



Job File No.181202/ 71088-0031/M-NK-2015

**INSPECTION REPORT**

In pursuance of an order for inspection given to us

**BY** : " CARBO ONE LIMITED "  
**TO INSPECT** : Coal Sample 0-50 mm, grade "Washed T-coal"(as declared) in rail cars  
**BY** : Sampling and Analysis  
**AT** : Krasny Brod, Kemerovo region, Russia  
**ON** : 25-26 February 2015

**WE HEREBY REPORT** that we have performed sampling and analysis of the above mentioned commodity.

**QUANTITY:** 64 rail cars with coal of total net weight (as declared) 4,438.85 MT were presented for inspection.

**SAMPLING:** Mechanical sampling<sup>1</sup> as per ISO 13909 Part 2. Samples collected throughout the entire loading of the vessel by MSS under SGS supervision.

Mechanical Sampling System was checked by SGS prior to loading and confirmed to have been designed and operated in accordance with ISO 13909-2,5:2001(E) Annex C / ASTM D7430-08 Part C. Performance Monitoring of the system, and collection of extraction ratios, confirmed the system continues to perform as designed. Bias Test data was made available to SGS. SGS cannot guarantee that the collected samples are free of bias.

**I. ANALYSES WERE PERFORMED IN SGS LABORATORY:**

1. **Proximate analysis** was performed in SGS laboratory (Accreditation Certificate No. POCC RU.0001.21TY38, valid till 22.09.2016) according to ISO Methods with results as follows:

Basis Reported	TM % GOST R 52911-2013	ASH % GOST R 55661-2013	VM % GOST R 55660-2013	TS % GOST R 53356-2009	Gross calorific value, kcal/kg GOST 147-2013
As Received	8.5	7.9	10.6	0.27	7110
Air Dry Basis	0.3	8.6	11.5	0.30	7749
Dry Basis		8.6	11.6	0.30	7771
Dry Ash Free			12.7	0.33	8504

**Net Calorific Value (as received)** was calculated in accordance with ISO 1928:2009 (Pt. 12.2.2.1 и Pt E.3.3): 7005 kcal/kg

**Net Calorific Value (as received)** was calculated in accordance with ISO 1928:2009 (Pt. 12.2.2.1): 6984 kcal/kg

2. **Screen test** was performed in accordance with ISO 1953:

Nominal Top Size (mm)	+50	25-50	13-25	6-13	3-6	1-3	0.5-1	0-0.5
Yield (%)	1.7	7.8	18.3	18.5	8.3	16.1	7.1	22.2

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**3. Determination of characteristics of hygroscopic moisture** was performed in accordance with GOST 8719-90 with results as follows:

**Hygroscopic moisture:** 1.46

**4. Determination of characteristics of plastic layer** was performed in accordance with GOST 1186-87 with results as follows:

Attribute	Unit	Value
X	mm	14
Y	mm	0

**5. Ultimate analysis** was performed in accordance with ISO methods with results as follows:

Element	Percentage, %	Test's methods
	Dry Ash Free basis	
Carbon	91.89	ISO 625-96 (GOST 2408.1-95), ISO 609-96 (GOST 2408.4-98)
Hydrogen	4.1	
Nitrogen	2.32	ISO 333-83 (GOST 28743-95)
Oxygen	1.36	ISO 1994-76 (GOST 2408.3-95)

**6. Determination of chemical composition of ash** was performed in accordance with ASTM D 3682-87 (GOST 10538-87) methods with results as follows:

Compounds	Percentage, %
Silicon dioxide	44.40
Alumina	25.15
Iron trioxide	5.49
Titanium dioxide	0.81
Calcium oxide	10.58
Magnesium oxide	4.35
Potassium oxide	1.279
Sodium oxide	0.306
Sulphur trioxide	6.853
Phosphorus oxide	0.692
Manganese oxide	0.085

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**7. Determination of elements' content** was performed in accordance with ISO and ASTM methods with results as follows:

Element	Percentage, %	Test's methods
Fluorine	0.0074	ASTM D 3761-96
Chlorine	0.009	ISO 587-97 (GOST 9326-2002)
Arsenic	0.0001	ISO 601-81, ISO 2590-73 (GOST 10478-93)
Phosphorous	0.026	ISO 662-81 (GOST 1932-93)

**8. Determination of free swelling Index** was performed in accordance with ISO 501-81 (GOST 20330-91) with results as follows:

FSI            0.5

**9. Determination of Grey-King coke type** was performed in accordance with ISO 502-82 (GOST 16126-91) with results as follows:

GREY-KING COKE TYPE            B

**10. Determination of Roga Index** was performed in accordance with ISO 335-74 (GOST 9318-91) with results as follows:

RI            0 (2:4)

**11. Determination of plasticity according to Gieseler** was performed in accordance with GOST 54247-2010 (ISO 10329:2009) with results as follows:

Attribute	Unit	Value
Initial softening Temperature	°C	-
Max. Fluidity Temperature	°C	-
Resolidification Temperature	°C	-
Max. fluidity	ddpm	0

**12. Audiber-Arnu Dilatometer test** was performed in accordance with ISO 349-75 (GOST 13324-94) with results as follows:

Attribute	Unit	Value
Softening Temperature	°C	438
Max. Contraction Temperature	°C	511
Max. Dilatation Temperature	°C	-
Contraction	%	-9.8
Dilatation	%	-

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**13. Determination of Hardgrove Index** was performed in accordance with ISO 5074-80 (GOST 15489.2-93) with results as follows:

**HGI** 65

**14. Determination of actual density** was performed in accordance with GOST 2160-92 with results as follows:

**AD** 1.40 g/cm<sup>3</sup>

**15. Determination of ash fusibility** was performed in accordance with GOST P 54238-2010 (ISO 540:2008) with results as follows:

