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CANADA  
DEPARTMENT OF MINES

HON. MARTIN BURRELL, MINISTER; R. G. McCONNELL, DEPUTY MINISTER

MINES BRANCH

EUGENE HAANEL, Ph.D., DIRECTOR

BULLETIN No. 26.

Analyses of Canadian Fuels

IN FIVE PARTS

PART V

BRITISH COLUMBIA and YUKON TERRITORY

COMPILED BY

Edgar Stansfield, M.Sc.,

and

J. H. H. Nicolls, M.Sc.



OTTAWA

J. DE LABROQUERIE TACHÉ

PRINTER TO THE KING'S MOST EXCELLENT MAJESTY

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## EXPLANATORY NOTES.

The samples of fuel from British Columbia and the Yukon Territory collected previous to 1910 were analysed at McGill University by the staff then engaged in a special "Investigation of the Coals of Canada". Early in 1910, however, this work was transferred to the Division of Fuels and Fuel Testing, Mines Branch, Department of Mines, Ottawa; and all subsequent samples have been tested there.

The expressions "anal." and "calc." at the head of any column indicate whether the figures recorded were obtained directly by analysis, or by calculation. The usual practice was to analyse the fuels after air-drying, although, in some cases, determinations were made on samples either in the condition received, or after being completely dried.

Figures in columns "R" refer to fuels as received; in columns "AD" to air-dried fuels; and in columns "D" to those dried at 105° C.

In making the determinations, the necessary calculations were made to give one more significant figure than is reported. All deduced values were calculated before the rounding-off process took place.

A description of the "Hoffmann Potash Test" is given on page 65 of the Summary Report of the Mines Branch for the year 1916.

A "Commercial" sample of any grade of fuel is one representative of the corresponding product as shipped from any mine.

The "Mine" and "Prospect" samples were collected by technical officers of either the Federal or Provincial governments: the former term being applied to those procured from deposits already under development. "Prospect" samples are apt to be weathered, and may, therefore, only give an indication of the composition of the main body of the deposit.

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# ANALYSES OF CANADIAN FUELS.

## PART V.

### British Columbia Coal Fields.

#### Crowsnest Pass Area.

Description.	Corbin Coal and Coke Co., Ltd., No. 4 Mine, Corbin.								
Sample No. ....	477			478			479		
Moisture condition (see note p. 2).....	R	AD	D	R	AD	D	R	AD	D
Loss on air-drying .....	0.4			0.5			0.3		
Results obtained by .....	Calc.	Anal.	Calc.	Calc.	Anal.	Calc.	Calc.	Anal.	Calc.
Proximate analysis:—									
Moisture.....	1.0	0.6	.....	1.0	0.6	.....	0.9	0.6	.....
Ash.....	13.4	13.5	13.6	12.2	12.2	12.3	15.3	15.3	15.4
Volatile matter.....	23.0	23.1	23.3	23.3	23.4	23.6	24.0	24.0	24.2
Fixed carbon.....	62.6	62.8	63.1	63.5	63.8	64.1	59.8	60.1	60.4
Ultimate analysis:—									
Carbon.....	75.3	75.6	75.9	76.1	76.4	76.8	72.6	72.8	73.3
Hydrogen.....	4.2	4.2	4.2	4.2	4.2	4.1	4.2	4.2	4.1
Ash.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sulphur.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nitrogen.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oxygen.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Calorific value:—									
Calories per gram, gross.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
B. Th. U. per lb., gross.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fuel ratio.....	.....	2.70	.....	.....	2.70	.....	.....	2.50	.....
Carbon-Hydrogen ratio.....	17.8	18.0	18.3	18.2	18.4	18.7	17.3	17.4	17.7
Coking properties.....	Small lump of poor coke.			Small lump of poor coke.			Small lump of poor coke.		
Hoffmann potash test.....	10			11-12			12		
Location in mine.....	A level.....100 ft. level.....200 ft. level.								
Kind of sample.....	Mine.								
Quality of coal.....									
Taken by.....	Fire ranger, Board of Railway Commissioners.								
Date of sampling.....	January, 1915.								
Remarks.....									

