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CANADA
DEPARTMENT OF MINES
HON. MARTIN BURRELL, MINISTER; R. G. McCONNELL, DEPUTY MINISTER

MINES BRANCH
EUGENE HAASEL, Ph.D., DIRECTOR

BULLETIN No. 23

Analyses of Canadian Fuels

IN FIVE PARTS

PART II
QUEBEC AND ONTARIO

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
1918

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EXPLANATORY NOTES.

The samples of fuel from Quebec and Ontario 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 "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.

An account of the methods employed for the distillation of petroleum and its products is to be found in the appendix to Part IV of this report.

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Quebec Peat Bogs.

Description.	Peat from Les Bergeron- nes, Saguenay county.	Cacouna bog,* Temiscouata county.	Leparc bog, near Cacouna,* Temiscouata county.	Rivière-du-Loup bog,† Temiscouata county.				
				209 D	210 D	211 D	212 D	213 D
Sample No.....	81	208	207					
Moisture condition (see note, p. 2).....	D	D	D	D	D	D	D	D
Loss on air-drying.....								
Proximate analysis:—								
Moisture.....								
Ash.....	3.1	6.0	2.7	2.8	2.1	1.9	2.1	2.8
Volatile matter.....	71.5	65.7	69.5	69.2	69.3	70.5	69.2	67.8
Fixed carbon.....	25.4	28.3	27.8	28.0	28.6	27.6	28.7	29.4
Ultimate analysis:—								
Carbon.....								
Hydrogen.....								
Ash.....								
Sulphur.....								
Nitrogen.....		1.6	0.9	1.0	1.0	0.8	0.9	0.9
Oxygen.....								
Caloric value:—								
Calories per gram, gross.....	4,630	5,290	5,000	5,060	5,040	5,000	4,960	5,020
B. Th. U. per lb., gross.....	8,330	9,520	9,000	9,110	9,070	9,000	8,930	9,030
Fuel ratio.....	0.35	0.43	0.40	0.40	0.41	0.39	0.41	0.43
Carbon-Hydrogen ratio.....								
Kind of sample.....		Prospect.						
Taken by.....	Private indi- vidual.	A. Anrep, Mines Branch, Ottawa.						
Date of sampling.....	1911.....	Summer of 1912						
Remarks.....		*Bog traversed by Canadian Government railway. †Bog traversed by Temiscouata railway.						

Quebec Peat Bogs.

Description.	Rivière-du-Loup bog,* Temiscouata county.					Rivière Ouelle bog,† Kamouraska county.	
	214 D	215 D	216 D	217 D	218 D	219 D	220 D
Sample No.							
Moisture condition (see note p. 2) .							
Loss on air-drying %							
Proximate analysis:—							
Moisture %							
Ash %	2.9	2.3	3.9	4.2	2.8	3.3	3.5
Volatile matter %	68.8	70.0	67.1	67.2	68.6	67.9	67.6
Fixed carbon %	28.3	27.7	29.0	28.6	28.6	28.8	28.9
Ultimate analysis:—							
Carbon %							
Hydrogen %							
Ash %							
Sulphur %							
Nitrogen %	1.0	0.9	1.1	1.1	1.0	1.1	1.1
Oxygen %							
Calorific value:—							
Calories per gram, gross	5,030	4,950	5,100	5,360	4,960	5,050	5,160
B. Th. U. per lb., gross	9,060	8,910	9,180	9,650	8,930	9,080	9,280
Fuel ratio	0.41	0.40	0.43	0.43	0.42	0.42	0.43
Carbon-Hydrogen ratio							
Kind of sample	Prospect.						
Taken by	A. Anrep, Mines Branch.						
Date of sampling	Summer of 1912.						
Remarks	*Bog traversed by Temiscouata railway. †Bog traversed by Canadian Government railway.						

Quebec Peat Bogs.

