



Job File No.: 181202/65647-1481-1/M-NK-2015

**INSPECTION REPORT**

In pursuance of an order for inspection given to us

**BY** : " CARBO ONE LIMITED "  
**TO INSPECT** : Coal 50-200 mm, grade "Washed SS - coal" (Bachatsky SSPK) (as declared) in rail cars  
**BY** : Sampling and Analysis  
**AT** : Bachatsky open cut, Kemerovo region, Russia  
**ON** : 3 January 2015.

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

**SAMPLING:** Manual sampling as per ISO 18283 5.3. from the tops of the rail cars: Sampling material in motion, on systematic known mass intervals basis. Increments were collected from freshly exposed surface, on a mass interval basis, with fixed increment mass. Manual Sampling method was agreed to with the SGS Principal, as sampling by other methods was not possible.

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

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

Basis Reported	Total moisture, % ISO 589-2003, ISO 5068-1-2007	Ash, % ISO 1171-97	Yield of volatile matter, % ISO 562-98	Total sulphur, % ISO 334-92	Gross calorific value, kcal/kg ISO 1928-76
As Received	4.9	4.9	20.0	0.22	7595
Air Dry Basis	0.5	5.1	21.0	0.23	7949
Dry Basis		5.1	21.1	0.23	7990
Dry Ash Free			22.2	0.24	8421

**Net Calorific Value (as received)** was calculated in accordance with ISO 1928:2009 (Pt. 12.2.2.1 и Pt E.3.3): 7368 kcal/kg

2. **Screen test** were performed in accordance with ISO 1953 with results as follows:

Nominal Top Size (mm)	+200	150-200	100-150	50-100	20-50	0-20
Yield (%)	0	14.1	35.5	43.9	4.0	2.5

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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: 1.67**

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

Attribute	Unit	Value
X	mm	20
Y	mm	7

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

Element	Percentage, %	Test's methods
	Dry Ash Free basis	
Carbon	88.2	ISO 625-96 (GOST 2408.1-95), ISO 609-96 (GOST 2408.4-98)
Hydrogen	4.61	
Nitrogen	2.04	ISO 333-83 (GOST 28743-95)
Oxygen	4.91	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	17.06
Alumina	27.04
Iron trioxide	18.54
Titanium dioxide	0.47
Calcium oxide	19.71
Magnesium oxide	7.68
Potassium oxide	0.368
Sodium oxide	0.195
Sulphur trioxide	8.500
Phosphorus oxide	0.103
Manganese oxide	0.326

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

Compounds	Percentage, %	Test's methods
Fluorine	0.0041	ASTM D 3761-96
Chlorine	0.021	ISO 587-97 (GOST 9326-2002)
Arsenic	<0.0005	ISO 601-81, ISO 2590-73 (GOST 10478-93)
Phosphorous	0.002	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 A**

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

**RI 16(2:4)**

**11. Determination of plasticity according to Gieseler** was performed in accordance with ASTM D 2639-98 with results as follows:

Attribute	Unit	Value
Initial softening Temperature	°C	423
Max. Fluidity Temperature	°C	456
Resolidification Temperature	°C	479
Max. fluidity	ddpm	2

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**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	395
Max. Contraction Temperature	°C	513
Max. Dilatation Temperature	°C	-
Contraction	%	-7.5
Dilatation	%	-

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

**HGI 68**

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

**AD 1.39 g/cm<sup>3</sup>**

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

Attribute	Unit	Value	
		Oxidizing	Reducing
Initial deformation temperature	°C	1238	1173
Softening temperature	°C	1250	1187
Hemispherical temperature	°C	1269	1209
Fluid temperature	°C	1300	1243

**16. Determination of petrographic composition and metamorphism stage** was performed in accordance with ISO 7404 with results as follows:

Composition		Percentage, %
Coal		96
Mineral inclusions	Clay	4
	Quartz	-
	Sulphide	-
	Carbonate	-