### British Columbia Coal Fields.

#### Crowsnest Pass Area.

Description.	Corbin Coal and Coke Co., Ltd., No. 4 Mine, Corbin.								
Sample No. ....	480			481			482		
Moisture condition (see note p. 2).....	R	AD	D	R	AD	D	R	AD	D
Loss on air-drying .....	0.5			0.3			0.3		
Results obtained by .....	Calc.	Anal.	Calc.	Calc.	Anal.	Calc.	Calc.	Anal.	Calc.
Proximate analysis:—									
Moisture.....	1.0	0.6	.....	0.7	0.4	.....	0.8	0.4	.....
Ash.....	8.9	8.9	9.0	18.5	18.6	18.6	15.0	15.1	15.2
Volatile matter.....	24.7	24.8	24.9	22.6	22.7	22.8	26.7	26.8	26.9
Fixed carbon.....	65.4	65.7	66.1	58.2	58.3	58.6	57.5	57.7	57.9
Ultimate analysis:—									
Carbon.....	79.0	79.3	79.8	69.6	69.8	70.1	71.4	71.6	71.9
Hydrogen.....	4.5	4.4	4.4	4.0	4.0	3.9	4.2	4.2	4.1
Ash.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sulphur.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nitrogen.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oxygen.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Calorific value:—									
Calories per gram, gross.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
B. Th. U. per lb., gross.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fuel ratio.....	.....	2.65	.....	.....	2.55	.....	.....	2.15	.....
Carbon-Hydrogen ratio.....	17.6	18.0	18.2	17.5	17.6	17.8	17.1	17.3	17.5
Coking properties.....	Fair coke.			Small lump of poor coke.			Fair coke.		
Hoffmann potash test.....	12			12			12		
Location in mine.....	300 ft. level.....400 ft. level.....500 ft. level.								
Kind of sample.....	Mine.								
Quality of coal.....									
Taken by.....	Fire ranger, Board of Railway Commissioners.								
Date of sampling.....	January, 1915.								
Remarks.....									

## British Columbia Coal Fields.

## Crownsnest Pass Area.

Description.	Corbin Coal & Coke Co., Ltd., No. 4 Mine, Corbin.			Crow's Nest Pass Coal Co., Ltd., Michel Colliery, Michel.					
	R	AD	D	R	M31 AD	D	M231 D	M2031 R D	
Sample No. ....	483			1-0					
Moisture condition (see note p. 2).....	0.4			Calc.	Calc.	Anal.	Anal.	Calc.	Anal.
Loss on air-drying.....	0.4			1-0					
Results obtained by.....	Calc.	Anal.	Calc.	Calc.	Calc.	Anal.	Anal.	Calc.	Anal.
Proximate analysis:—									
Moisture.....	0.8	0.5		1.4	0.4		.....	1.0	.....
Ash.....	13.8	13.8	13.9	12.4	12.5	12.5	6.2	11.8	11.9
Volatile matter.....	24.6	24.6	24.8	24.4	24.7	24.8	25.2	21.3	21.5
Fixed carbon.....	60.8	61.1	61.3	61.8	62.4	62.7	68.6	65.9	66.6
Ultimate analysis:—									
Carbon.....	74.0	74.3	74.6	74.4	75.2	75.5	82.4	.....	.....
Hydrogen.....	4.2	4.2	4.1	4.4	4.3	4.3	4.8	.....	.....
Ash.....	.....	.....	.....	12.4	12.5	12.5	6.2	.....	.....
Sulphur.....	.....	.....	.....	0.5	0.5	0.5	0.5	0.5	0.5
Nitrogen.....	.....	.....	.....	1.2	1.2	1.2	1.3	.....	.....
Oxygen.....	.....	.....	.....	7.1	6.3	6.0	4.8	.....	.....
Calorific value:—									
Calories per gram, gross.....	.....	.....	.....	7270	7340	7370	7950	7430	7510
B. Th. U. per lb., gross.....	.....	.....	.....	13080	13210	13270	14310	13380	13520
Fuel ratio.....	.....	2.50	.....	.....	.....	.....	.....	.....	3.10
Carbon-Hydrogen ratio.....	17.7	17.9	18.1	17.0	17.5	17.7	17.3	.....	.....
Coking properties.....	Small lump of poor coke.								
Hoffmann potash test.....	12								
Location in mine.....	600 ft. level.....			No. 3 mine, east level.....			No. 3 mine.		
Kind of sample.....	Mine.....			Commercial—10 tons.....			Mine.		
Quality of coal.....				Over 2 inch grizzly and picking belt.			Washed coal from M31, yield 82% Roughly hand picked lump.		
Taken by.....	Fire ranger, Board of Railway Commission- ers.			T. Denis, Mines Branch, Ottawa.			E. Stansfield.		
Date of sampling.....	January, 1915.....			April 30, 1908.....			July 27, 1909.		
Remarks.....									