Description.	Pont Rouge bog, Portneuf county.	Lanoraie bog,* Joliette and Berthier counties.			L'Assomption bog, near L'Epiphanie, L'Assomption county.		
		204	205	206	524	525	526
Sample No.	1177						
Moisture condition (see note, p. 2)	D	D	D	D	D	D	D
Loss on air-drying	%	%	%	%	%	%	%
Proximate analysis:—	%	%	%	%	%	%	%
Moisture							
Ash	2.8	9.2	5.4	8.7	5.2	3.5	4.8
Volatile matter	66.7	64.4	66.4	65.0	66.1	67.6	66.9
Fixed carbon	30.5	26.4	28.2	26.3	28.7	28.9	28.3
Ultimate analysis:—	%	%	%	%	%	%	%
Carbon							
Hydrogen							
Ash							
Sulphur	0.2				0.1	0.1	0.1
Nitrogen	1.6	2.0	2.2	2.0	1.6	1.6	1.7
Oxygen							
Caloric value:—							
Calories per gram, gross.	5,760	4,940	5,120	4,890	5,360	5,390	5,370
B. Th. U. per lb., gross.	10,370	8,900	9,220	8,810	9,660	9,710	9,670
Fuel ratio	0.46	0.41	0.42	0.40	0.44	0.43	0.42
Carbon-Hydrogen ratio							
Kind of sample	Prospect.						
Taken by	A. Anrep.	Mines Branch.					
Date of sampling	Summer of 1917.	Summer of 1912			Summer of 1914.		
Remarks		*Bog traversed by Canadian Pacific railway.					

Quebec Peat Bogs.

Description.	St. Hyacinthe bog, St. Hyacinthe and Bagot counties.		Canrobert bog, Rouville county.			
	202 D	203 D	937 D	938 D	939 D	940 D
Sample No.						
Moisture condition (see note, p. 2)						
Loss on air-drying	%	%	%	%	%	%
Proximate analysis:—	%	%	%	%	%	%
Moisture						
Ash	6.6	5.7	3.0	3.8	4.1	8.4
Volatile matter	62.9	63.3	68.6	66.0	66.6	63.3
Fixed carbon	30.5	31.0	28.4	30.2	29.3	28.3
Ultimate analysis:—	%	%	%	%	%	%
Carbon						
Hydrogen						
Ash						
Sulphur			0.2	0.2	0.2	0.2
Nitrogen	1.9	1.7	1.6	1.6	1.5	1.9
Oxygen						
Caloric value:—						
Calories per gram, gross	4,890	4,970	5,310	5,340	5,330	5,180
B. Th. U. per lb., gross	8,800	8,940	9,560	9,620	9,600	9,320
Fuel ratio	0.49	0.49	0.41	0.46	0.44	0.45
Carbon-Hydrogen ratio						
Kind of sample	Prospect.					
Taken by	A. Anrep, Mines Branch.					
Date of sampling	Summer of 1912.			Summer of 1916.		
Remarks						

Quebec Peat Bogs.

Description.	Industrial Peat Co., Ltd., Farnham.	Farnham bog, Iberville and Missisquoi counties.						
		929	930	931	932	933	934	935
Sample No.	114	929	930	931	932	933	934	935
Moisture condition (see note, p. 2).....	D	D	D	D	D	D	D	D
Loss on air-drying.....	%	%	%	%	%	%	%	%
Proximate analysis:—	%	%	%	%	%	%	%	%
Moisture.....								
Ash.....	5.3	4.7	4.6	6.0	4.4	5.2	4.6	4.3
Volatile matter.....	65.8	64.7	65.9	63.8	66.1	66.6	67.2	66.1
Fixed carbon.....	28.9	30.6	29.5	30.2	29.5	28.2	28.2	29.6
Ultimate analysis:—	%	%	%	%	%	%	%	%
Carbon.....								
Hydrogen.....								
Ash.....								
Sulphur.....		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nitrogen.....		1.7	1.7	1.8	1.7	1.8	1.5	1.7
Oxygen.....								
Calorific value:—								
Calories per gram, gross	5,430	5,340	5,440	5,350	5,420	5,400	5,540	5,400
B. Th. U. per lb., gross	9,770	9,620	9,790	9,630	9,760	9,720	9,970	9,730
Fuel ratio.....	0.44	0.47	0.45	0.47	0.45	0.42	0.42	0.45
Carbon-Hydrogen ratio.....								
Kind of sample.....	Commercial.	Prospect.						
Taken by.....	Operators of bog.	A. Anrep, Mines Branch.						
Date of sampling.....	1911.	Summer of 1916.						
Remarks.....								

Quebec Peat Bogs.

