



# Certificate of Analysis

AR 947

HIGH SULFUR/CARBON STEEL CHIP CRM

LOT # 620B

% CARBON

MEAN = 0.385

Standard Deviation =  $\pm 0.003$

Expanded Uncertainty =  $\pm 0.007$

(k=2, @ 95% confidence) n=30

% SULFUR

MEAN = 0.104

Standard Deviation =  $\pm 0.001$

Expanded Uncertainty =  $\pm 0.003$

(k=2, @ 95% confidence) n=32

% NITROGEN

MEAN= 0.0103

Standard Deviation =  $\pm 0.0003$

Expanded Uncertainty =  $\pm 0.0007$

(k=2, @ 95% confidence) n=32

Method of Analysis is ASTM E 1019-18, ARI-LAB-621 and ARI-LAB-622

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

NIST 50c, 12h, 368, 345b, 100b, 8k

EURO BCS 232/2, BAM183-1

JSS 604-9

NCS HC11111

ALPHA - AR947-22900, AR951-918C, AR952-120308, AR948-817D

The intended use of this reference material standard is for the calibration and verification of Carbon/Sulfur/Nitrogen analysis as described by ASTM E-1019. The mean analytical values were derived by data sets showing traceability to the above-mentioned references. The minimum and typical size used for testing was 1g. The precision values represent the estimated mean, standard deviation, and expanded uncertainty derived from the data sets using ISO Guide 35, ANOVA, and the Guide to Uncertainty Measurement. Metrological traceability is to the SI derived unit of mass fraction expressed as percent. Refer to your test method for additional uncertainty information. 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 reference material standard was identified in accordance with ARI-LAB-603. The samples for round robin testing were selected in accordance with ARI-LAB-625. The above values relate only to the material used to produce this product. This bottle contains 150g iron chips, to be used directly from the bottle with no preparation needed. While unable to determine a definite shelf life, this reference should be reviewed every 25 years from the date of certification. Keep sealed and store under normal laboratory conditions. 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.

This is a Certified Reference Material (CRM) and is traceable to the above-mentioned reference materials. For good laboratory practice, it is recommended that all references be verified as fit for purpose prior to use. These test results are accredited under the Alpha Resources LLC. laboratory's ISO/IEC 17025 and ISO 17034 accreditation (RMP) issued by ANSI-ASQ/ANAB. Refer to certificate and scope of accreditation(s) AT-1200 and AR-1920.

Certified March 2, 2021

Chief Chemist