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GASOLINE SURVEY FOR 1926

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By

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A survey of the gasoline sold in Canada was made by the Fuels and Fuel Testing Division of the Mines Branch in 1923, 1924, and 1925³. This report covers a similar survey for 1926. During the latter part of August, 76 samples were collected⁴ from wholesalers or distributors in the following cities: Halifax, St. John, Quebec, Montreal, Ottawa, Toronto, London, Winnipeg, Regina, Calgary, Edmonton, Vancouver and Victoria. These samples were tested for distillation range, iodine value and specific gravity. The distillation range was determined according to the method recommended by the United States Bureau of Mines.⁵ From the results so obtained, a weighted index number was calculated after the method advocated by Gruse,⁶ with the difference that the index numbers were calculated from temperatures of the distillation range expressed in °F. instead of from temperatures expressed in °C. as was done by Gruse. The iodine values were determined by the Hanus method⁷ and the specific gravities were obtained by the Westphal balance at room temperature and the results calculated to 60°F.

1. Chemist, Division of Fuels and Fuel Testing, Mines Branch.
2. Junior Chemist, Division of Fuels and Fuel Testing, Mines Branch.
3. Investigations of Fuels and Fuel Testing, Mines Branch, 1925.
4. The hearty support and co-operation of the Department of Health in taking the samples is gratefully acknowledged.
5. U.S. Bureau of Mines, Technical Paper, 323A.
6. Chemical and Metallurgical Engineering, Vol. 29, No. 22, page 970, Investigations of Fuels and Fuel Testing, Mines Branch, 1923, page 53.
7. Ellis and Meigs, "Gasoline and other Motor Fuels."

TABLE I - RESULT OF ANALYSES

Lab. No.	Brand	DISTILLATION RANGE							End point °F	Recovery	Iodine value	Sp. Gr.	° Be	Index number °F
		1st Drop °F	10% °F	20% °F	50% °F	70% °F	90% °F							
<u>HALIFAX, N.S.</u>														
3845	Red Seal (b)	133	197	223	276	314	370	414	97.9	34	0.755	55.5	1794	
3846	Premier (c)	120	186	210	264	294	342	410	98.0	45	0.744	58.2	1706	
3847	White Rose (b)	111	167	195	254	293	359	412	97.0	30	0.736	60.1	1680	
Average		121	183	209	265	300	357	412	97.6	36	0.745	57.9	1726	
<u>ST. JOHN, N.B.</u>														
3833	White Rose (b)	118	170	195	243	276	329	400	97.8	31	0.736	60.3	1613	
3834	Fundy (c)	117	166	192	253	293	355	407	97.2	26	0.738	59.6	1666	
3835	Premior (a)	133	195	218	266	303	360	405	97.7	32	0.750	56.6	1747	
Average		123	177	202	254	291	348	404	97.6	30	0.741	58.8	1676	
<u>QUEBEC, Que.</u>														
3819	Super Power (a)	104	155	182	254	295	356	406	98.1	21	0.739	59.5	1648	
3820	Red Seal (b)	109	163	188	258	301	358	402	98.0	22	0.740	59.2	1670	
3821	Premier (a)	110	165	193	259	306	365	410	97.6	24	0.740	59.2	1698	
3822	Peerless (c)	108	155	177	226	259	318	376	97.4	6	0.724	63.3	1511	
3823	Queen (a)	110	161	190	260	304	364	409	97.8	10	0.742	58.7	1688	
3824	White Rose (b)	107	159	184	247	298	365	408	97.5	10	0.737	60.0	1661	
Average		108	160	186	251	294	354	402	97.7	16	0.737	60.0	1647	
<u>MONTECAL, Que.</u>														
3811	Yale (g)	105	156	170	222	270	341	405	97.11	6	0.725	63.1	1564	
3812	British Motor (d)	102	153	186	261	306	366	414	97.6	9	0.742	58.5	1686	
3813	Premier (a)	107	156	185	260	304	356	401	97.6	19	0.744	58.2	1662	
3814	Peerless (d)	106	155	174	219	260	323	383	97.3	6	0.721	64.1	1514	
3815	Queen (a)	100	144	170	244	291	350	399	97.0	15	0.733	61.0	1598	
3816	Shell (e)	114	157	177	230	272	340	402	98.0	5	0.727	62.7	1578	
3817	Tidioute (f)	105	150	175	234	275	327	385	98.0	4	0.723	63.8	1546	
3818	Sunoco (g)	117	188	210	287	333	380	420	98.0	60	0.769	52.2	1818	
Average		107	157	181	245	299	348	401	97.6	16	0.736	60.5	1621	