Description.	Girard bog, St. John's county.						
	1170	1171	1172	1173	1174	1175	1176
Sample No.	1170	1171	1172	1173	1174	1175	1176
Moisture condition (see note, p. 2).	D	D	D	D	D	D	D
Loss on air-drying							
Proximate analysis:—							
Moisture							
Ash	5.2	5.8	6.2	18.6	10.3	9.5	8.0
Volatile matter	62.6	64.0	61.1	53.9	58.3	61.2	62.1
Fixed carbon	32.2	30.2	32.7	27.5	31.4	29.3	29.9
Ultimate analysis:—							
Carbon							
Hydrogen							
Ash							
Sulphur	0.4	0.6	0.6	0.6	0.6	0.6	0.6
Nitrogen	1.6	1.9	1.8	2.0	1.6	1.6	1.8
Oxygen							
Caloric value:—							
Calories per gram, gross	5,270	5,280	5,180	4,530	5,050	5,050	5,240
B. Th. U. per lb., gross	9,480	9,500	9,330	8,150	9,090	9,090	9,430
Fuel ratio	0.51	0.47	0.53	0.51	0.54	0.48	0.48
Carbon-Hydrogen ratio							
Kind of sample	Prospect.						
Taken by	A. Anrep, Mines Branch.						
Date of sampling	Summer of 1917.						
Remarks							

Quebec Peat Bogs.

Description.	Napierville bog, Napierville county.			St. Isidore bog, La Prairie, Chateauguay and Napierville counties.	Holton bog,* Chateauguay, Napierville and Huntingdon counties.	Large Tea Field bog; near Huntingdon, Huntingdon county.		Small Tea Field bog; near Huntingdon, Huntingdon county.	
	941 D	942 D	943 D	528 D	527 D	198 D	199 D	200 D	201 D
Sample No.									
Moisture condition (see note, p. 2)	D	D	D	D	D	D	D	D	D
Loss on air-drying..... ^{°C}									
Proximate analysis:—									
Moisture..... ^{°C}									
Ash..... ^{°C}	11.4	11.4	3.7	6.8	13.4	5.6	5.0	4.7	8.1
Volatile matter..... ^{°C}	61.1	60.1	66.6	61.6	59.3	65.2	65.8	64.9	64.2
Fixed carbon..... ^{°C}	27.5	28.5	29.7	31.6	27.3	29.2	29.2	30.4	27.7
Ultimate analysis:—									
Carbon..... ^{°C}									
Hydrogen..... ^{°C}									
Ash..... ^{°C}									
Sulphur..... ^{°C}	0.4	0.4	0.4	0.4	1.2				
Nitrogen..... ^{°C}	2.4	2.1	1.9	2.0	2.5	1.6	2.0	1.7	2.0
Oxygen..... ^{°C}									
Calorific value:—									
Calories per gram, gross.....	4,670	4,720	5,210	4,960	4,740	5,160	5,290	4,970	5,310
B. Th. U. per lb., gross.....	8,400	8,490	9,380	8,920	8,530	9,290	9,530	8,940	9,550
Fuel ratio.....	0.45	0.47	0.45	0.51	0.46	0.45	0.44	0.47	0.43
Carbon-Hydrogen ratio.....									
Kind of sample.....	Prospect.								
Taken by.....	A. Anrep, Mines Branch.								
Date of sampling.....	Summer of 1916.			Summer of 1914.			Summer of 1912.		
Remarks.....	*Bog traversed by Grand Trunk railway.								

Ontario Peat Bogs.

Description.	Government bog, † Alfred, Prescott county.		Moose Creek bog, Stormont county.				
	74	562	659	660	661	662	663
Sample No.	74	562	659	660	661	662	663
Moisture condition (see note, p. 2).....	D	D	D	D	D	D	D
Loss on air-drying.....							
Proximate analysis:—							
Moisture.....							
Ash.....	6.0	5.4	9.7	10.8	11.9	9.8	9.0
Volatile matter.....	63.1	64.4	60.7	59.6	61.5	60.9	60.7
Fixed carbon.....	30.9	30.2	29.6	29.6	26.6	29.3	29.4
Ultimate analysis:—							
Carbon.....	56.0	55.4					
Hydrogen.....	5.2	5.2					
Ash.....		5.4					
Sulphur.....		0.2	0.5	0.5	0.5	0.5	0.5
Nitrogen.....		1.5	2.0	2.1	2.2	2.0	2.1
Oxygen.....		32.3					
Calorific value:—							
Calories per gram, gross	5,250	5,290	4,660	4,660	4,740	4,690	4,700
B. Th. U. per lb., gross.	9,460	9,520	8,390	8,390	8,540	8,450	8,460
Fuel ratio.....	0.49	0.47	0.49	0.50	0.43	0.48	0.48
Carbon-Hydrogen ratio	10.7	10.7					
Kind of sample.....	Commercial	Commercial	Prospect.				
Taken by.....	Operators of bog.	Operators of bog.	A. Anrep, Mines Branch.				
Date of sampling.....	Season of 1910.	Season of 1911.	Summer of 1915.				
	Lab. sample Mar. 17, 1911.	Lab. sample May 3, 1915.					
Remarks.....	†Bog traversed by Canadian Pacific railway.						