## British Columbia Coal Fields.

## Crow's Nest Pass Area.

Description.	Crow's Nest Pass Coal Co., Ltd., Michel Colliery, Michel.								
	M30			M29			M2029		
	R	AD	D	R	AD	D	R	D	
Sample No. ....	1-2			1-9					
Moisture condition (see note p. 2) .....	Calc.	Calc.	Anal.	Calc.	Calc.	Anal.	Calc.	Anal.	
Loss on air-drying .....	1-8	0-7	.....	3-0	1-2	.....	1-1	.....	
Results obtained by .....	11-7	11-9	11-9	9-9	10-1	10-2	8-5	8-6	
Proximate analysis:—	22-2	22-4	22-6	23-4	23-8	24-1	25-5	25-8	
Moisture .....	64-3	65-0	65-5	63-7	64-9	65-7	64-9	65-6	
Ash .....	75-2	76-0	76-5	73-8	75-2	76-1	.....	.....	
Volatile matter .....	4-6	4-5	4-5	4-7	4-6	4-5	.....	.....	
Fixed carbon .....	11-7	11-9	11-9	9-9	10-1	10-2	.....	.....	
Ultimate analysis:—	0-3	0-4	0-4	0-6	0-6	0-6	0-7	0-7	
Carbon .....	1-2	1-2	1-2	1-3	1-3	1-3	.....	.....	
Hydrogen .....	7-0	6-0	5-5	9-7	8-2	7-3	.....	.....	
Ash .....	7280	7370	7420	7270	7410	7490	7580	7660	
Sulphur .....	13110	13260	13350	13090	13330	13490	13640	13790	
Nitrogen .....	2-00			2-70			2-55		
Oxygen .....	16-4	16-9	17-1	15-6	16-3	16-8	.....	.....	
Calorific value:—									
Calories per gram, gross .....									
B. Th. U. per lb., gross .....									
Fuel ratio .....									
Carbon-Hydrogen ratio .....									
Coking properties .....									
Hoffmann potash test .....									
Location in mine .....	No. 7 mine.....			No. 8 mine, No. 2 district.			No. 8 mine.		
Kind of sample .....	Commercial—10 tons.....			Commercial—10 tons.....			Mine.		
Quality of coal .....	Over 2 inch grizzly and picking belt.			Over 2 inch grizzly and picking belt.			Roughly hand picked lump.		
Taken by .....	T. Denis, Mines Branch			T. Denis.			E. Stansfield.		
Date of sampling .....	April 29, 1908.....			April 28, 1908.....			July 29, 1909.		
Remarks .....									



## British Columbia Coal Fields.

## Crowsnest Pass Area.

Description.	Canadian Pacific Railway Natural Resources Department. Hosmer Mine, Hosmer.								
	M51			M52			M53		
Sample No.	R	AD	D	R	AD	D	R	AD	D
Moisture condition (see note p. 2)	0.8			1.5			2.7		
Loss on air-drying	0.8			1.5			2.7		
Results obtained by	Calc.	Calc.	Anal.	Calc.	Calc.	Anal.	Calc.	Calc.	Anal.
Proximate analysis:—									
Moisture	1.7	0.9		2.6	1.1		4.0	1.3	
Ash	15.0	15.2	15.3	12.1	12.3	12.4	7.2	7.4	7.5
Volatile matter	21.0	21.1	21.3	24.9	25.3	25.6	26.9	27.6	28.0
Fixed carbon	62.3	62.8	63.4	60.4	61.3	62.0	61.9	63.7	64.5
Ultimate analysis:—									
Carbon	73.2	73.8	74.4	73.9	75.0	75.9	76.7	78.8	79.8
Hydrogen	4.3	4.2	4.2	4.7	4.6	4.5	5.4	5.2	5.1
Ash	15.0	15.2	15.3	12.1	12.3	12.4	7.2	7.4	7.5
Sulphur	0.3	0.3	0.3	0.6	0.6	0.6	0.5	0.5	0.6
Nitrogen	1.0	1.0	1.0	1.1	1.1	1.2	1.3	1.4	1.4
Oxygen	6.2	5.5	4.8	7.6	6.4	5.4	8.9	6.7	5.6
Caloric value:—									
Calories per gram, gross	6940	7000	7060	7080	7190	7270	7460	7670	7770
B. Th. U. per lb., gross	12500	12600	12710	12750	12940	13090	13430	13800	13980
Fuel ratio		2.95			2.40			2.30	
Carbon-Hydrogen ratio	17.0	17.4	17.8	15.9	16.5	16.9	14.3	15.2	15.6
Coking properties									
Hoffmann potash test									
Location in mine	No. 2 seam south			No. 6 seam south			No. 8 seam south.		
Kind of sample	Commercial—3 tons			Commercial—3 tons			Commercial—5 tons.		
Quality of coal	Lumps of slate not passing 1½ inch ring removed by hand.								
Taken by	E. Stansfield.								
Date of sampling	July 24, 1909.								
Remarks									



