

## LOCHINVAR METALLURGICAL COAL PROJECT

Low ash, high volatile metallurgical coal  
located in Southern Scotland

### Historical Exploration

- 13 historic drill holes and over 100km of seismic lines
- Key target seam is the Nine Foot Seam, (thickness from 1.5m to 3.5m and dip between 5° and 15°)

### Exploration

- Phase 1a drill program nearing completion
- Successful twin of one historical hole

### Secure Tenure

- 100% NAE owned Exploration Licence and Conditional Underground Mining Licence from The Coal Authority

### Infrastructure

- World class infrastructure located near licence boundary, including rail, road and power

Strong support from local, regional and national government and largely positive initial community engagement



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Countries of Focus  
UK  
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## Positive Clean Coal Results for Lochinvar Metallurgical Coal Project

- **Washability test work results for the first drill hole, LOI-001, demonstrates potential for Lochinvar to produce an attractive low ash high volatile metallurgical coal for the UK and European markets**

Coal Seam	Clean Coal Recovery (at CF1.4) (%)	Ash (ad. %)	Sulphur (ad. %)	Volatile Matter (ad. %)	Phos (ad. %)	CSN	Geiseler Max Fluidity (ddpm)
Six Foot	77	4.0	1.82	34.7	0.034	7.0	1,400
Nine Foot	84	3.5	1.36	34.5	0.008	7.5	3,400

- **Results indicate the potential to produce low ash and low phosphorous clean metallurgical coal at good yields**
- **Preliminary discussions with potential UK customers indicate that the sulphur levels are within desirable specifications**
- **The maximum fluidity demonstrated by these coals is high and could provide a suitable blend for coals of lower reactivity**

**NAE Managing Director, Gary Fietz commented:** “Whilst it is early days in optimising the washing parameters, these test results indicate the potential for Lochinvar coal to be an attractive low ash metallurgical coal, ideal for sale into the UK and European markets. This is a great stepping stone for NAE on its path to enhance the value of the Lochinvar Project with the completion of the Phase 1a drilling program which will lead to our maiden resource statement.”

## Raw Coal Analysis

Initial raw coal analysis (announced on 11 April 2013) indicated that the Lochinvar coals are high volatile bituminous coals with good coking properties. The key results for the Nine Foot and Six Foot seams, including the lower section (1.92m) of the Nine Foot Seam, are presented in Table 1.

**Table 1 Summary Raw Coal Analysis (excluding mudstone bands) – air dried basis**

Coal Seam	Coal Thickness (m)	Inherent Moisture (ad %)	Ash (ad %)	Sulphur (ad %)	Volatile Matter (ad %)	CSN	Gray King Coke Type	Vitrinite (%)
Nine Foot (Entire Seam)	2.81	2.7	10.3	2.05	33.4	6.5	G6 – G7	50
Nine Foot (Lower Section)	1.92	2.8	8.3	1.76	33.7	7.0	G6 – G7	60
Six Foot	1.66	2.6	9.0	3.08	33.7	6.5	G6 – G7	63

## Washability Results

Washability test work has been completed on the first hole, LOI-001, in the Lochinvar drill program with the following results:

**Table 2 Summary of Clean Coal Analysis<sup>1 2</sup>**

Seam	Units	Nine Foot Seam (Lower Seam)	Nine Foot Seam (Entire Seam)	Six Foot Seam
Coal Recovery <sup>3</sup>	%	88	84	77
Inherent Moisture <sup>3</sup>	Adb. %	3.6	3.6	3.9
Ash <sup>3</sup>	Adb. %	2.9	3.5	4.0
Sulphur <sup>3</sup>	Adb. %	1.07	1.36	1.82
Volatile Matter	Adb. %	NA	34.5	34.7
CSN		NA	7.5	7.0
Gray King		NA	G7	G6
Phosphorous	Adb. %	NA	0.008	0.034
Calorific Value	Kcal/kg	NA	7,850	7,750
Gieseler Max Fluidity <sup>4</sup>	ddpm	NA	3,400	1,400
Vitrinite	%	NA	64.0	69.2
Total Reactives	%	NA	73.6	81.7
Rank Romax	%	NA	0.83	0.83

The washability analysis of LOI-001 indicates that the potential for high yields of low ash coal (under 5%) are achievable with attractive metallurgical properties: CSN of 7.0 to 7.5, Gray King Coke Type G6-G7 and RoMax of 0.83. Also of note are the low phosphorous levels.

Sulphur values have been reduced through the washability test work from 2.05% in the raw coal to 1.36% for the complete Nine Foot Seam. The lower section (1.92m) of the Nine Foot Seam demonstrated a reduction in sulphur values from 1.76% to 1.07% through washing. Preliminary

<sup>1</sup> Clean coal result based on cumulative floats at 1.4

<sup>2</sup> The analysis has been completed on the coal plies within the whole seam and excludes any dirt bands within the overall seam.

<sup>3</sup> Based on a weighted average between two laboratories

<sup>4</sup> Potential oxidation of the core prior to testing is expected to have reduced the fluidity results.

discussions with potential UK customers (steel mills and merchant coke producers) indicate that these sulphur levels are within their specifications for coal supply. Further test work on the sulphur types and washability is planned for future holes to optimise clean coal sulphur levels.

The Gieseler maximum fluidity of the coals is high and is reflective of the high proportions of reactive macerals in the coals. These results, in combination with the low ash content of the coals, suggest that the coal could be a suitable “sweetener” for blending with coals with higher ash and inert maceral content.

Further, based on the washability tests, there is the potential to make a saleable middlings product, as shown in Table 3.

**Table 3 Middlings Composite Results**<sup>5</sup>

Seam	Coal Recovery (F1.50+F1.60) (%)	Ash (ad %)	Inherent Moisture (ad %)	Volatile Matter (ad %)	Sulphur (ad %)	Gross Cal. Value (ad Kcal/kg)
Six Foot	6.0	18.4	2.7	30.9	5.6	6,400
Nine Foot	3.5	19.3	3.0	30.9	1.9	6,100

## Analysis Process

Due to some concerns with initial results, a full set of proximate and ultimate analysis and washability tests have been undertaken by two separate UK laboratories. This has caused a delay in releasing results but was necessary to ensure reliable results for use in future resource estimation.

The following laboratories have been utilised:

### Proximate and Ultimate Analysis and Washability Tests

Alfred H Knight, UK  
Environmental Scientifics Group (ESG), UK

### Petrographic Analysis

Pearsons Coal Petrography Pty Ltd, Australia

### Gieseler Fluidity and Dilatation Testwork

DMT GmbH & Co, Germany

<sup>5</sup> Middlings product based on +1.5 and 1.6 float composite.