Ontario Peat Bogs.

Description.	Richmond bog,*† Carleton county.			Meath bog,‡ Renfrew county.	Westmeath bog,‡ Renfrew county.				
	453	454	455	664	655	656	657	658	
Sample No.....									
Moisture condition (see note, p. 2).....	D	D	D	D	D	D	D	D	
Loss on air-drying..... Proximate analysis:—									
Moisture.....									
Ash.....	12.0	11.0	11.2	20.4	9.2	6.8	4.6	9.9	
Volatile matter.....	59.9	60.9	60.8	56.9	59.3	62.0	65.5	62.7	
Fixed carbon.....	28.1	28.1	28.0	22.7	31.5	31.2	29.9	27.4	
Ultimate analysis:—									
Carbon.....									
Hydrogen.....									
Ash.....									
Sulphur.....		0.5		1.1	0.5	0.5	0.5	0.5	
Nitrogen.....	2.0	1.9	2.1	3.0	1.7	1.8	1.4	1.7	
Oxygen.....									
Caloric value:—									
Calories per gram, gross	4,860	4,680	4,710	4,420	4,700	5,200	5,270	4,850	
B. Th. U. per lb., gross	8,750	8,440	8,470	7,960	8,470	9,360	9,480	8,730	
Fuel ratio.....	0.47	0.46	0.46	0.40	0.53	0.50	0.46	0.44	
Carbon-Hydrogen ratio.....									
Kind of sample.....	Prospect.								
Taken by.....	A. Anrep, Mines Branch.								
Date of sampling.....	†Summer of 1913.				‡Summer of 1915.				
Remarks.....	*Bog traversed by Canadian Northern railway.								

Ontario Peat Bogs.

Description.	Stoco bog,*‡ Hastings county.			Manilla* bog, near Mariposa, Victoria county.	Sunder* land bog, Ontario county.	Holland bog, near† Bradford, Simcoe and York counties.		
	456	457	458	446	448	46	47	48
Sample No.	456	457	458	446	448	46	47	48
Moisture condition (see note, p. 2)	D	D	D	D	D	D	D	D
Loss on air-drying.....								
Proximate analysis:—								
Moisture.....								
Ash.....	14.7	15.4	17.6	11.3	11.2	19.3	12.2	13.6
Volatile matter.....	61.1	61.6	60.2	59.9	60.5	59.5	63.2	63.4
Fixed carbon.....	24.2	23.0	22.2	28.8	28.3	21.2	24.6	23.0
Ultimate analysis:—								
Carbon.....								
Hydrogen.....								
Ash.....								
Sulphur.....		1.3		0.6	0.6			
Nitrogen.....	2.2	2.2	2.7	2.1	2.0		2.4	
Oxygen.....								
Calorific value:—								
Calories per gram, gross.....	4,390	4,300	4,340	4,500	4,600	4,230	4,640	4,490
B. Th. U. per lb., gross.....	7,910	7,750	7,810	8,100	8,280	7,610	8,350	8,080
Fuel ratio.....	0.40	0.37	0.37	0.48	0.47	0.36	0.39	0.36
Carbon-Hydrogen ratio								
Kind of sample.....	Prospect.							
Taken by.....	A. Anrep, Mines Branch.							
Date of sampling.....	*Summer of 1913.					†Summer of 1910.		
Remarks.....	‡Bog traversed by Canadian Northern railway.							

Ontario Peat Bogs.