## British Columbia Coal Fields.

## Flathead Area.

Description.	14-ft. Seam on Cauldrey Creek		Butt's 31-ft. Seam.				15-ft. Seam under Butt's 31-ft Seam.		7-ft. Seam at Townsite.	
	R	D	R	D	R	D	R	D	R	D
Sample No.....	387		388		339		390		391	
Moisture condition (see note p. 2).....	R	D	R	D	R	D	R	D	R	D
Loss on air-drying.....%	Anal.	Calc.	Anal.	Calc.	Anal.	Calc.	Anal.	Calc.	Anal.	Calc.
Results obtained by.....%										
Proximate analysis:—										
Moisture.....%	23.9	.....	4.7	.....	3.0	.....	9.2	.....	1.6	.....
Ash.....%	17.3	22.7	12.0	12.6	9.4	9.6	10.7	11.8	20.0	20.4
Volatile matter.....%	39.6	52.1	24.1	25.3	22.6	23.0	24.4	26.9	24.2	24.6
Fixed carbon.....%	19.2	25.2	59.2	62.1	66.0	67.4	55.7	61.3	54.2	55.0
Ultimate analysis:—										
Carbon.....%	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hydrogen.....%	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ash.....%	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sulphur.....%	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nitrogen.....%	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oxygen.....%	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Calorific value:—										
Calories per gram, gross.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
B. Th. U. per lb., gross.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fuel ratio.....	0.49	.....	2.45	.....	2.95	.....	2.30	.....	2.25	.....
Carbon-Hydrogen ratio.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coking properties.....	Non-coking.....	.....	Non-coking.....	.....	Agglomerates.....	.....	Non-coking.....	.....	Non-coking.....	.....
Hoffmann potash test.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Location in mine.....	.....	.....	4-ft. bench near surface.	.....	4-ft. bench, lower part of seam.	.....	Lower 9-ft. of seam.	.....	Prospect.	.....
Kind of sample.....	Prospect.....	.....	Prospect.....	.....	Prospect.....	.....	Prospect.....	.....	Prospect.	.....
Quality of coal.....	.....	.....	Lower grade than average of seam.	.....	Higher grade than average of seam.	.....	.....	.....	.....	.....
Taken by.....	J. D. Mackenzie,	.....	Geological Survey, Ottawa.							
Date of sampling.....	Summer of 1914.	.....	.....							
Remarks.....	.....	.....	.....							

## British Columbia Coal Fields.

## Tulameen Area.

Description.	Prospect tunnels at Granite Creek.					
	M. EX. 1 D	M. EX. 201 D	M. EX. 2 D	M. EX. 202 D	M. EX. 3 D	M. EX. 203 D
Sample No. ....						
Moisture condition (see note p. 2).....	D	D	D	D	D	D
Loss on air-drying.....	.....	.....	.....	.....	.....	.....
Results obtained by.....	Anal.	Anal.	Anal.	Anal.	Anal.	Anal.
Proximate analysis:—						
Moisture.....	.....	.....	.....	.....	.....	.....
Ash.....	12.3	7.9	14.0	10.4	16.0	13.9
Volatile matter.....	33.7	.....	32.4	.....	32.1	.....
Fixed carbon.....	54.0	.....	53.6	.....	51.9	.....
Ultimate analysis:—						
Carbon.....	71.6	.....	70.1	.....	69.4	.....
Hydrogen.....	4.8	.....	4.4	.....	4.3	.....
Ash.....	.....	.....	14.0	.....	.....	.....
Sulphur.....	.....	.....	1.9	1.8	.....	.....
Nitrogen.....	.....	.....	.....	.....	.....	.....
Oxygen.....	.....	.....	.....	.....	.....	.....
Calorific values:—						
Calories per gram, gross.....	.....	.....	.....	.....	.....	.....
B. Th. U. per lb., gross.....	.....	.....	.....	.....	.....	.....
Fuel ratio.....	1.60	.....	1.65	.....	1.60	.....
Carbon-Hydrogen ratio.....	14.9	.....	15.9	.....	16.1	.....
Coking properties.....	.....	.....	.....	.....	.....	.....
Hoffmann potash test.....	.....	.....	.....	.....	.....	.....
Location in mine.....	No. 1 opening. Prospect.....	.....	No. 2 opening. Prospect.....	.....	No. 4 opening. Prospect.....	.....
Kind of sample.....	.....	Washed coal from M. EX. 1; yield 85 %	.....	Washed coal from M. EX. 2; yield 90 %	.....	Washed coal from M. EX. 3; yield 90 %
Quality of coal.....	.....	.....	.....	.....	.....	.....
Taken by.....	Prof. J. B. Porter, McGill University.					
Date of sampling.....	June, 1908.					
Remarks.....						

