ALPHA RESOURCES LLC

Value Beyond Measure

Certificate of Analysis

AR-2782

ULTIMATE COAL STANDARD

LOT # 782118 LID # 782118

DRIED BASIS VALUES

Proximate Analysis		ASTM	Ultimate Analysis		ASTM
% Ash.....	23.64 ± 0.24	D3174/D7582	% Carbon.....	55.70 ± 1.27	D5373
% Volatile Matter.....	32.24 ± 1.40	D3175/D7582	% Hydrogen.....	4.10 ± 0.32	D5373
% Fixed Carbon(calculated)	44.12	D3172	% Nitrogen.....	(1.28 ± 0.49)	D5373
% Sulfur.....	5.39 ± 0.16	D4239	% Oxygen (calculated)...	(9.89)	D3176
Btu/lb.....	10031 ± 250	D5865	MAF/DAF BTU	13163 ± 355	D3180

Mineral Analysis		ASTM	Sulfur Forms		ASTM
Silica.....	45.92 ± 2.63	D4326/D6349	% Pyritic.....	1.83 ± 0.30	D2492
Alumina.....	20.77 ± 1.08	D4326/D6349	% Organic (calculated)...	(1.95)	D2492
Titania.....	1.04 ± 0.12	D4326/D6349	% Sulfate.....	1.61 ± 0.21	D2492
Ferric Oxide.....	(23.16 ± 4.37)	D4326/D6349			
Calcium Oxide.....	1.28 ± 0.08	D4326/D6349	Ash Fusion Temperature	Degrees F	Degrees F
Magnesium Oxide.....	0.79 ± 0.04	D4326/D6349	ASTM D1857	Reducing	Oxidizing
Potassium Oxide.....	2.68 ± 0.24	D4326/D6349	Initial deformation...	2030	2515
Sodium Oxide.....	(0.21 ± 0.14)	D4326/D6349	Softening.....	2190	2548
Sulfur Trioxide.....	1.63 ± 0.24	D4326/D6349	Hemispherical.....	2281	2569
Phosphorus Pentoxide.....	0.12 ± 0.02	D4326/D6349	Fluid/Final.....	2385	2602
Strontium Oxide.....	(0.03)	D4326/D6349			
Barium Oxide.....	0.18 ± 0.04	D4326/D6349	% Chlorine D4208/D6721	(0.0282)	
Manganese Oxide...	(0.02)	D4326/D6349			
Undetermined (calculated)	(2.17)				

REFERENCES USED: Sulfur - NIST SRM 2685b, NCS FC28143; BTU - NIST 39j; C/H/N – CRM-6, CRM-9; Sulfate sulfur – QAR-RM-1; Pyritic Sulfur – SRM1635a; Chlorine – SRM1635a, SRM2685c. () 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 (Working Standard) and is traceable (Sulfur) to the above mentioned NMI references. For good laboratory practice it is recommended that all standards be verified fit for purpose prior to use. This standard was produced in accordance to ISO 17034 and ISO Guide 31.

EXPIRATION DATE

THIS CRM IS VALID FOR TWO YEARS FROM THE DATE OF OPENING

CERTIFIED March 19, 2018

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