

## **Certificate of Analysis**

## AR-2781

## **ULTIMATE COAL STANDARD**

LOT # 781918

LID # 781918

## **DRIED BASIS VALUES**

	ASTM	Ultimate Analysis		ASTM
42.89 ± 0.43	D3174/D7582	% Carbon	45.14 ± 0.57	D5373
26.30 ± 1.45	D3175/D7582	% Hydrogen	3.39 ± 0.18	D5373
(30.81)	D3172	% Nitrogen	0.91 ± 0.16	D5373
2.27 ± 0.06	D4239	% Oxygen (calculated)	(5.40)	D3176
8097 ± 90	D5865	MAF/DAF BTU	14163 ± 140	D3180
	ASTM	Sulfur Forms		ASTM
60.54 ± 2.52	D4326/D6349	% Pyritic	1.40 ± 0.10	D2492
19.91 ± 1.88	D4326/D6349	% Organic (calculated)	(0.52)	D2492
0.96 ± 0.09	D4326/D6349	% Sulfate	0.35 ± 0.08	D2492
9.44 ± 1.33	D4326/D6349			
$0.50 \pm 0.08$	D4326/D6349	Ash Fusion Temperature	Degrees F	Degrees F
1.48 ± 0.23	D4326/D6349	ASTM D1857	Reducing	Oxidizing
3.55 ± 0.50	D4326/D6349	Initial deformation	2231	2443
0.57 ± 0.07	D4326/D6349	Softening	2346	2564
$(0.72 \pm 0.27)$	D4326/D6349	Hemispherical	2443	2643
$(0.07 \pm 0.03)$	D4326/D6349	Fluid/Final	2562	2667
$(0.04 \pm 0.01)$	D4326/D6349			
0.14 ± 0.03	D4326/D6349	% Chlorine D4208/D6721	0.0769 ± 0.	0065
0.05 ± 0.01	D4326/D6349			
(2.03)				
	$26.30 \pm 1.45$ $(30.81)$ $2.27 \pm 0.06$ $8097 \pm 90$ $60.54 \pm 2.52$ $19.91 \pm 1.88$ $0.96 \pm 0.09$ $9.44 \pm 1.33$ $0.50 \pm 0.08$ $1.48 \pm 0.23$ $3.55 \pm 0.50$ $0.57 \pm 0.07$ $(0.72 \pm 0.27)$ $(0.07 \pm 0.03)$ $(0.04 \pm 0.01)$ $0.14 \pm 0.03$ $0.05 \pm 0.01$	$\begin{array}{llll} 42.89 \pm 0.43 & D3174/D7582 \\ 26.30 \pm 1.45 & D3175/D7582 \\ (30.81) & D3172 \\ 2.27 \pm 0.06 & D4239 \\ 8097 \pm 90 & D5865 \\ & & & & & & \\ & & & & & \\ & & & & & $	42.89 ± 0.43       D3174/D7582       % Carbon	42.89 ± 0.43       D3174/D7582       % Carbon

REFERENCES USED: Sulfur - NIST SRM 2683c, NCS FC28011d; BTU - NIST 39j(Benzoic Acid); C/H/N - Phenylalanine, EDTA; Sulfate Sulfur - QAR-RM-6; Mineral Analysis - NIST634a, USGS AGV-2; Chlorine - SRM2693. () indicates reference only value Notes:

The intended use of this standard is for the verification of various tests by the above-mentioned methods. Typical sample size for analytical testing and minimum size is subject to the test method and instrumentation used. The uncertainty values represent the expanded uncertainty (k=2, @95% confidence) obtained through analytical testing by the mentioned ASTM methods utilizing ANOVA, ISO Guide 35, and the Guide to Uncertainty Measurement. Normal test procedures should be employed when using this standard; this includes using the *reproducibility* and *repeatability* factors of the method for establishing analytical uncertainty if needed. When necessary, professional judgment is applied toward consideration of data and statistical information. The statistical analysis and the overall direction and coordination of the analytical measurements leading to certification were performed by K.E. Dyer, Chief Chemist at Alpha Resources.

The material used in production of this standard was prepared and sampled in accordance with ARI 041. The samples for round-robin testing were selected in accordance with ARI 031. The above values relate only to the material used to produce this standard. The analytical samples should be dried or corrected for moisture as per the test method you are using. This bottle contains 50g fine coal powder (-60 mesh). While unable to determine a definite shelf life this reference standard should be reviewed 20 years from the data of certification. Once opened this certificate is valid for two years. Keep sealed tight and store under normal laboratory conditions. This certificate cannot be reproduced except in full.

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 is a Certified Reference Material and is traceable to the above-mentioned references. For good laboratory practice it is recommended that all standards be verified as fit for purpose prior to use. This standard was produced in accordance to ISO Guide 31 and ISO 17034 (RMP) accreditation issued by ANSI-ASQ/ANAB. Refer to certificate and scope of accreditation AR1920.

EXPIRATION DATE
THIS CRM IS VALID FOR TWO YEARS FROM THE DATE OF OPENING
CERTIFIED November 29, 2018

Kent Dyer