## British Columbia Coal Fields.

## Nicola Area.

Description.	Middlesboro Collieries Ltd., Merritt.									
	M22*			M22SP*			M22M	M222M		
	R	AD	D	R	AD	D	D	D		
Sample No.....										
Moisture condition (see note p. 2).....	0.5			0.6						
Loss on air-drying.....										
Results obtained by.....	Calc.	Calc.	Anal.	Calc.	Calc.	Anal.	Anal.	Anal.		
Proximate analysis:—										
Moisture.....	4.4	3.9		2.9	2.3					
Ash.....	13.9	14.0	14.5	12.5	12.6	12.9	14.1	10.0		
Volatile matter.....	37.4	37.6	39.1	37.9	38.1	39.0	39.1	39.8		
Fixed carbon.....	44.3	44.5	46.4	46.7	47.0	48.1	46.8	50.2		
Ultimate analysis:—										
Carbon.....	64.3	64.6	67.2	67.4	67.9	69.4	66.1	70.8		
Hydrogen.....	5.3	5.3	5.0	5.3	5.2	5.1	4.9	5.3		
Ash.....	13.9	14.0	14.5	12.5	12.6	12.9	14.1	10.0		
Sulphur.....	0.9	0.9	1.0	0.7	0.7	0.7	0.9	0.9		
Nitrogen.....	1.2	1.2	1.3	1.9	1.9	2.0	1.4	1.5		
Oxygen.....	14.4	14.0	11.0	12.2	11.7	9.9	12.6	11.5		
Calorific value:—										
Calories per gram, gross.....	6200	6240	6490	6570	6610	6760	6510	7010		
B. Th. U. per lb., gross.....	11170	11230	11680	11820	11890	12170	11720	12620		
Fuel ratio.....		1.20			1.25		1.20	1.25		
Carbon-Hydrogen ratio.....	12.1	12.3	13.4	12.8	13.0	13.6	13.5	13.4		
Coking properties.....										
Hoffmann potash test.....										
Location in mine.....	No. 1 mine, Jewel seam			No. 2 mine, Rat Hole seam.						
Kind of sample.....	Commercial—10 tons.....			Commercial—1 ton.....			Com- mercial.			
Quality of coal.....	Run-of-mine.....			Run-of-mine.....			Mixture of Nos M22 and M22SP	Washed coal from M22M, yield 87%		
Taken by.....	T. Denis, Mines Branch									
Date of sampling.....	April 18, 1908.									
Remarks.....	*Operated by Nicola Valley Coal & Coke Co., Ltd., at time of sampling.									

## British Columbia Coal Fields.

## Nicola Area.

Description.	Middlesboro Collieries Ltd., Merritt.											
	626			627			628			629		
Sample No. ....	R	R	D	R	R	D	R	R	D	R	R	D
Moisture condition (see note p. 2).....												
Loss on air-drying.....												
Results obtained by.....	Anal.	Anal.	Calc.	Anal.	Anal.	Calc.	Anal.	Anal.	Calc.	Anal.	Anal.	Calc.
Proximate analysis:—												
Moisture.....	4.0	4.0	.....	6.8	6.8	.....	7.5	7.5	.....	7.9	7.9	.....
Ash.....	4.3	4.3	4.5	5.3	5.3	5.7	5.7	5.7	6.1	6.8	6.8	7.4
Volatile matter.....	33.5†	37.7*	39.2*	34.9†	39.2*	42.0*	32.9†	36.6*	39.6*	33.7†	37.3*	40.5*
Fixed carbon.....	58.2	54.0	56.3	53.0	48.7	52.3	53.9	50.2	54.3	51.6	48.0	52.1
Ultimate analysis:—												
Carbon.....												
Hydrogen.....												
Ash.....												
Sulphur.....												
Nitrogen.....												
Oxygen.....												
Calorific value:—												
Calories per gram, gross.....												
B. Th. U. per lb., gross.....												
Fuel ratio.....	1.75	1.45	1.45	1.50	1.25	1.25	1.65	1.35	1.35	1.55	1.30	1.30
Carbon-Hydrogen ratio.....												
Coking properties.....	Good coke.			Poor coke.			Poor coke.			Poor coke.		
Hoffmann potash test.....	6—7			5—4			5					
Location in mine.....	No. 4 seam.....			No. 5 seam.....			No. 3 seam.....			No. 7 seam.		
Kind of sample.....	Mine.											
Quality of coal.....												
Taken by.....	Fire ranger, Board of Railway Commissioners.											
Date of sampling.....	September, 1915.											
Remarks.....	*Quick coking. †Slow coking.											

