

**Domtar Paper Company
Marlboro Mill**
By-products Land Application Program

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Southeast Sustainable Soils Forum
September 18, 2014

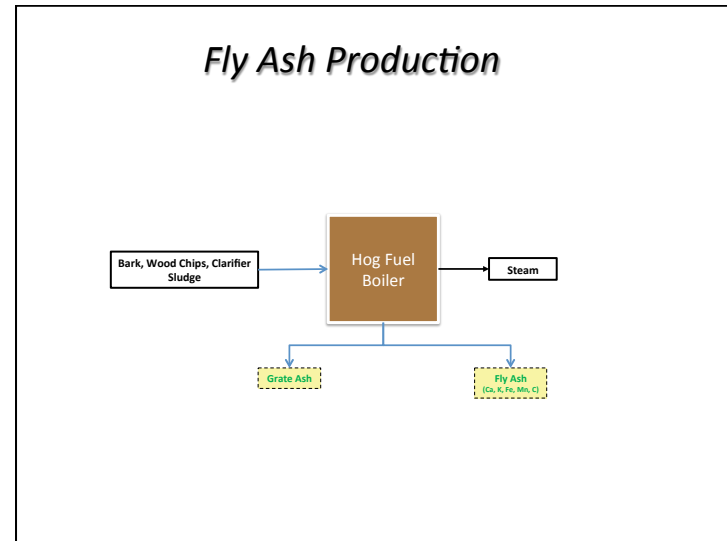
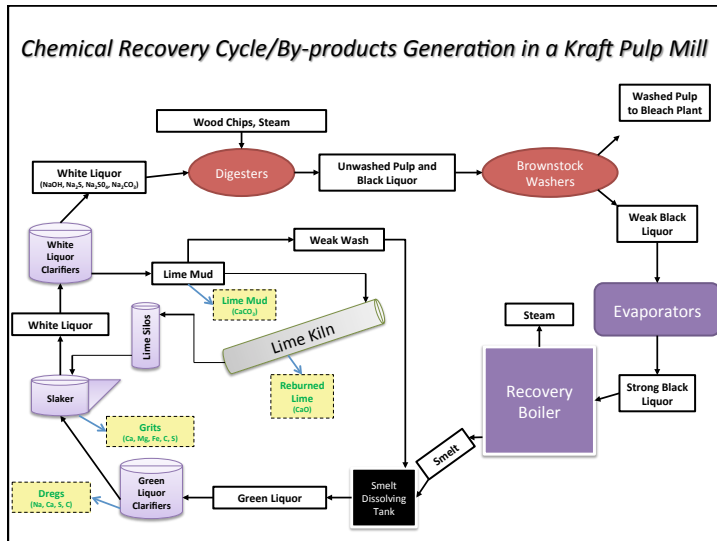
**Domtar Paper Company
Marlboro Mill**
By-products Land Application Program

- Kraft Pulp and Paper Mill located in Bennettsville, SC
- Began operation in 1990 (Willamette Industries)
- Produce approx. 1,100 tons/day bleached pulp and 1,000 tons/day copy paper, envelope paper, tablet paper, and receipt paper (newest product)
- Chemical Recovery process produces “by-products” – grits, dregs, lime mud and reburned lime. Wood fly ash from wood waste boiler
- Approximately 35,000 tons by-products/year (as of 2013)
- Operate under South Carolina Department of Health and Environmental Control (DHEC) land application permit

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- Land application program began in 1993 with technical assistance from Clemson University
- Regulatory assistance from DHEC and logistical recommendations from Marlboro Mill to help write permit
- Now conduct land application activities in 6 SC counties – *Chesterfield, Darlington, Dillon, Florence, Marlboro and Marion*
- By-products provided free-of-charge to farmers, landowners and others
- Recipients must provide soil analyses to confirm need for pH adjustment

