ALPHA RESOURCES® Value Beyond Measure

Certificate of Analysis

AR2780, Lot# 240304

Ultimate Coal CRM

AR2780, Lot# 240304 – Certified Values (Dried Basis)						
Proximate Analysis						
	ASTM Method	**Mean**	**St Dev**	**Expanded Uncertainty**	**n**	**k**
% Ash	D3174/D7582	19.18	0.12	0.24	21	2.09
% Volatile Matter	D3175/D7582	29.28	0.75	1.56	21	2.09
% Fixed Carbon (calc)	D3172	(51.16)	--	--	--	--
% Sulfur	D4239	3.31	0.13	0.27	40	2.02
BTU/lb	D5865	11377	33	78	8	2.36
Ultimate Analysis						
	ASTM Method	**Mean**	**St Dev**	**Expanded Uncertainty**	**n**	**k**
% Carbon	D5373	64.27	0.31	0.73	8	2.36
% Hydrogen	D5373	4.04	0.26	0.62	8	2.36
% Nitrogen	D5373	1.19	0.12	0.28	8	2.36
% Oxygen (calc)	D3176	(7.98)	--	--	--	--
MAF/DAF BTU (calc)	D3180	(14075)	--	--	--	--
Mineral Analysis						
	ASTM Method	**Mean**	**St Dev**	**Expanded Uncertainty**	**n**	**k**
% Silica	D4326/D6349	46.21	0.31	0.73	8	2.36
% Alumina	D4326/D6349	22.80	0.27	0.63	8	2.36
% Titania	D4326/D6349	1.13	0.05	0.13	8	2.36
% Ferric Oxide	D4326/D6349	19.63	0.26	0.63	8	2.36
% Calcium Oxide	D4326/D6349	2.49	0.08	0.20	8	2.36
% Magnesium Oxide	D4326/D6349	1.00	0.04	0.10	8	2.36
% Potassium Oxide	D4326/D6349	2.26	0.17	0.41	8	2.36
% Sodium Oxide	D4326/D6349	(0.32)	--	--	8	2.36
% Sulfur Trioxide	D4326/D6349	(3.35)	--	--	8	2.36
% Phosphorus Pentoxide	D4326/D6349	(0.31)	--	--	8	2.36
% Strontium Oxide	D4326/D6349	(0.07)	--	--	8	2.36
% Barium Oxide	D4326/D6349	(0.10)	--	--	8	2.36
% Manganese Oxide	D4326/D6349	(0.05)	--	--	8	2.36

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Additional Values			
Sulfur Forms			
	ASTM Method	**Value**	
% Pyritic	D2492	(1.34)	
% Organic (calc)	D2492	(0.96)	
% Sulfate	D2492	(1.01)	
Ash Fusion Temperature			
	ASTM Method	**Degrees F Reducing**	**Degrees F Oxidizing**
Initial deformation	D1857	(2100)	(2485)
Softening	D1857	(2241)	(2521)
Hemispherical	D1857	(2353)	(2538)
Fluid/Final	D1857	(2422)	(2590)
Halogens			
	ASTM Method	**Value**	
% Chlorine	D4208/D6721	(0.121)	
% Fluorine	D3761/D5987	(0.0097)	

Note: Parentheses () indicate an information-only value.

Primary (NMI)/GUIDE 34/ISO 17034 Reference Standards Employed:

Test	Primary Reference Standards
% Sulfur	**NIST SRM 2684c, 2685c; NCS FC28009F; AR1709-709512, AR1710-710621; QAR CRM-9a; LQSI 8H0158**
% C/H/N	**EDTA, phenylalanine**
Mineral Analysis	**USGS AGV-2; NIST 634A, 2691, 16359**
BTU	**Benzoic acid**
Volatile Matter	**LQSI 200045**
Ash Fusion	**LQSI 200049**
Halogens	**QAR-CRM-3a; NIST 2682c, 2684c, 8499**

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AR2780 is a Certified Reference Material (CRM) traceable to the above-mentioned reference standards. All reference materials should be verified as fit for purpose prior to use. Analytical values are accredited under Alpha Resources, LLC ISO/IEC 17025 and ISO 17034 accreditation issued by ANSI National Accreditation Board (ANAB). Please refer to certificates and scopes of accreditation AT-1200 and AR-1920. This material is intended to be dried or corrected for moisture as per the test methods used. Each bottle contains 50 g of fine coal powder (-60 mesh). Typical sample size for analytical testing is dependent upon the test method and instrumentation used.

The intended use of this Ultimate Coal CRM is for the verification of various tests using the above-mentioned test methods. The mean analytical values were derived by separate data sets with traceability to the above-mentioned reference standards. Metrological traceability is to the SI derived unit of mass fraction expressed as percent and BTU/lb. The precision values represent the estimated mean value and uncertainty derived from the data sets utilizing ANOVA, ISO Guide 35, and the Guide to Uncertainty Measurement. Refer to the test method for additional information related to measurement uncertainty.

While unable to determine a definite shelf life, this reference material should be reviewed 20 years from the date of certification. Once packaging is 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. Produced in accordance with ISO 17034.

Certification Date: April 19, 2024

Dustin Jenkins, Ph.D.
Global Technical Director

ANAB
ANSI National Accreditation Board
ACCREDITED
ISO 17034
REFERENCE MATERIAL PRODUCER