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REPORT ON THE COAL OF THE CARIBOO COAL AND CLAY SYNDICATE

(copy 2)

J. deSOUZA COSTA Dec 21st 1929

REPORT

ON THE

COAL OF THE CARIBOO COAL

AND CLAY SYNDICATE

I N D E X

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PRELIMINARY

The following report is made consequently and to ascertain a certain number of analysis and tests carried on samples of coal that were given to me for the above purpose and described as being samples of the coal of the mine of the CARIBOO COAL AND CLAY SYNDICATE.

The tests were carried under constant control and the analysis and descriptions foregoing, made in conformity of the said tests.

Vancouver, B.C.,

December 19th. 1929.

"Jean deSouza Costa"

REPORT ON THE COAL OF THE MINE

SECTION A.

MINERALOGISTE ANALYSIS

The coal is of a dull appearance on the surface exposed to the contact of the atmosphere; while the inner part of it is quite shiny and black. In my opinion and from the test carried this is due to the rather big affinity of this coal for oxygen.

Its formation is of the crystalline type and the crystals pass hardly through a 100 mesh. The breaking down of this coal to its crystalline point is rather easy and does not require much energy; however, from this point on and to reduce it in very fine powder the energy required is quite important and rather out of proportion.

From its appearance, showing a very definite vegetable formation, this coal ought to be qualified as a lignite; but for its chemical analysis and its hardness in the reduced stage as well as its permanent black color of the inside of the crystals I would qualifyit in the range of the non-bituminous semi-anthracite coals. This is also confirmed by its high carbon and low ash content.

Its cohesion is large enough to allow careless transportation without reducing it to powder or residue.

It will stand to damp weather without breaks but will in a very short time lose its shiny aspect but without,however, losing any to its fuel qualities as this is only superficial.

SECTION B.

CHEMICAL ANALYSIS

Moisture	12.8%
Volatiles	28.3%
Carbon	56.4%
Sulphur	0.1%
Ash	2.4%
	100%

"Jean deSouza Costa"

I.E.C.

Vancouver, December 19th. 1929.

SECTION C.

PHYSICAL ANALYSIS

Porosity	14.6%
Resistance, compression test	2.583 lbs. per sq.inch.
Specific gravity	1.35
Calorific value	12.800 B.T.U.

Vancouver, December 19th. 1929.

"Jean deSouza Costa"

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SECTION D.

CHEMICAL ANALYSIS OF THE CONDENSED VOLATILES

Procedure - The substance was heated to 100°c. in a close vessel and thoroughly stirred, after which the sample was drawn for analysis.

The arbitrary fractions were taken as follows: 80° to 170°; 170° to 210°; 210° to 235°; 235° to 270°; 270° to 315°; 315° to 360°; and residue.

The percentage fractions were:

1.	170°	32.32
2.	210°	10.46
3.	235°	7.06
4.	270°	9.15
5.	315°	12.01
6.	360°	6.07
7.	Residue	22.93

Vancouver, December 19th.1929.

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SECTION E.

NOTE ON THE DISTILLED FRACTIONS

The seven different fractions distilled and indicated in the "chemical analysis of the condensed volatiles" can be classified as follows:

1. Light products
2. Light oils
3. Middle oils
4. Creosote oils
5. Heavy oils
6. Antracene
7. Pitch

Fraction No. 1. - Light Products

This fraction contains light products mixed with ammonia. Benzol being the principa; light product.

Fraction No. 2. - Light oils

This fraction contains:

Benzene
Toluene
Xylene

Fraction No. 3. - Middle Oils

This fraction contains:

Phenol
Cresol
Naphthalene

Fraction No. 4. - Creosote Oils

This fraction contains:

Cresol
Naphthalene
Anthracene

Fraction No. 5. - Heavy Oils

This fraction is composed chiefly of anthracene with some naphtalene.

Fraction No. 6. - Anthracene

This fraction contains only anthracene.

Fraction No. 7. - Pitch

This fraction is a solid hydrocarbon which forms the residue of the distillation.

Vancouver, December 19th. 1929.

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USES OF THE PRODUCTS OF DISTILLATION

A. AMMONIA - Ammonia is used in chemical works as well as in pharmaceutical products and drugs; transformed in ammonium sulphates it is largely used for fertilizers and in the preparation of the other ammonia salts.

B. BENZOL OR BENZENE - Benzol is used as a solvent and for the preparation of its derivatives (principally nitro-benzene and aniline) which are largely used in the colour industries. Very much used lately as or in the manufacture of motor-fuels. Also used as an ingredient in the manufacture of vegaline.

C. TULUOL - Toluene is an excellent ingredient as solvent for many organic compounds. It is used in the manufacture of explosives, dyes, perfumes, drugs, substitute for sugar, poisons and in the chemical warfare.

D. XYLENE - Used similar to Toluene.

E. PHENOL - Phenol is used in the manufacture of various compounds, pioric acid, for medicinal purposes, disinfecting powder and liquids, as a base for various drugs, as an intermediate in the making of dyes and for the manufacture of bakelite.