Description.	Holland bog, near Bradford, Simcoe and York counties.							
	49	50	51	52	53	54	55	56
Sample No.	49	50	51	52	53	54	55	56
Moisture condition (see note, p. 2).....	D	D	D	D	D	D	D	D
Loss on air-drying.....								
Proximate analysis:—								
Moisture.....								
Ash.....	12.2	17.3	15.2	8.8	10.1	10.5	10.5	28.5
Volatile matter.....	64.3	59.6	64.6	66.9	63.6	65.0	65.4	53.0
Fixed carbon.....	23.5	23.1	20.2	24.3	26.3	24.5	24.1	18.5
Ultimate analysis:—								
Carbon.....								
Hydrogen.....								
Ash.....								
Sulphur.....								
Nitrogen.....		2.5			2.5			
Oxygen.....								
Caloric value:—								
Calories per gram, gross.....	4,660	4,330	4,410	4,650	4,430	4,580	4,730	3,730
B. Th. U. per lb. gross.....	8,390	7,790	7,950	8,380	7,980	8,250	8,510	6,720
Fuel ratio.....	0.37	0.39	0.31	0.36	0.41	0.38	0.37	0.35
Carbon-Hydrogen ratio.....								
Kind of sample.....	Prospect.							
Taken by.....	A. Anrep, Mines Branch.							
Date of sampling.....	Summer of 1910.							
Remarks.....								

Ontario Peat Bogs.

Description.	Marsh Hill bog, Ontario county.								
	459	460	461	462	463	464	465	466	467
Sample No.	459	460	461	462	463	464	465	466	467
Moisture condition (see note, p. 2)	D	D	D	D	D	D	D	D	D
Loss on air-drying %									
Proximate analysis:—									
Moisture. %									
Ash. %	11.1	10.2	11.5	10.9	11.0	10.8	17.0	17.4	14.2
Volatile matter %	61.0	61.5	61.1	61.6	60.0	61.8	59.1	59.4	62.1
Fixed carbon. %	27.9	28.3	27.4	27.5	29.0	27.4	23.9	23.2	23.7
Ultimate analysis:—									
Carbon. %									
Hydrogen. %									
Ash. %									
Sulphur. %						0.8			
Nitrogen. %	2.0	2.1	2.0	2.4	2.0	2.4	2.2	2.1	2.4
Oxygen. %									
Caloric value:—									
Calories per gram, gross.	4,590	4,580	4,430	4,530	4,560	4,540	4,330	4,290	4,470
B. Th. U. per lb., gross.	8,270	8,240	7,980	8,150	8,200	8,180	7,800	7,730	8,050
Fuel ratio.	0.46	0.46	0.45	0.45	0.48	0.44	0.40	0.39	0.38
Carbon-Hydrogen ratio.									
Kind of sample.	Prospect.								
Taken by.	A. Anrep, Mines Branch.								
Date of sampling.	Summer of 1913.								
Remarks.	Bog traversed by Grand Trunk railway.								

Ontario Peat Bogs.

Description.	Amaranth* bog, near Crombie, Dufferin county.	Luther bog, near Grand* Valley, Dufferin and Wellington counties.			West* over bog, Went- worth county.	Cargill* bog, Bruce county.	Fort† Frances bog, Rainy River county.
		450	451	452	445	447	144
Sample No.	449	450	451	452	445	447	144
Moisture condi- tion (see note, p. 2).....	D	D	D	D	D	D	D
Loss on air-dry- ing.....							
Proximate analy- sis:—							
Moisture.....							
Ash.....	12.9	2.7	10.9	18.8	20.3	26.3	8.7
Volatile mat- ter.....	59.9	67.2	61.1	56.8	55.6	51.6	62.4
Fixed carbon.....	27.2	30.1	28.0	24.4	24.1	22.1	28.9
Ultimate analy- sis:—							
Carbon.....							
Hydrogen.....							
Ash.....							
Sulphur.....	0.3		0.7		1.3	0.5	
Nitrogen.....	1.7	0.8	2.4	1.8	2.3	2.1	1.7
Oxygen.....							
Caloric value:—							
Calories per gram, gross.....	4,840	5,200	4,550	4,180	4,400	4,110	4,950
B. Th. U. per lb., gross.....	8,710	9,360	8,200	7,530	7,920	7,400	8,910
Fuel ratio.....	0.45	0.45	0.46	0.43	0.43	0.43	0.46
Carbon-Hydro- gen ratio.....							
Kind of sample.....	Prospect.						
Taken by.....	A. Anrep, Mines Branch.						
Date of sampling.....	*Summer of 1913.				†Summer of 1911.		
Remarks.....							

Ontario Peat Bogs.