## British Columbia Coal Fields.

Description.	Nicola Area.			Vancouver Area.					
	Middlesboro Collieries, Ltd., Merritt.			Seams on east side of English Bay.					
Sample No. ....	630			361			362		
Moisture condition (see note p. 2).....	R	R	D	R	AD	D	R	AD	D
Loss on air-drying.....	%			4.6	%		6.8	%	
Results obtained by.....	Anal.	Anal.	Calc.	Calc.	Anal.	Calc.	Calc.	Anal.	Calc.
Proximate analysis:—									
Moisture.....	3.6	3.6	.....	18.4	14.5	.....	23.7	18.1	.....
Ash.....	4.2	4.2	4.4	6.6	6.9	8.1	4.1	4.4	5.3
Volatile matter.....	34.5†	37.6*	39.0*	32.7	34.3	40.1	31.4	33.7	41.2
Fixed carbon.....	57.7	54.6	56.6	42.3	44.3	51.8	40.8	43.8	53.5
Ultimate analysis:—									
Carbon.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hydrogen.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ash.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sulphur.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nitrogen.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oxygen.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Calorific value:—									
Calories per gram, gross.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
B. Th. U. per lb., gross.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fuel ratio.....	1.65	1.45	1.45	1.30			1.30		
Carbon-Hydrogen ratio.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coking properties.....	Good coke.			Non-coking.			Non-coking.		
Hoffmann potash test.....									
Location in mine.....	No. 4 seam.....			No. 1 (1 foot) seam, near Kitsilano Beach.			No. 2 (8 inch) seam, near Kitsilano Beach.		
Kind of sample.....	Mine.			Private individual at Vancouver.			Private individual.		
Quality of coal.....	Fire ranger, Board of Railway Commis- sioners.			Private individual at Vancouver.			Private individual.		
Taken by.....	September, 1915.....			1914.....			1914.....		
Date of sampling.....	September, 1915.....			1914.....			1914.....		

\* Quick coking. † Slow coking.

## British Columbia Coal Fields.

## Nanaimo Area.

Description.	Western Fuel Co., Ltd., No. 1 mine, Nanaimo.								
	R	M18 AD	D	M2018		R	M17 AD	D	
Sample No.....									
Moisture condition (see note p. 2).....	0.6					0.5			
Loss on air-drying.....	Calc.	Calc.	Anal.	Calc.	Anal.	Calc.	Calc.	Anal.	
Results obtained by.....									
Proximate analysis:—									
Moisture.....	2.2	1.6		1.8		2.4	1.9		
Ash.....	10.1	10.1	10.3	10.2	10.4	11.6	11.7	11.9	
Volatile matter.....	40.3	40.6	41.2	40.8	41.5	40.5	40.7	41.5	
Fixed carbon.....	47.4	47.7	48.5	47.2	48.1	45.5	45.7	46.6	
Ultimate analysis:—									
Carbon.....	70.4	70.9	72.1			67.4	67.7	69.0	
Hydrogen.....	5.0	4.9	4.8			4.8	4.7	4.6	
Ash.....	10.1	10.1	10.3			11.6	11.7	11.9	
Sulphur.....	0.9	0.9	0.9	0.9	0.9	1.2	1.2	1.3	
Nitrogen.....	1.2	1.2	1.2			1.1	1.1	1.2	
Oxygen.....	12.4	12.0	10.7			13.9	13.6	12.0	
Calorific value:—									
Calories per gram, gross.....	6970	7010	7130	6950	7080	6760	6790	6930	
B. Th. U. per lb., gross.....	12550	12620	12830	12520	12740	12180	12230	12470	
Fuel ratio.....		1.20			1.15		1.10		
Carbon-Hydrogen ratio.....	14.2	14.4	14.9			14.2	14.3	15.0	
Coking properties.....									
Hoffmann potash, test.....									
Location in mine.....	Upper or Douglas seam, Esplanade shaft.			Upper or Douglas seam.		Lower or Newcastle seam, Esplanade shaft.			
Kind of sample.....	Commercial—10 tons.			100 lbs.		Commercial—10 tons.			
Quality of coal.....	Over 2 inch screen, and picking table.			Over 2 inch screen, and picking table.		Over 2 inch screen, and picking table.			
Taken by.....	T. Denis, Mines Branch.			Mine authorities		T. Denis.			
Date of sampling.....	April 4, 1908.			April, 1909.		April 6, 1908.			