F. CREOSOL - Creosol is used as a wood preservative, in the preparation of disinfection liquids and for medicinal purposes.

G. NAPHTALENE - Naphtalene forms a multitude of various compounds, the most important are the sulphonic acids used in the manufacture of dyes. The nitro-derivatives of naphtalene are also used as intermediates in the dye making industries, for the manufacture of coal, tar, camphor.

H. ANTHRACENE - Anthracene has its principal use in the dye industries; transformed in alizarin it is the most important of all the chemicals employed in modern dyeing methods.

Vancouver, December 20th. 1929.

"Jean deSouza Costa"

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QUANTITATIVE ANALYSIS OF THE CHEMICAL COMPOSING THE CONDENSED VOLATILES

Ammonia liquor	9.32%
Benzol	6.47%
Toluene	7.66%
Creosol	27.35%
Naphthalene	6.64%
Anthracene	12.77%
Residue	29.79%
	100%

The traces of sulphur were so low that it was practically impossible to determine the percentage

Vancouver, December 20th.1929.

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CHEMICAL ANALYSIS OF THE NON-CONDENSABLE VOLATILES

G A S

Carbon dioxide	2.00%
Illuminante	7.35%
Oxygen	7.00%
Carbon monoxide	6.28%
Hydrogen	42.15%
Methane	22.05%
Nitrogen	13.15%
	100%

Production of gas per pound of coal - 9 cubic feet having a B.T.U. value of 497 per cubic foot.

Vancouver, december 29th. 1929.

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QUANTITATIVE RESULTS OF THE INDIVIDUAL CHEMICAL COMPOUNDS CONTAINED IN THE COAL OF THE MINE OF THE "CARIBOO COAL & CLAY SYNDICATE"

Water	12.8%
Carbon	56.4%
Sulphur	0.1%
Ash	2.4%
Ammonia liquor	2.6%
Benzol	1.8%
Toluene	2.1%
Creosol	8.0%
Naphthalene	1.8%
Pitch	8.4%
Anthracene	3.6%
	100%

Note: There is also a production of 18.000 c.f. of gas per ton of coal.

Vancouver, December 20th. 1929.

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I.E.C.

COMPARATIVE TESTS OF SEVERAL COAL FUELS COMPARED

WITH THE COAL OF THE MINE OF THE

"CARIBOO COAL & CLAY SYNDICATE"

COALS	MOISTURE	VOLATILES	FIXED CARBON	SULPHUR	ASH	B.T.U.
Pennsylvania	0.78	21.80	66.35	2.10	11.07	13.500
Illinois	10.83	30.18	48.06	2.28	10.93	11.560
Ohio	6.91	35.76	42.92	2.00	9.90	12.100
Drumheller	16.50	32.10	43.80	0.40	7.60	9.590
Ladysmith	* 1.70	39.90	48.90	0.40	9.90	12.500
"CARIBOO COAL"	12.80	28.30	56.40	0.10	2.40	12.800

VANCOUVER, December 20th. 1929

"Jean deSouza Costa"

I.E.C.

SECTION K.

CONCLUSIONS

From the tests and analysis carried and exibited in the other sections of this report, this coal compares very favorably with the outstanding coals actually on the market.

Its carbon content is relatively high and its ash content very particularly low, and is at my knowledge the lower from any coal of this Continent; consequently its calorific value is also relatively high ahd only excelled in this Continent by the Pennsylvania Anthracites.

Another important feature of this coal is its good cohesion, thus allowing transportation without any particular care and with the lowest percentage of waste possible.

The volatiles are very rich in valuable products, which can find an open market immediately, and if the carbonization of this coal was decided it would eliminate the rather high percentage of moisture, producing an outstanding smokeless fuel.

The expense of this carbonization would be largely compensated by the recovery of the condensed volatiles and gase.

The char remaining from the carbonization, mostly carbon, could be easily briqueted without any additional binder than the pitch that would not have been distillated in the carbonization process. A briquet made by above process and from this coal would give a remarkably good smo keless fuel with a very high calorific value.

Analysis from this fuel would be approximately as follows:

Carbon	84.0%
Pitch	12.0%
Ash	4.0%
	100%

and a calorific value of 14.360 B.T.U.

Further this coal is particularly suitable for the gasification process, as its ash content is very low. The yield of gas produced, by complete gasification of this coal in contact with air and steam is:

42.150 cubic feet per ton of coal, and the approximate calorific value of this gas will be:

385 B.T.U. per cubic foot.

Another point very important in any fuel is the sulphur content, for the reason that in industrial purposes the sulphur corrodes the metallic surfaces of the boilers, flue pipes, etc. and in domestic purposes the smell and gases produced by the burning sulphur is very disagreeable and sometimes dangerous. From the comparative test carried it appears that the sulphur content of this coal is also particularly low.

Respectfully submitted,

Vancouver, 21st. day of
December, 1929

"Jean deSouza Costa"

I.E.C.