Description.	Samples from bogs on T. & N. O. Ry., South of Cochrane.									
	No. 1 bog, mileage 249.				No. 2 bog, mileage 240.			No. 3 bog, mileage 243.		
Sample No.	1085	1086	1087	1088	1089	1090	1091	1092	1093	
Moisture condition (see note, p. 2)...	D	D	D	D	D	D	D	D	D	
Loss on air-drying %										
Proximate analysis:—										
Moisture.....%										
Ash.....%										
Volatile matter.....%										
Fixed carbon.....%										
Ultimate analysis:—										
Carbon.....%										
Hydrogen.....%										
Ash.....%										
Sulphur.....%										
Nitrogen.....%										
Oxygen.....%										
Caloric value:—										
Calories per gram, gross.....	5,290	5,130	5,190	4,970	5,140	4,720	4,650	5,090	4,880	
B. Th. U. per lb., gross.....	9,530	9,240	9,340	8,950	9,250	8,500	8,380	9,170	8,790	
Fuel ratio.....										
Carbon-Hydrogen ratio.....										
Location in bog....	6-ft. depth.	7-ft. depth.	9-ft. depth.	14-ft. depth.	2-ft. depth.	4-ft. depth.	6-ft. depth.	3-ft. depth.	6-ft. depth.	
Kind of sample.....										
Taken by.....	A. A. Cole, Chief Engineer, T. & N.O. Ry.									
Date of sampling...	Summer of 1917.									
Remarks.....	These samples contained 85% to 90% of water when received.									

Miscellaneous Samples.

Description.	Coal from* Albany River, North of Lake Superior, Ontario.		Briquettes made from organic city refuse with tar as a binder.		Typical anthracite coal as sold in the Province of Ontario.			
	1306		1288		318		426	
Moisture condition (see note, p. 2).	R	D	R	D	R	D	R	D
Loss on air-drying, %								
Results obtained by	Anal.	Calc.	Anal.	Calc.	Anal.	Calc.	Anal.	Calc.
Proximate analysis:—								
Moisture.....%	2.0		2.1		2.4		2.7	
Ash.....%	3.9	3.9	19.3	19.7	11.0	11.3	11.3	11.6
Volatile matter.....%	32.7	33.4	32.9	33.6				
Fixed carbon.....%	61.4	62.7	45.7	46.7				
Ultimate analysis:—								
Carbon.....%								
Hydrogen.....%								
Ash.....%								
Sulphur.....%			0.9	0.9	0.7	0.7	1.0	1.0
Nitrogen.....%								
Oxygen.....%								
Calorific value:—								
Calories per gram, gross.....			6,230	6,360	7,180	7,350	7,170	7,370
B. Th. U. per lb., gross.....			11,210	11,450	12,930	13,240	12,910	13,270
Fuel ratio.....	1.85		1.40					
Carbon-Hydrogen ratio.....								
Coking properties...	Poor coke.		Agglomerates slightly.					
Specific gravity.....			0.83					
Date.....	Received 1918.		1918		1913-1914		1914-1915	
Size.....							Egg.	
No. of samples represented.....					8		16	
Remarks.....								* Sample taken about 15 years previous by a private individual.

Miscellaneous Samples.

Description.	Typical anthracite coal as sold in the Province of Ontario.													
	688		690		811		813		812		826		901	
Sample No.	R	D	R	D	R	D	R	D	R	D	R	D	R	D
Moisture condition (see note, p. 2)														
Loss on air-drying ^{°C}	Anal.	Calc.	Anal.	Calc.	Anal.	Calc.	Anal.	Calc.	Anal.	Calc.	Anal.	Calc.	Anal.	Calc.
Results obtained by														
Proximate analysis:—														
Moisture..... ^{°C}	3.1		5.2		3.9		3.8		3.8		8.9		8.9	
Ash..... ^{°C}	12.9	13.3	18.7	19.8	11.2	11.7	12.4	12.9	12.0	12.5	7.4	8.1	14.6	16.0
Volatile matter..... ^{°C}														
Fixed carbon..... ^{°C}														
Ultimate analysis:—														
Carbon..... ^{°C}														
Hydrogen..... ^{°C}														
Ash..... ^{°C}														
Sulphur..... ^{°C}	0.9	0.9	0.7	0.7	0.8	0.8	0.8	0.8	0.9	1.0	0.8	0.9	0.7	0.8
Nitrogen..... ^{°C}														
Oxygen..... ^{°C}														
Caloric value:—														
Calories per gram, gross.....	6,980	7,210	6,160	6,500	7,000	7,290	6,850	7,120	6,930	7,200	6,620	7,260	6,180	6,780
B. Th. U. per lb., gross.....	12,570	12,970	11,090	11,700	12,610	13,120	12,330	12,810	12,470	12,950	11,910	13,070	11,120	12,210
Fuel ratio.....														
Carbon-Hydrogen ratio.....														
Coking properties.....														
Date.....	1915-1916		1915-1916		1916-1917		1916-1917		1916-1917		1916-1917		1916-1917	
Size.....	Furnace.		Birdseye.		Furnace.		Egg.		Stove.		Birdseye.		Birdseye.	
No. of samples represented.....	5		1		12		9		7		1		1	

Miscellaneous Samples.