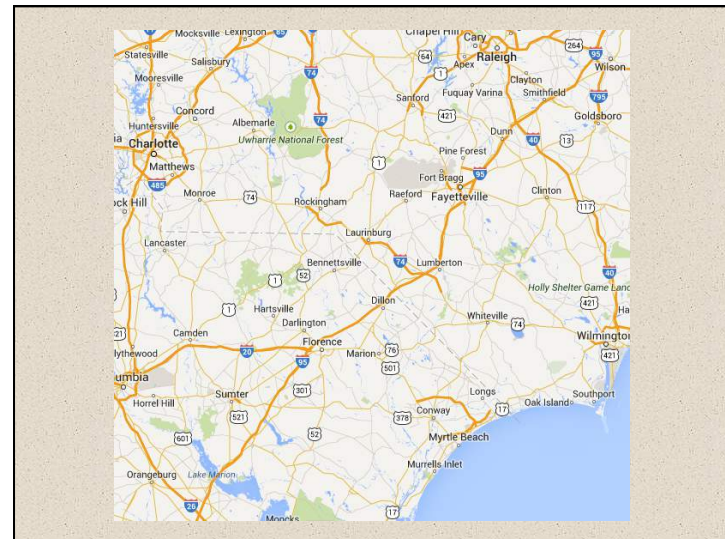






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- Over 400,000 tons to 280+ recipients
- Over 150,000 acres
- Volume equivalent to 400,000 yd³ or a football field 400 feet tall!
- Residual alkalinity is useful for increasing soil pH- similar to that of agricultural lime (2:1 equivalency)
- Row crops and hay/pasture land
- No claim of any micro nutrients or fertilizer benefit
- No known issues adversely affecting crops- actually get repeat requests
- Contractor provides equipment and employees for supervision, delivery and spreading



Domtar Paper Company - Marlboro Paper Mill
BY-PRODUCTS ANALYSIS - July 8, 2014

CHARACTERISTIC	DREGS (and GRITS)*		FLY ASH		LIME MUD		REBURNED LIME	
	100 % dry basis	As is basis	100 % dry basis	As is basis	100 % dry basis	As is basis	100 % dry basis	As is basis
Solids, % (as is)	51.78	1035.60	89.46	1789.20	77.76	1555.20	100.00	2000.00
Nitrogen, TKN, %	0.012	0.006	0.120	0.027	0.006	0.006	0.002	0.040
Phosphorus, %	0.15	0.08	1.55	0.50	0.45	0.28	0.75	0.57
Potassium, %	1.74	0.90	18.52	2.95	1.83	0.65	0.47	0.54
Sulfur, %	3.08	1.59	31.90	0.59	0.53	0.04	0.78	0.27
Calcium, %	14.60	10.13	202.88	32.53	29.07	581.45	26.40	582.09
Magnesium, %	2.98	1.94	30.88	1.03	0.92	0.87	10.42	1.09
Iron, mg/kg	2,870	1,838	3.1	6,390	5,716	11.4	462	375
Manganese, mg/kg	11,500	5,955	11.3	2,280	2,280	4.4	491	385
Copper, mg/kg	167	86.5	0.2	55	49.2	0.1	ND	<5.0
Zinc, mg/kg	970	502	1.0	648	580	1.2	43	33
Ammonia Nitrogen, mg/kg	0.780	29.98	0.1	11.20	10.02	0.0	10.00	10.00
Nitrate/Nitrite Nitrogen, mg/kg	ND	<2.0	-	ND	129.72	0.3	ND	<2.0
Cadmium, mg/kg	5.0	2.6	0.0	2.0	1.8	0.0	ND	<2.0
Nickel, mg/kg	231	120	0.2	44	39	0.1	84	65
Lead, mg/kg	15	8	0.0	13	12	0.0	ND	<5.0
Arsenic, mg/kg	ND	<3.0	-	ND	<3.0	-	ND	<3.0
Mercury, mg/kg	ND	<0.4	-	ND	<0.4	-	ND	<0.4
Selenium, mg/kg	ND	<5.0	-	ND	<5.0	-	ND	<5.0
Calcium Carbonate Equivalent, %	89.88	48.5	NA	88.89	79.4	NA	101.08	79.5
Organic Nitrogen, %	0.006	0.003	0.060	0.029	0.020	0.001	0.020	0.001
Available P ₂ O ₅ , %	0.21	0.11	2.17	0.49	0.43	0.33	6.69	0.14
Nitrate, % H ₂ O	44.22		10.54		22.24		0.00	
Boron, %	0.850	0.46	9.22	0.890	0.80	15.92	0.018	0.28
Boron (water soluble), %	0.001	0.0	0.01	0.0	0.01	ND	<1.0	0.00
Cadmium neutral equivalent, %	16.00	7.82	156.28	0.279	0.25	4.91	0.025	0.26
Conductivity, mS/cm (mmho/cm)	4.18		7.88		6.54		6.30	6.40
Inorganic % Ash	85.07	49.23	884.54	100.00	89.46	1789.20	89.47	77.35
Organic % Organic	4.93	2.55	51.08	0.00	0.00	0.53	0.41	0.24
Molybdenum, mg/kg	7	4	0.0	ND	7	0.0	ND	<5.0
Beryllium, mg/kg	ND	<5.0	-	ND	<5.0	-	ND	<5.0
Vanadium, mg/kg	130	71.46	0.1	59	52.7	0.1	13	10.2