## British Columbia Coal Fields.

## Nanaimo Area.

Description.	Canadian Collieries (Dunsmuir), Ltd., Ladysmith, Wellington Extension Colliery.										
	M20			M2020		567		568		569	
Sample No.	R	AD	D	R	D	R	D	R	D	R	D
Moisture condition (see note p. 2).	0.7										
Loss on air-drying	%										
Results obtained by	Calc.			Calc.		Anal. Calc.		Anal. Calc.		Anal. Calc.	
Proximate analysis:—											
Moisture	1.7	1.1	.....	1.2	.....	1.3	.....	1.6	.....	1.4	.....
Ash	9.9	10.0	10.1	8.5	8.6	8.4	8.5	11.8	12.0	11.3	11.5
Volatile matter	39.5	39.7	40.1	39.9	40.4	40.7	41.2	38.9	39.5	38.8	39.4
Fixed carbon	48.9	49.2	49.8	50.4	51.0	49.6	50.3	47.7	48.5	48.5	49.1
Ultimate analysis:—											
Carbon	71.7	72.1	72.9	.....	.....	74.3	75.3	.....	.....	.....	.....
Hydrogen	4.8	4.8	4.7	.....	.....	5.2	5.2	.....	.....	.....	.....
Ash	9.9	10.0	10.1	.....	.....	8.4	8.5	.....	.....	.....	.....
Sulphur	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4
Nitrogen	1.2	1.2	1.2	.....	.....	1.2	1.2	.....	.....	.....	.....
Oxygen	12.0	11.5	10.7	.....	.....	10.5	9.4	.....	.....	.....	.....
Calorific value:—											
Calories per gram, gross	7180	7230	7310	7340	7430	7340	7430	7060	7170	7220	7330
B. Th. U. per lb., gross	12930	13020	13160	13210	13370	13210	13380	12700	12910	13000	13190
Fuel ratio	1.25			1.25		1.20		1.20		1.25	
Carbon-Hydrogen ratio	14.8	15.0	15.4	.....	.....	14.2	14.6	.....	.....	.....	.....
Coking properties	.....					Good coke.		Good coke.		Fair coke.	
Hoffmann potash test	.....										
Location in mine	Wellington seam.....			Wellington seam.		.....		.....		.....	
Kind of sample	Commercial—10 tons			100 lb.		.....		.....		.....	
Quality of coal	Over 14 inch screen, and picking tables.			.....		.....		.....		.....	
Taken by	T. Denis, Mines Branch.			Mine authorities.		Mine authorities.		Mine authorities.		Mine authorities.	
Date of sampling	April 8, 1908			April, 1909		1915		1915		1915.	
Remarks	Operated by Wellington Colliery Co., Ltd., at time of sampling.										

## British Columbia Coal Fields.

## Comox Area.

Description.	Canadian Collieries (Dunsmuir), Ltd., Cumberland, Comox Colliery.					
	M 21 D	M 21 SP D	M 21 M D	M 221 M D	570 R D	
Sample No. ....						
Moisture condition (see note p. 2). ....						
Loss on air-drying .....%						
Results obtained by .....	Anal.	Anal.	Anal.	Anal.	Anal.	Calc.
Proximate analysis:—						
Moisture .....%					1-1	
Ash .....%	11-9	11-9	12-0	8-9	10-4	10-5
Volatile matter .....%	31-6	28-0	30-2	30-8	32-2	32-6
Fixed carbon .....%	56-5	60-1	57-8	60-3	56-3	56-9
Ultimate analysis:—						
Carbon .....%	72-9	74-4	73-4	77-6	75-0	75-8
Hydrogen .....%	4-4	4-5	4-4	4-6	4-9	4-8
Ash .....%	11-9	11-9	12-0	8-9	10-4	10-5
Sulphur .....%	1-0	0-9	0-9	0-8	1-3	1-3
Nitrogen .....%	1-0	1-0	1-0	1-1	0-9	0-9
Oxygen .....%	8-8	7-3	8-3	7-0	7-5	6-7
Calorific value:—						
Calories per gram, gross.	7150	7210	7230	7550	7340	7420
B. Th. U. per lb., gross.	12870	12980	13010	13590	13210	13360
Fuel ratio .....	1-80	2-15	1-90	1-95	1-75	
Carbon-Hydrogen ratio .....	16-5	16-5	16-7	16-9	15-3	15-7
Coking properties .....					Fair coke.	
Hoffmann potash test .....						
Location in mine .....	No. 4 mine, lower seam.	No. 7 mine, lower seam.				
Kind of sample .....	Commercial—5 tons.	Commercial—5 tons.	Commercial.			
Quality of coal .....	Over $\frac{1}{2}$ -inch screen, and picking belt.	Over $\frac{1}{2}$ to 1 inch bar screen, and picking belt.	Mixture of M 21 and M 21 SP.	Washed coal from M 21 M: yield 88 %.	Comox lump.	
Taken by .....	T. Denis, Mines Branch.	T. Denis .....			Mine authorities	
Date of sampling .....	April 11, 1908.	April 13, 1908.			1915.	
Remarks .....	Operated by Wellington Colliery Co., Ltd., at time of sampling.					