Description.	Typical anthracite Coal as sold in the Province of Ontario.									
Sample No.....	1249		1226		1247		1232		1236	
Moisture condition (see note, p. 2).....	R	D	R	D	R	D	R	D	R	D
Loss on air-drying.....	%		%		%		%		%	
Results obtained by.....	Anal.	Calc.	Anal.	Calc.	Anal.	Calc.	Anal.	Calc.	Anal.	Calc.
Proximate analysis:—										
Moisture.....	3.1		1.7		2.5		3.1		5.9	
Ash.....	14.3	14.8	15.4	15.6	16.5	16.9	15.4	15.9	12.4	13.2
Volatile matter.....										
Fixed carbon.....										
Ultimate analysis:—										
Carbon.....										
Hydrogen.....										
Ash.....										
Sulphur.....										
Nitrogen.....	0.8	0.9			1.1	1.1				
Oxygen.....										
Calorific value:—										
Calories per gram, gross.....	6,870	7,090			6,660	6,830				
B. Th. U. per lb., gross.....	12,360	12,760			11,980	12,290				
Fuel ratio.....										
Carbon-Hydrogen ratio.....										
Coking properties.....										
Date.....	1917-1918		1917-1918		1917-1918		1917-1918		1917-1918	
Size.....	Furnace		Egg		Stove		Chestnut		Screenings	
No. of samples represented.....	5		5		6		6		7	

Miscellaneous Samples from Ontario.

SAMPLES NOS. 963-965.

Oil shales from Kettle Point, Lambton county.

No. 963—Upper 3½ feet.

No. 964—Lower 1½ feet.

No. 965—Separate 3 feet deposit of shale.

Sample.	No. 963.	No. 964.	No. 965.
Moisture.....	2.3	2.1	1.8
Ash.....	84.6	81.7	82.5
Volatile matter.....	9.0	10.0	10.1
Fixed carbon.....	4.1	6.2	5.6
Nitrogen.....	0.13	0.14
Caloric value, gross—			
Calories per gram.....	890	1,180	1,100
B. Th. U. per lb.....	1,600	2,130	1,980
Specific gravity.....	2.3	2.4

The nitrogen content is low, theoretically corresponding to a yield of about 15 lbs. ammonium sulphate per long ton.

Samples taken by M. Y. Williams, Geological Survey, Ottawa, during the summer of 1916.

SAMPLE NO. 1151.

Oil shale from Alvinston, Lambton county.

Analysis—

Moisture.....	1.3
Ash.....	90.0
Volatile matter.....	7.5
Fixed carbon.....	1.2
Nitrogen.....	0.32

This theoretically corresponds to a yield of 34 lbs. ammonium sulphate per long ton.

Specific gravity..... 2.5

DESTRUCTIVE DISTILLATION: In electrically heated retort, with temperature slowly increased up to 650° C. (1,200° F.).

Yield of oil—3 imperial gallons per long ton.

The oil has a specific gravity of 0.872 at 15.5° C. (60° F.).

Ammonium sulphate obtained—6 lbs per long ton.

Sample taken by M. Y. Williams, Geological Survey, Ottawa, during the summer of 1917.

SAMPLE NO. 1152.

Oil shale from Shetland, Lambton county.

<i>Analysis</i> —	
Moisture.....	1.1
Ash.....	90.0
Volatile matter.....	8.1
Fixed carbon.....	0.8
Nitrogen.....	0.28
Specific gravity.....	2.6

DESTRUCTIVE DISTILLATION: Similar to last.
 Yield of oil—4 imperial gallons per long ton.
 The oil has a specific gravity of 0.891 at 15.5°C. (60° F.).
 Ammonium sulphate obtained—6 lbs. per long ton.

Sample taken by M. Y. Williams, Geological Survey, Ottawa, during the summer of 1917.

SAMPLE NO. 385.

Oil from Russell county, at a depth of 950 ft.

DISTILLATION TEST: Engler apparatus, continuous method. First drop at 166° C.

