	<0.60	0.65	4.7	7.7	8.17	5.3	139	287	527

mg NPE/kg chip

# Low Effluent Pulping/Bleaching Technologies

## Selected NPE Wood Chip Studies: Mill B

	Cr	Mn	Fe	Co	Ni	Cu	Al	Si	Ba	Na	Mg	K	Ca
SW Chip	>.34	12.0	1.38	>.36	>.63	0.55	7.18	18.8	0.54	14.8	161	77.9	430
SW Willy Milld	>.34	19.5	59.4	>.36	>.66	9.26	27.9	9.59	1.65	21.8	162	164	553

mg NPE/kg chip



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## Selected NPE Wood Chip Studies: Mill C

	Cr	Mn	Fe	Co	Ni	Cu	Al	Si	Ba	Na	Mg	K	Ca
HW Mill Chipped	<.32	9.95	26.5*	<0.34	<0.60	3.98	13.1	19.9	8.37	69.2	318	565	2240
HW Purchased	0.77	77.5	48.5	<0.37	<0.65	5.68	7.86	14.8	29.2	34.4	120	933	4690
SW Mill Chipped	<.35	18.8	26.5	<0.36	<0.63	2.85	5.08	8.77	4.76	27.8	203	219	693
SW Purchased	<.32	51.2	31.9	<0.34	<0.60	3.44	11.9	14.3	4.12	9.85	146	189	545

mg NPE/kg chip

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## Selected NPE Wood Chip Studies: Mill D

	Cr	Mn	Fe	Co	Ni	Cu	Al	Si	Ba	Na	Mg	K	Ca
HW	>0.35	26.8	31.9	>0.36	>0.64	3.70	2.52	18.9	13.5	13.8	283	1060	797
Mill	>0.35	28.1	28.8	>0.37	>0.64	5.10	3.25	12.9	14.1	13.5	298	1100	853
Chipped													
HW	>0.34	43.8	82.9	>0.38	>0.62	3.01	2.39	15.9	8.32	47.1	217	611	1790
Purchased													
SW	>0.34	80.0	50.1	>0.36	1.28	5.21	18.2	9.94	4.04	11.3	119	309	455
Mill													
Chipped													
SW	>0.34	81.0	99.8	>0.35	0.62	4.85	7.88	11.2	4.18	11.2	119	312	458
Purchased													

mg NPE/kg chip

# Low Effluent Pulping/Bleaching Technologies

- Additional NPE data available on mills A - D.
- Several other wood chips have been received are being processed for analysis.
- Strong interest in results from all GA mills contacted and data will be distributed to mill contacts

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## Preliminary Results

SW kraft → DEDED - open model system  
- closed model system

D<sub>0</sub>: 0.25 kf, E: 2.5% NaOH 75°C

D<sub>1</sub>: 0.38% ClO<sub>2</sub>; D<sub>2</sub>: 0.1%

<u>NPEs</u>	<u>Chips</u>	<u>Brownstock</u>	<u>D<sub>0</sub>open</u>
Na	20.3	1560	87.4
Ca	627.0	1470	646.0
K	556.0	212.0	71.0
Mg	270.0	334.0	71.1
Ba	4.83	7.27	1.02
Mn	86.2	42.1	0.23
Fe	5.80	9.30	3.72