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**Microlythotype:**

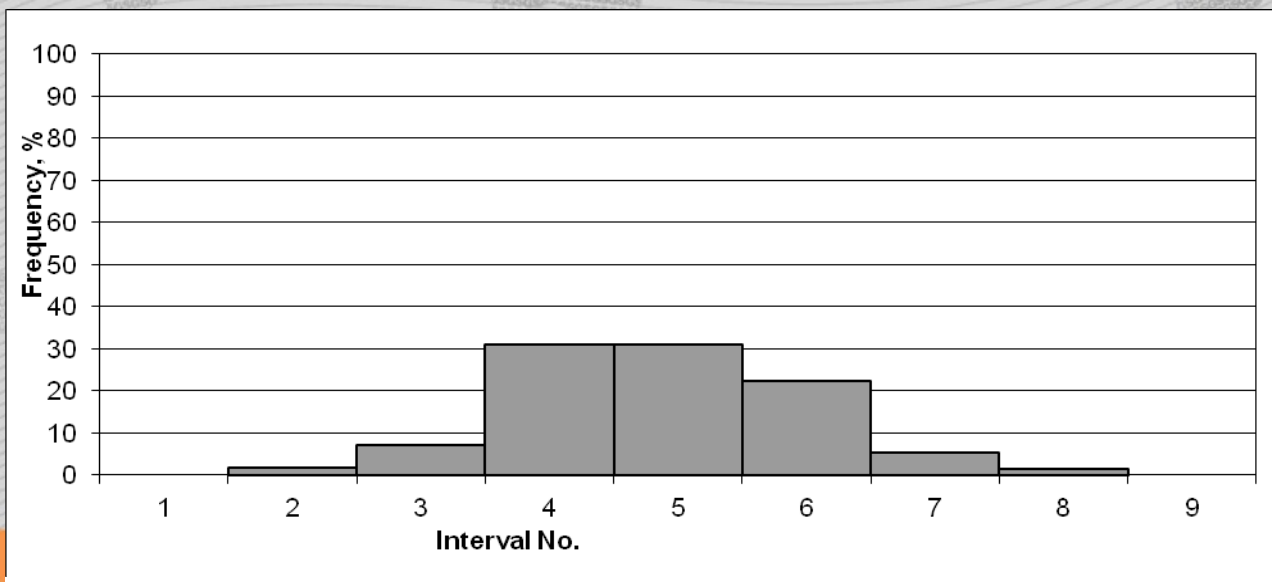
Microconstituent	Percentage, %
Vitrinite	20
Semivitrinite	16
Inertinite	64
Liptinite	0

**Sum of the fusainized components**

**ΣOK 75 %**

**Rank III**

Interval No.	Ro min	Ro max	Frequency, %
1	0.85	0.89	0
2	0.90	0.94	2
3	0.95	0.99	7
4	1.00	1.04	31
5	1.05	1.09	31
6	1.10	1.14	22
7	1.15	1.19	5
8	1.20	1.24	2
9	1.25	1.29	0



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**Reflectance indices R<sub>0</sub>:**

Average	1.07
Minimum	0.90
Maximum	1.25
Standard deviation	0.057
Quantity of scissions	-

**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:

Compounds	Percentage, %
Germanium	<0.0001
Selenium	<0.0005
Gallium	0.0002
Mercury	<0.2*10 <sup>-4</sup>

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

Element	Content, %	Element	Content, %	Element	Content, %
Ba	0.01	Cd	<0.001	Pb	<0.0002
Be	<0.0001	Co	0.0001	Ag	<0.00001
B	0.004	Li	<0.001	Sc	0.0002
Bi	<0.0002	La	0.001	Sr	0.02
V	<0.001	Mn	0.005	Sb	<0.002
W	<0.002	Cu	<0.0001	Ti	0.01
Yb	<0.0001	Mo	0.0001	P	<0.1
Y	0.001	As	<0.01	Cr	<0.001
Nb	0.001	Ni	0.0001	Ce	<0.02
Sn	<0.0002	Zr	0.001		
Zn	<0.003				

This document is a witness of services in collection and processing of information rendering.

Signed and dated  
in Novokuznetsk / ES  
20 January 2015

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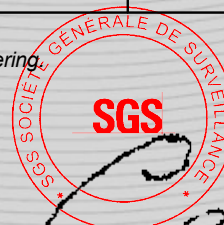
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For and on behalf of  
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