Temperature.	Per cent by volume.	Nature of Distillate.
0°—150° C.....	0.0	Naphtha.
150°—200° C.....	4.0	Illuminating oils.
200°—250° C.....	17.4	
250°—300° C.....	20.6	
300°—higher.....	58.0	Lubricating oils, tar, etc.

The sample submitted was so small that only half the usual quantity was used for the distillation test, and therefore the results are not strictly comparable with those from distillations employing the full quantity of oil.

Sample submitted by private individual in September, 1914.

SAMPLE NO. 631.

Oil from a well at Flesherton, Grey county.

The oil was light yellow in colour, somewhat turbid and possessed no pronounced odour.

DISTILLATION TEST: Continuous method.

First drop at 150° C.

Temperature.	Per cent by volume.
150°—240° C.	58.5
240°—300° C.	35.2
Residue.....	6.0
Loss.....	0.3

Sample submitted by Dr. Sproule in October, 1915.

SAMPLE NO. 714.

Natural gas from a shallow well on lot 24, concession VIII, north of Plantagenet township, Prescott county.

Analysis—

Methane.....	85.0%
Nitrogen.....	15.0%

Density..... 0.610

Calorific value, gross: 865 B. Th. U. per cubic foot, of moisture free gas at 60° F. and 30 inches mercury pressure.

The gas is practically insoluble in alcohol, and is therefore a dry gas.

Sample submitted by E. D. Ingall, Geological Survey, Ottawa, in April, 1916.

SAMPLE NO. 1318.

Natural gas from a well near Vankleek Hill, Prescott county.

Analysis—

Carbon dioxide.....	0.8%
Oxygen.....	0.4%
Methane.....	66.2%
Nitrogen.....	32.6%

Sample taken by private individual during April, 1918.

Typical Commercial Gasolines as sold to the Canadian Government.

SAMPLE NO. 404.

Specific gravity.—At 15.5° C.

0.704.

Distillation Test: Engler apparatus, continuous method.
First drop at 58° C.

Temperature.	Per cent by volume.	Total per cent by volume.
58°—70°	4.5	4.5
70°—80°	14.3	18.8
80°—90°	17.9	36.7
90°—100°	18.9	55.6
100°—110°	15.4	71.0
110°—120°	11.9	82.9
120°—130°	7.8	90.7
130°—140°	3.9	94.6
140°—150°	1.8	96.4
150°—154°	0.9	97.3
Residue	1.2	
Loss	1.5	

Sample received November, 1914.

Number of samples tested during 1914—three.

SAMPLE NO. 754.

Specific gravity.—At 15.5° C.

0.721.

Distillation Test: Engler apparatus, continuous method. First drop at 66° C.

Temperature.	Per cent by volume.	Total per cent by volume.
66°—70° C	0.7	0.7
70°—80° C	5.9	6.6
80°—90° C	13.6	20.2
90°—100° C	17.2	37.4
100°—110° C	17.9	55.3
110°—120° C	14.6	69.9
120°—130° C	10.4	80.3
130°—140° C	6.9	87.2
140°—150° C	4.1	91.3
150°—160° C	2.6	93.9
160°—170° C	1.6	95.5
170°—175° C	1.0	96.5
Residue	1.8	
Loss	1.7	

Sample received July, 1916. Number of samples tested during 1916—three.

SAMPLE NO. 1142.

Specific gravity.—At 15.5° C.

0.743.

Distillation Test: Engler apparatus, continuous method.
First drop at 76° C.

Temperature.	Per cent by volume.	Total per cent by volume.
75°—100° C.....	11.0	11.0
100°—125° C.....	30.3	41.3
125°—150° C.....	32.6	73.9
150°—175° C.....	18.5	92.4
175°—177° C.....	1.6	94.0
Residue.....	3.0	
Loss.....	3.0	

Sample received October, 1917. Number of samples tested during 1917—twenty-nine.

SAMPLE NO. 1266.

Specific gravity.—At 15.5° C.

0.745.

Distillation Test: Engler flask, by Dean continuous method.
First drop at 50° C.

Temperature.	Per cent by volume.	Total per cent by volume.
50°—125° C.....	59.5	59.5
125°—175° C.....	34.0	93.5
175°—185° C.....	1.5	95.0
185°—195° C.....	2.0	97.0
Residue.....	1.5	
Loss.....	1.5	

Sample received February, 1918. Number of samples tested to March 31st, 1918—four.