



# VANGUARD SOLUTIONS, INC.

## CERTIFICATE OF ANALYSIS

### Certified Calibration Sample – Coal

CATALOG # VS6-056

PAGE 1 OF 2

**Description:** VS6-056 is a coal reference material. The type of coal is *bituminous*.

**Methodology:** VS6-056 was analyzed by round robin sample exchange.

**Drying:** The values reported are based on a properly dried sample. Vanguard Solutions recommends drying for 1 hour at 105 degrees C. Typical moisture loss in this product is **2.36 %**.

#### Statistics:

<u>Parameter</u>	<u>Certified Value</u>	<u>Uncertainty Value</u>	<u>Determinations</u>
% Sulfur	0.80	± 0.02	36
% Ash	10.51	± 0.08	40
% Volatile	36.70	± 0.42	28
BTU/lb.	12,839	N.A.	48
% Fixed Carbon	52.78	*	36
<b><u>Ultimate Analysis</u></b>			
% Carbon	73.89	± 1.66	8
% Hydrogen	4.91	± 0.36	10
% Nitrogen	1.46	± 0.16	12
% Oxygen	8.31	*	10
<b><u>Sulfur Forms</u></b>			
% Pyritic	0.05	± 0.03	8
% Sulfate	0.04	± 0.03	10
% Organic	0.70	*	2
<i>*Note: % Fixed Carbon, % Oxygen and % Organic Sulfur are determined by difference, therefore there is no standard deviation.</i>			
% Chlorine	0.03	± 0.02	10

Date of Certification: 06/01/11



# VANGUARD SOLUTIONS, INC.

## CERTIFICATE OF ANALYSIS

**Certified Calibration Sample – Coal**

CATALOG # VS6-056

PAGE 2 OF 2

**Statistics (continued):**

<u>Parameter</u>	<u>Certified Value</u>	<u>Uncertainty Value</u>	<u>Determinations</u>
<b><u>Mineral Analysis of Ash</u></b>			
% P <sub>2</sub> O <sub>5</sub>	0.11	± 0.20	14
% SiO <sub>2</sub>	-	± -	-
% Fe <sub>2</sub> O <sub>3</sub>	2.01	± 0.72	14
% Al <sub>2</sub> O <sub>3</sub>	34.20	± 1.70	12
% CaO	0.73	± 0.12	14
% MgO	0.51	± 0.26	14
% SO <sub>3</sub>	0.42	± 0.16	8
% K <sub>2</sub> O	1.49	± 0.28	14
% Na <sub>2</sub> O	0.18	± 0.02	8
% TiO <sub>2</sub>	1.53	± 0.14	14
% MnO <sub>2</sub>	-	± -	-
<b><u>Ash Fusion Temperature (Degrees Fahrenheit) Reducing</u></b>			
Initial	-	± -	-
Softening	-	± -	-
Hemispherical	-	± -	-
Fluid	-	± -	-

**Notes:**

- Results are on a dry basis.
- Certification is valid for three (3) years from date of certification.

Date of Certification: **06/01/11**

Prepared By: **SR**

Lot Number: **1618**

**Any inquiries concerning this certified calibration sample should be directed to 1-800-304-1970.**

*No warranties of a description, merchantability or fitness for a particular purpose or any other express or implied warranties arise out of sale of this product. Remedies for any claimed defect in this product will be limited to replacement of the product or refund of the purchase price. In no event shall Vanguard Solutions be liable for incidental or consequential damages.*