

# Alpha Resources, Inc.

## Certificate Of Analysis

AR 1946  
WOOD FUEL BIOMASS STANDARD  
LOT # 815A

### DRIED BASIS VALUES

#### Proximate Analysis

% Ash	3.90 ± 0.37	% Carbon	49.44 ± 1.17
% Volatile Matter	79.5 ± 3.2	% Hydrogen	5.71 ± 0.26
% Sulfur	(0.03)	% Nitrogen	0.23 ± 0.05
% BTU	8345 ± 124	% Oxygen (calculated)	(40.68)
% MAF BTU	8701 ± 196	% Moisture	(3.48)

#### Mineral Analysis

% Calcium	0.45 ± 0.05	% Potassium	0.14 ± 0.03
% Magnesium	0.048 ± 0.001	% Sodium	(0.009)
% Silicon	(1.08 ± 0.003)	% Barium	(0.0047)
% Strontium	(0.0033)	% Lead	(0.0004)
% Nickel	(0.0003)	% Copper	(0.0004)
% Iron	0.11 ± 0.02	% Manganese	0.011 ± 0.001
% Zinc	(0.0014)	% Aluminum	(0.04)
% Vanadium	(0.0003)	% Mercury	(<0.000005)
% Fluorine	(<0.005)	% Chlorine	(<0.02)

() – Indicates for reference only. [] indicates reference used for tests

The following procedures and standards were employed in the analysis of the above standard:

Moisture – ASTM E871, E1756A, D3302, D3173, EN14774      Ash- ISO18122, ASTM D1102, D3174, D5142, E1755  
 BTU – ASTM E711, D5865, EN14918 [Benzoic Acid]      Volatile Matter- ASTM E872, D3175, ISO18123 mod  
 Sulfur – ASTM D4239, ISO16994      [NIST 2693]  
 C/H/N/O – ASTM D5373, D3176, ISO16948, ISO16993 [EDTA, CRM-3, BBOT]  
 Metals/Mineral – ISO 16967, ISO16968, D6349 mod, D3682 mod  
 Hg/F/Cl – ISO16994, ASTM D4208, EPA SW846-5050, EPA SW846-7471B

This reference is made of finely pulverized wood (-40mesh) that has been kept at 0°C for a minimum of 72 hours and then dried at 120°C for a minimum of 1 hour before blending for homogeneity. The intended use is for a control or test method validation/quality check of laboratory test procedures.

When necessary, professional judgment is applied toward consideration of data and statistical information. The statistical analysis, the overall direction, and coordination of the analytical measurements leading to certification were performed by K.E. Dyer, Technical Manager, at Alpha Resources. The uncertainty values represent the k=2, 95% confidence limit, expanded uncertainty. The test values were derived by multiple labs using various test methods and may not be consistent with your test method and capabilities. Refer to your test method or manufacturer recommendations for overall repeatability/reproducibility uncertainties.

Samples for round robin testing were selected in accordance to ARI 031. The values only relate to the material certified. This bottle contains 50g of fine wood pulp to be used per the test method you use. Recommended drying is 105° C to a constant mass or per your test method. This reference has an indefinite known shelf life when kept sealed and unopened. Once opened the shelf life is limited to two years. This reference standard was produced in accordance to ISO Guide 31 and Guide 34.

This is a certified reference material (Working Standard) and is verified by the above-mentioned reference test standard(s). For good laboratory practice, we recommend that all secondary standards be verified and documented prior to use. Remedies for any claimed defect in this product will be limited to product replacement or refund of the purchase price. In no event shall alpha resources be liable for incidental or consequential damages. This certificate cannot be reproduced except in full.

EXPIRATION DATE  
THIS CRM IS VALID FOR TWO YEARS FROM THE DATE OF OPENING  
CERTIFIED September 15, 2016