Values in cells highlighted in green are in %
Others are in units of mg/kg; Conductivity in mS/cm

Note: All for products passed the USEPA Regulatory Limits for TCLP Parameters.
ND = Not detected
* 10% Grits/90% Dregs (Because of little analytical difference and large proportion of dregs, only Dregs analytical results are presented)
** The standard Pass Filter test for solids pH does not produce free water from the solids; therefore, pH is not applicable.
† 1 mg/kg = 1 ppm = 0.0001 %
‡ Calcium Carbonate Equivalent is substituted for alkalinity due to high pH of materials
* These items (in red) are analysis-required parameters for Class I materials. (3C Regulation 61-107.15 Definitions Section B, 4)

Domtar Paper Company - Marlboro Paper Mill
BY-PRODUCTS ANALYSIS - AVERAGE
2014 Report Year: July 1, 2013 through June 30, 2014
(Average of the following samples: 40914, 50914, 10314, and 60914)

COMPONENT UNIT	CUMULATIVE LIFETIME LOADING RATE (kg/acre)		CUMULATIVE LIFETIME LOADING RATE (lb/acre)		GRITS AND DREGS (G/D)		CUMULATIVE LIFETIME LOADING RATE (lb/acre)		CUMULATIVE LIFETIME LOADING RATE (kg/acre)	
	100 % dry basis	As is basis	100 % dry basis	As is basis	100 % dry basis	As is basis	100 % dry basis	As is basis	100 % dry basis	As is basis
Ammonia, TKN, %	0.012	0.006	0.120	0.027	0.006	0.006	0.002	0.040		
Phosphorus, %	0.15	0.08	1.55	0.50	0.45	0.28	0.75	0.57		
Potassium, %	1.74	0.90	18.52	2.95	1.83	0.65	0.47	0.54		
Sulfur, %	3.08	1.59	31.90	0.59	0.53	0.04	0.78	0.27		
Calcium, %	14.60	10.13	202.88	32.53	29.07	581.45	26.40	582.09		
Magnesium, %	2.98	1.94	30.88	1.03	0.92	0.87	10.42	1.09		
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COMPONENT, unit	CUMULATIVE LIFETIME LOADING RATE LIMIT (4)	CUMULATIVE LIFETIME LOADING RATE (for applied by-product, G/D)	GRITS AND DREGS (G/D)	
			100 % dry basis	As is basis
	lb/acre	lbs component per acre (based on 1 ton/acre)		
Nitrogen, TKN, %			0.01	0.00
Phosphorus, %			0.25	0.15
Potassium, %			1.31	0.70
Sulfur, %			2.52	1.32
Calcium, %			24.33	15.03
Magnesium, %			2.59	1.33
Iron, mg/kg		1,370	3982.50	2154.60
Manganese, mg/kg		1.370	6247.50	4117.15
Copper, mg/kg		2,950	145.00	72.17
Zinc, mg/kg			931.00	465.53
Ammonia Nitrogen, mg/kg			10.75	5.01
Nitrate/Nitrite Nitrogen, mg/kg			ND	ND
Cadmium, mg/kg		35	0.006	5.50
Nickel, mg/kg		383	0.249	112.77
Lead, mg/kg		274	0.017	14.50
Arsenic, mg/kg		37	0.0	ND
Mercury, mg/kg		15	0.0	ND
Selenium, mg/kg		91	0.002	1.50

Domtar
MARLBORO PAPER MILL

MORE FARM, LLC

BY-PRODUCTS LAND APPLICATION REGISTER
OF HAULING AND SPREADING

Recipient: WIN FARM COLLINS Number: 286

Location: RD 20 (Address)

Latitude: 35° 07' 32" Longitude: 77° 16' 34"

Field Size: 30 (in acres) Soil Sample pH: 5.7

By-Product to be Applied: Fly Ash

Delivery Dates: 7-17-14 Spreading Dates: 7-21-14

Application Rate: 2 (ton/acre) Equivalent Lime Rate: 1 (ton/acre)

Planned Crop: Pasture

Adjacent Structures/Buildings (general description, location, and distance to field):

1. Windmill (Structure) has received approval letter copies or implied written or verbal from landowner to land apply the above by-product materials to the above lands (excludes for soil pH adjustment)

Signature: [Signature] Date: 6/20/14

Quantity of By-Product Delivered and Applied:

FLY

Comments: FRANK ED MAHON MR

Delivered By: Laura Wooten - Philip Byrd

Spread By: [Signature]

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