ALPHA RESOURCES LLC

Value Beyond Measure

Certificate of Analysis

AR-2895

RESIDUAL OIL STANDARD

LOT # 895418		**LID ID 895418**
WEIGHT PERCENT SULFUR	**=**	**0.51**
EXPANDED UNCERTAINTY	**=**	**± 0.02**

(k=2, @ 95% confidence limit, n=29)

Method used for analysis: ASTM D 4294-16, ARI-078
NMI Standard(s) used: NIST 1619a
ALPHA – AR2809-809606, AR2812-812808, AR2895-895615

The intended use of this standard is for the calibration and or verification of sulfur analysis by XRF or other valid testing methods. This standard was produced gravimetrically using high purity materials, with balances calibrated and checked by precision NIST traceable weights. The above ASTM test method and NMI references listed were used for testing. The uncertainty value represents the 95% confidence limit (k=2) derived from analysis, including possible errors in weighing, and utilizing ISO Guide 35, ANOVA, and the Guide to Uncertainty Measurement. The sample size used for testing was placed into a removable sample cup, equipped with replaceable X-ray transparent plastic film and providing a sample depth of at least 4mm and a diameter of at least 10mm. 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. Normal test procedures should be employed when using this standard. This includes using the *reproducibility* and *repeatability* uncertainty for the test method you wish to employ. The material used in production of this standard was identified 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.

Before use, the contents of the bottle should be mixed by vigorous shaking. Any exposure to air and light should be kept to a minimum. Keep sealed and store upright under normal laboratory conditions. This bottle contains 100ml to be used as per the test method. Sample size and minimum sample size may be contingent upon your test method or instrumentation manufacturer recommendations. While unable to provide a definite shelf life, unopened and stored properly this product should be reverified every 20 years from certification. Once opened this certificate is valid for two years. This reference material was produced in accordance to ISO 17034 and ISO Guide 31.

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 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. These test results are accredited under the Alpha Resources LLC laboratory's ISO/IEC 17025 and ISO 17034 (RMP) accreditation issued by ANSI-ASQ/ANAB. Refer to certificate and scope of accreditation(s) AT-1200 and AR1920.

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

Certified November 1, 2018

Chief Chemist