

## TECHNICAL REPORT

### ACIRS-G6-2014

#### General Coal Reference Material

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Previous ACIRS-G series: This is the fourth in the ACIRS-Gx-yyyy series and  
supersedes ACIRS-G5-2013

## 1. Introduction

This report describes the preparation and certification of ACIRS-G6-2014 which comprises a sealed jar containing approximately 125 g of reference coal at a nominal top size of 212 µm.

This reference material is intended to be used as a quality control tool.

## 2. Property Values

Table1 Characterisation of ACIRS-G6-2014

	Property Values <sup>1</sup>	Standard Deviation <sup>2</sup>	Uncertainty <sup>3</sup>	Number of laboratories
Ash, % d <sup>1a</sup>	10.72	0.060	0.012	38
Volatile Matter, % d <sup>1b</sup>	19.93	0.291	0.059	38
Gross Calorific Value, MJ/kg d	32.150	0.0830	0.0092	127
Relative Density, d <sup>1c</sup>	1.372	0.0160	0.0053	14
Total Carbon, % d	79.36	0.738	0.114	65
Hydrogen, % d	4.33	0.113	0.018	64
Nitrogen, % d	1.75	0.064	0.010	60
Total Sulfur, % d	0.59	0.022	0.002	148
Pyritic Sulfur, % d	0.05	0.021	0.006	22
Sulfate Sulfur, % d	0.01	0.008	0.002	18
Chlorine, % d	0.041	0.0054	0.0009	57
Phosphorus, % d	0.023	0.001	<0.001	16
Carbonate Carbon, % d <sup>1d</sup>	0.055	0.0061	0.0031	6
Fluorine, mg/kg d	67	6.3	1.4	30
Mercury, mg/kg d	0.026	0.0059	0.0011	44
Selenium, mg/kg d	0.8	0.17	0.05	16

*1 Property values are the best estimate of the true value for the measurand and are based on the robust mean of participant results (outliers excluded) from proficiency test programs conducted by CANSPEX and Proficiency Testing Australia. Unless otherwise specified, parameters have been assigned from the results of multiple analysis methods. Biases between methods were not observed.*

*1a Ash certified by ISO 1171 and equivalent methods*

*1b Volatile Matter certified by ISO 562 and equivalent methods*

*1c Relative Density certified by AS1038.21.1.1/1038.21.1.2*

*1d Carbonate carbon certified by AS 1038.23.*

*2 Standard deviation (sd) 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 sd of the certified value with 95% probability.*

*3 The uncertainty of this value has been calculated from  $sd/\sqrt{n}$  where  $n$  = number of laboratories.*

### **3. Instructions for Use**

ACIRS-G6-2014 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.acirs.com.au/products/general-coal-reference-material/](http://www.acirs.com.au/products/general-coal-reference-material/)

### **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 2.36 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  $\mu\text{m}$ . This pulverised material was further divided by RSD until representative 125 g samples were obtained. Each sample was then placed into a plastic bag within sealed 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 ISO 1171.

### **6. Characterisation**

Blind samples of ACIRS-G6-2014 were analysed through proficiency test programs conducted by CANSPEX and Proficiency Testing Australia. Characterisation of ACIRS-G6-2014, based on results from these programs, was conducted by ACIRS. 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.

Property values are based on the robust mean, after exclusion of outliers, of proficiency test program participant results. Property values are based on analysis by multiple test methods including national and international recognised test methods\*, and in-house methods. Where data from multiple methods have been combined, significant method biases were not detected.

\*Ash, volatile matter, carbonate carbon and relative density were assigned in accordance with AS/ISO equivalent methods.

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+ Property values for coal samples are subject to change due to the normal oxidation processes for coals. For this reason, oxidation sensitive parameters i.e. calorific value, volatile matter, carbon, hydrogen and forms of sulfur are considered stable until at least August 2017. All other parameters are considered stable until August 2019. It is the responsibility of the user to obtain the most recent Technical Report and Product Information Leaflet for this reference material available at [www.acirs.com.au/products/general-coal-reference-material/](http://www.acirs.com.au/products/general-coal-reference-material/)

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Where the product does not conform to assigned property 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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#### Revision History

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TRI-G6-2014-rev02	Updated period of validity	28/06/2017