Attribute	Unit	Value	
		Oxidizing	Reducing
Initial deformation temperature	°C	1292	1211
Softening temperature	°C	1310	1232
Hemispherical temperature	°C	1326	1253
Fluid temperature	°C	1360	1290

**16. Determination of petrographic composition and metamorphism stage** was performed in accordance with GOST 9414.1,2,3, 12113, 21489 with results as follows:

Composition		Percentage, %
Coal		95
Mineral inclusions	Clay	3
	Quartz	-
	Sulphide	-
	Carbonate	2

#### Microlythotype:

Microconstituent	Percentage, %
Vitrinite	34
Semivitrinite	8
Inertinite	58
Liptinite	0

#### Sum of the fusainized components

**ΣOK** 63 %

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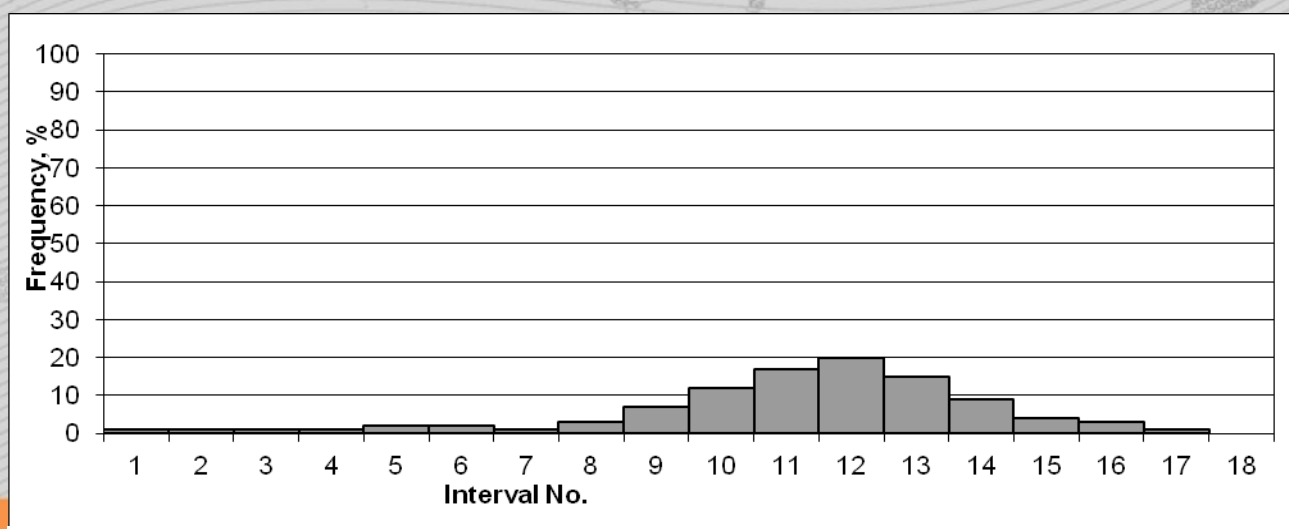
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Rank V

Interval No.	Ro min	Ro max	Frequency, %
1	1.30	1.34	1
2	1.35	1.39	1
3	1.40	1.44	1
4	1.45	1.49	1
5	1.50	1.54	2
6	1.55	1.59	2
7	1.60	1.64	1
8	1.65	1.69	3
9	1.70	1.74	7
10	1.75	1.79	12
11	1.80	1.84	17
12	1.85	1.89	20
13	1.90	1.94	15
14	1.95	1.99	9
15	2.00	2.04	4
16	2.05	2.09	3
17	2.10	2.14	1
18	2.15	2.19	0



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**Reflectance indices  $R_0$ :**

Average	1.84
Minimum	1.30
Maximum	2.15
Standard deviation	0.139
Quantity of scissions	0

**II. ANALYSES WERE PERFORMED IN SUBCONTRACTED LABORATORY:**

The sample was sent to subcontracted laboratory OAO "Zapadno-Sibirski Ispytatelny Centr" (Accreditation Certificate No. POCC RU.0001.21 AY 07) for analysis, and the findings reported by OAO "Zapadno-Sibirski Ispytatelny Centr" were as follows:

**1. Determination of elements' content** was performed in accordance with GOST methods with results as follows:

Elements	Percentage, %
Germanium	0.0001
Selenium	0.000002
Gallium	0.0003
Mercury	0.000004





**2. Determination of elements' content** was performed in accordance with GOST methods with results as follows:

Element	Content, %	Element	Content, %	Element	Content, %
Ba	0.04	Cd	<0.001	Pb	<0.0002
Be	0.0002	Co	0.0004	Ag	<0.00001
B	0.005	Li	<0.001	Sc	0.0002
Bi	<0.0002	La	0.001	Sr	0.04
V	<0.001	Mn	0.05	Sb	<0.002
W	<0.002	Cu	0.0004	Ti	0.1
Nb	0.001	Mo	<0.0001	P	<0.1
Sn	0.0002	As	<0.01	Cr	<0.001
Zn	0.003	Ni	0.0002		
		Zr	0.002		

*<sup>1</sup>SGS Mineral Services is unable to verify that the mechanical sampling system used to collect the samples meets all applicable criteria and cautions the holder of this report/certificate that the samples obtained from the mechanical sampling system may not be free of bias and the precision of the results are unknown. The test results obtained from such samples must be used judiciously and may not be representative of the consignment from which the samples were collected. SGS is not responsible for any actions taken or not taken based upon the test results of these samples. This document is a witness of services in collection and processing of information rendering.*

Signed and dated  
in Novokuznetsk / ES  
13 March 2015

For and on behalf of  
**SGS** Vostok Limited

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