



## Certificate of Analysis

AR-4007

**CARBON AND SULFUR IN ORE**

**LOT # 418B**

**% CARBON**

**MEAN = 7.32**

**Standard Deviation =  $\pm 0.12$**

**Expanded Uncertainty =  $\pm 0.26$**

**(k=2, @95% confidence) (n=38)**

**% SULFUR**

**MEAN = 3.24**

**Standard Deviation =  $\pm 0.07$**

**Expanded Uncertainty =  $\pm 0.16$**

**(k=2, @95% confidence) (n=39)**

The intended use is for Carbon and Sulfur determination using induction and resistance type combustion furnaces with infrared detection. Accelerants like Tungsten Tri-oxide (WO<sub>3</sub>) were used in the resistance furnace. Tungsten metal and iron chip were used in the induction analysis. Method of analysis ASTM E1915-13 and ARI-033.

Standards Employed for traceability:

NIST	1D
NCS	DC73508, DC70010, DC73005, DC28091
EURO	ECISS 701-1
ALPHA	AR4007-1203, AR4016-213A, AR4006-411B

The mean analytical values were derived by data sets showing traceability to the above mentioned NMI and Alpha standards and reported in mass fraction. The precision values are derived using ISO Guide 35, the Guide to Uncertainty Measurement, and ANOVA. Refer to your test method or instrument manufacturer for the expanded method derived 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.

There were limited primary standards of this type of matrix available at the time of certification. Sample size and minimum sample size for this data was 150-300mg nominal. Refer to your instrument manufacturer for typical sample analysis size. This bottle contains 30g of fine powder to be used directly from the bottle without preparation. Keep sealed and store under normal laboratory conditions. While unable to determine a definite shelf life this reference should be reviewed 20 years from certification.

The material used in production of this standard was sampled in accordance with ARI 032. The samples for round robin testing were selected in accordance with ARI 014. The above values relate only to the material used to produce this standard.

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 its entirety.

This is a Certified Reference Material (Working Standard) and is traceable to the above-mentioned standards. 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 (non- scope).

Certified September 14, 2018

Chief Chemist