## British Columbia Coal Fields.

Description.	Comox Area.				Suquash Area.	
	Canadian Collieries (Dunsmuir Ltd., Cumberland, Comox Colliery.				Pacific Coast Coal Mines, Ltd., Suquash Mine, Suquash.	
Sample No. ....	574		572		M. EX. 34	M. EX. 234
Moisture condition (see note p. 2).....	R	D	R	D	D	D
Loss on air-drying.....	%		%		%	
Results obtained by.....	Anal.	Calc.	Anal.	Calc.	Anal.	Anal.
Proximate analysis:—						
Moisture.....	1.1	.....	1.1	.....	.....	.....
Ash.....	11.2	11.4	15.1	15.3	23.0	15.1
Volatile matter.....	29.6	29.9	28.6	28.9	34.3	36.7
Fixed carbon.....	58.1	58.7	55.2	55.8	42.7	48.2
Ultimate analysis:—						
Carbon.....	%		%		%	
Hydrogen.....	%		%		%	
Ash.....	%		%		%	
Sulphur.....	0.5	0.5	0.7	0.7	1.0	0.9
Nitrogen.....	%		%		%	
Oxygen.....	%		%		%	
Calorific value:—						
Calories per gram, gross.....	7200	7280	7030	7100	6170	6420
B. Th. U. per lb., gross.....	12960	13110	12650	12780	11100	11560
Fuel ratio.....	1.95		1.95		1.25	1.30
Carbon-Hydrogen ratio.....	.....		.....		.....	
Coking properties.....	Fair coke.		Fair coke.		.....	
Hoffmann potash test.....	.....		.....		.....	
Location in mine.....	.....		.....		.....	
Kind of sample.....	.....		.....		Commercial— 10 tons.	
Quality of coal.....	Comox nut.....	.....	Comox pea.....	.....	Washed coal from M. EX. 34; yield 81%	
Taken by.....	Mine authorities		Mine authorities		Mine authorities	
Date of sampling.....	1915		1915		October, 1909.	
Remarks.....	.....		.....		.....	









## Yukon Coal Fields.

## Kluane Mining Division.

Description.	From Head of Shop Creek.		Left Fork of Burwash Creek.		Left Limit of Granite Creek.			
	R 416 D		R 417 D		R 418 D		R 419 D	
Sample No. ....								
Moisture condition (see note p. 2) .....	R	D	R	D	R	D	R	D
Loss on air-drying .....	Anal.	Calc.	Anal.	Calc.	Anal.	Calc.	Anal.	Calc.
Results obtained by .....								
Proximate analysis:—								
Moisture .....	10.9	.....	10.2	.....	11.2	.....	9.8	.....
Ash .....	9.6	10.7	9.1	10.1	5.4	6.1	1.6	1.8
Volatile matter .....	41.0	46.0	42.0	46.8	40.9	46.0	43.9	48.6
Fixed carbon .....	38.5	43.3	38.7	43.1	42.5	47.9	44.7	49.6
Ultimate analysis:—								
Carbon .....	.....	.....	.....	.....	.....	.....	.....	.....
Hydrogen .....	.....	.....	.....	.....	.....	.....	.....	.....
Ash .....	.....	.....	.....	.....	.....	.....	.....	.....
Sulphur .....	.....	.....	.....	.....	.....	.....	.....	.....
Nitrogen .....	.....	.....	.....	.....	.....	.....	.....	.....
Oxygen .....	.....	.....	.....	.....	.....	.....	.....	.....
Calorific value:—								
Calories per gram, gross .....	.....	.....	.....	.....	.....	.....	.....	.....
B. Th. U. per lb., gross .....	.....	.....	.....	.....	.....	.....	.....	.....
Fuel ratio .....	0.94	.....	0.92	.....	1.05	.....	1.00	.....
Carbon-Hydrogen ratio .....	.....	.....	.....	.....	.....	.....	.....	.....
Coking properties .....	Non-coking	.....	Non-coking	.....	Non-coking	.....	Shows tendency to agglomerate.	.....
Hoffmann potash test .....	3-2	.....	2	.....	2	.....	.....	.....
Location in mine .....	Prospect.							
Kind of sample .....	D. D. Cairnes, Geological Survey.							
Quality of coal .....	Summer of 1914.							
Taken by .....								
Date of sampling .....								
Remarks .....								



## Miscellaneous Samples from British Columbia.

No. 300. Sawdust briquettes manufactured in Vancouver. Received in December, 1913.

## Proximate analysis—

	As received	Dried at 105° C
Moisture.....	7.3	.....
Ash.....	36.1	38.9
Volatile matter.....	44.5	48.0
Fixed carbon.....	12.1	13.1
Fuel ratio.....		0.27

## Calorific value—

Calories.....	Per gram, gross.	3630	3920
B. Th. U.....	Per lb., gross.	6530	7050

## Solubility—in ether.....

	.....	16.1	17.4
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No. 1141. Crude oil, said to be collected in the vicinity of Burnaby Lake, B.C.

The oil was black and very viscous at ordinary temperatures.

## Specific gravity—

At 15.5° C.....	0.928
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## Distillation test—Intermittent method—

Temperature.	% by volume.
0° — 100° C Water.....	14.3
150° — 200° C.....	1.6
200° — 250° C.....	2.2
250° — 320° C.....	53.7
Residue and loss.....	29.2

Sample received from private individual, October 1, 1917.