



TECHNICAL REPORT

ACIRS-G5-2013

General Coal Reference Material

Date of Certification: October, 2013
Valid to: October, 2015
Report Number: TR1-G5-2013
Previous ACIRS-G series: This is the third in the series and replaces ACIRS-G4-2012 withdrawn from sale in November 2013

1. Introduction

This report describes the preparation and certification of ACIRS-G5-2013 which comprises a sealed jar containing approximately 250 g of reference coal at a nominal top size of 212 µm.

This reference material is intended to be used to support the validity of analysis results for those parameters where certified values have been provided; and as a quality control tool.

2. Certified Values

Table1 Characterisation of ACIRS-G5-2013

| | Certified Values | Standard Deviation | Uncertainty | Number of laboratories |
|--------------------------------|-------------------|--------------------|-------------|------------------------|
| Ash, % d | 10.68 | 0.090 | 0.014 | 29 |
| Volatile Matter, % d | 20.03 | 0.154 | 0.025 | 29 |
| Total Sulfur, % d | 0.568 | 0.023 | 0.004 | 35 |
| Chlorine, % d | 0.046 | 0.007 | 0.001 | 13 |
| Phosphorus, % d | 0.0196 | 0.0014 | 0.0006 | 11 |
| Relative Density, d | 1.381 | 0.0098 | 0.0021 | 19 |
| Gross Calorific Value, MJ/kg d | 32.186 | 0.0940 | 0.0148 | 41 |
| Carbonate Carbon, % d | 0.036 | 0.004 | 0.002 | 9 |
| | | | | |
| | Indicative Values | Standard Deviation | Uncertainty | Number of laboratories |
| Total Carbon, % d | 79.19 | 0.410 | 0.110 | 11 |
| Hydrogen, % d | 4.34 | 0.099 | 0.027 | 14 |
| Nitrogen, % d | 1.77 | 0.067 | 0.020 | 11 |

Certified values are the best estimate of the true value for the measurand.

The uncertainty of this value is indicated by the associated standard uncertainty.

The standard deviation is used to derive the likely range of results - the value for a measurand from a randomly chosen laboratory would be expected to lie within 2 standards deviations of the certified value with 95% probability.

3. Instructions for Use

ACIRS-G5-2013 does not require further preparation prior to analysis however must always be thoroughly mixed by end-over-end rotation before sub-sampling.

To minimise the risk of compositional changes due to oxidation store in a cool, dark place in original containers with lids tightly sealed.

Samples shall be handled in accordance with the Safety Data Sheet available from www.acps.com.au/acirs

4. Sample Source and Preparation

Approximately 240 kg of a Queensland, Northern Bowen Basin coal was obtained at -50 mm top size. The coal was stabilised in storage for several months before being crushed in a swing hammer mill to a nominal top size of 4 mm. The material was then repeatedly mixed by rotary sample division (RSD) until lots of approximately 5 kg were obtained which were then air

dried and milled to a nominal top size of 212 µm. This pulverised material was further divided by RSD until representative 250 g samples were obtained. Each sample was then placed into a plastic bag in a HDPE jars.

5. Homogeneity testing

Homogeneity of the batch was confirmed by comparison of the dry ash value of each sample against the ash repeatability criteria of AS 1038.3.

6. Certification

Blind samples of ACIRS-G5-2013 were analysed through a proficiency test program conducted by an independent provider accredited to ISO/IEC 17043. Characterisation of ACIRS-G5-2013, based on results from this program, was conducted by ACIRS and overseen by an independent statistician. Robust statistical techniques were used in the characterisation process in accordance with the guidelines of:

- IUPAC, 2006 International Harmonized Protocol for the Proficiency Testing of Analytical Chemical Laboratories
- ISO 13528-2005, Statistical design for use in proficiency testing by interlaboratory comparison, and
- ISO Guide 35 -2006, Reference Materials – General and statistical principles for certification.

This technical report provides certified, indicative and informational values.

- Certified values – are based on the robust mean of results from all test methods with the exception of ash and volatile matter which were certified by AS1038.3/ISO1171, or equivalent, methods.
- Indicative values – were assigned for carbon, hydrogen and nitrogen where the uncertainty of the robust mean was considered unacceptably high. These values are best estimates and shall not to be used as certified values.
- Informational data – is provided in Table 2. These are results from the proficiency test program and for which insufficient data was available for certification. These are provided for informational purposes only and shall not to be used as certified values.

Table2 Informational data

| Average result | Arsenic, | Boron | Fluorine | Mercury | Selenium | Sulfate Sulfur | Pyritic Sulfur |
|----------------|----------|----------|----------|----------|----------|----------------|----------------|
| | mg/kg, d | mg/kg, d | mg/kg, d | mg/kg, d | mg/kg, d | %, d | %, d |
| #1 | 0.4 | 7 | 47 | 0.020 | 0.8 | 0.005 | 0.033 |
| #2 | 0.3 | 45 | 67 | 0.028 | 0.4 | 0.008 | 0.036 |
| #3 | 0.3 | | 55 | 0.029 | 0.5 | 0.011 | 0.038 |
| #4 | | | | 0.030 | | 0.012 | 0.043 |
| #5 | | | | 0.035 | | 0.015 | 0.094 |

The certified values presented herein will be subject to change should this reference material deteriorate due to the normal oxidation processes for coals. This will be monitored by stability test programs conducted by ACIRS. It is the responsibility of the user to use the most recent Technical Report and Certificate of Analysis for this reference material available at www.acps.com.au/acirs

To the extent permitted by law, ACIRS disclaims all warranties whether expressed or implied with regard to merchantability, non-infringement, or fitness for a particular purpose. In no event will ACIRS be liable for incidental damage or consequential loss arising from the use of this product.

Where the product does not conform to the certified values, giving due consideration to the stated uncertainties and accepted tolerances, the total liability of ACIRS shall be limited at ACIRS' absolute discretion to either replacement of the product or refund of the purchase price.

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