

1641 Sigman Road
PO Box 919
Conyers, GA 30012
1-770-922-8000 ext 164
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Report of Analysis

McHale & Associates Inc.
18378 Redmond Way
Redmond WA 98052

Company Contact: James Hollibaugh
james.hollibaugh@mchale.org

BEL ID Number(s):	BEL123919	Sample Weight (kg):	4.02/3.52
Product/Commodity:	Woody Biomass	Sample Received:	11/24/2013
Sample Designation:	Time 12:00 PM	Report Date:	12/3/2013
Packaging:	Plastic Bag	Report ID:	BEL123919-1
Date Sampled:	11/21/2013	Purchase Order #	N/A

Compositional Analysis: Proximate/Ulimate Analysis

Parameter	As-Received	Oven Dry	Analytical Method
Total Moisture (%)	37.74		CEN/EN 14774-1
Ash (%)	2.39	3.83	CEN/EN 14775
Volatiles (%)			CEN/EN 15148
Fixed Carbon (%)			By Difference
Gross Calorific Value (GJ/Tonne)	12.04	19.33	CEN/EN 14918
Net Calorific Value (cV)(GJ/Tonne)	10.42	18.13	CEN/EN 14918
Net Calorific Value (cP)(GJ/Tonne)	10.33	18.06	CEN/EN 14918
Carbon (%)	30.70	49.31	CEN/EN 15104
Hydrogen (%)	3.63	5.83	CEN/EN 15104
Nitrogen (%)	0.20	0.32	CEN/EN 15104
Sulfur (%)	0.01	0.01	CEN/EN 15289
Oxygen (%)	25.34	40.69	By Difference

Prepared By: 

Results shown on this certificate represent only the quantity of sample which was submitted for analysis. BEL does not assume responsibility for selection, representation, and/or sample identifications. Analyses are carried out within the scope of Principal's instructions and with due care and skill in conformity with BEL Terms and Conditions of Business. Claims in respect of services provided will be considered only if based upon failure to take due care proven by the Principal. Liability shall in no circumstances whatsoever exceed a total aggregate sum equal to 10 (ten) times the amount of the fee paid for the service.

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Major and Minor Elements:

Analyte	Dry Basis	Units	CEN/EN 15297
Aluminum (Al)	125.5	mg/kg	
Calcium (Ca)	5760	mg/kg	
Chromium (Cr)	<5.0	mg/kg	
Iron (Fe)	110	mg/kg	
Lead (Pb)	0.51	mg/kg	
Magnesium (Mg)	602.5	mg/kg	
Manganese (Mn)	79.7	mg/kg	
Mercury (Hg)	<0.020	mg/kg	
Phosphorus (P)	512	mg/kg	
Potassium (K)	1750	mg/kg	
Silica (Si)	6693	mg/kg	
Sodium (Na)	120	mg/kg	
Titanium (Ti)	6.1	mg/kg	

Analysis of Ash: Ash Fusion Temperatures/Mineral Ash Analysis

Ash Fusion Property	Oxidizing (°C)	ISO 540
Shrinkage Starting Temperature (SST)	1240	
Deformation Temperature (DT)	1250	
Hemispherical Temperature (HT)	1260	
Flow Temperature (FT)	1270	

Prepared By: Chris Wiberg

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