TABLE I - RESULT OF ANALYSES (CONT'D)

Lab. No.	Brand	DISTILLATION RANGE						End point °F	Recovery.	Iodine value	Sp. Gr.	° Be.	Index number °F.
		1st Drop °F	10% °F	20% °F	50% °F	70% °F	90% °F						
<u>OTTAWA, ONT.</u>													
3876	Sunoco L.T. (i)	117	184	212	278	326	370	402	97.4	55	0.772	51.4	1772
3877	Sunoco H.T. (i)	111	156	180	238	284	361	415	97.1	7	0.721	64.2	1634
3878	Premier (a)	108	163	201	261	305	364	405	97.4	13	0.747	57.3	1699
3879	Queen (a)	104	152	130	249	292	354	399	96.8	17	0.737	60.0	1626
3880	Red Seal (b)	112	173	199	265	309	362	407	97.2	18	0.748	57.2	1715
3881	White Rose (b)	102	155	187	262	309	376	434	97.0	12	0.730	61.8	1723
3882	Crown (e)	98	142	172	267	329	387	430	96.5	22	0.746	57.7	1727
3883	Aviation (e)	105	155	176	225	265	332	392	97.1	4	0.723	63.6	1545
3884	Peerless (d)	104	151	172	221	260	317	380	97.2	5	0.719	64.7	1501
3885	Super Power (d)	106	165	194	261	303	361	407	97.5	12	0.747	57.5	1691
3886	Super Quality (t)	92	133	159	239	291	356	400	96.5	14	0.729	62.0	1578
3887	Frontenac (j)	94	144	176	269	330	389	430	96.5	25	0.749	57.0	1738
3919	Marathon (h)	103	159	183	239	277	336	401	97.2	4	0.727	62.7	1595
3920	Ethyl (a)	103	160	185	243	281	332	375	97.2	15	0.745	57.9	1576
3921	High Compression (t)	91	140	167	231	270	322	372	97.1	3	0.718	65.0	1502
Average		103	155	183	250	295	354	403	97.0	15	0.737	60.0	1641
<u>TORONTO, ONT</u>													
3837	Premier (a)	118	171	200	269	311	364	407	97.5	19	0.748	57.1	1722
3838	Sunoco (g)	130	193	221	279	327	381	425	97.2	41	0.763	53.5	1826
3839	Peerless (d)	97	149	177	239	286	352	390	96.8	4	0.724	63.3	1593
3840	Crystal	118	186	217	279	318	370	418	97.4	6	0.745	58.0	1788
3841	White Rose (b)	106	164	194	266	306	369	431	97.3	25	0.736	60.3	1730
3842	Perfection (l)	110	155	176	223	265	341	398	97.5	20	0.724	63.2	1558
3843	Shell Avian. (e)	105	160	181	230	264	316	367	97.5	2	0.723	63.6	1510
3844	Hi-Test (h)	105	154	181	242	281	342	393	97.1	4	0.723	63.6	1593
Average		111	167	193	253	295	354	404	97.3	15	0.736	60.3	1666
(a)	Imperial Oil Company Limited							(f)	Fidhouse Refining Company Limited				
(b)	Canadian Oil Companies Limited							(g)	Sun Oil Company Limited				
(c)	Canadian Independent Oil Limited							(h)	McCull Brothers Limited				
(d)	British American Oil Company Limited							(i)	Capital City Oil Company Limited				
(e)	Shell Oil Company Limited							(j)	Frontenac Oil Company.				

TABLE I - RESULT OF ANALYSES (CONT'D)

Lab. No.	Brand	DISTILLATION RANGE							Recovery	Iodine value	Sp. Gr.	° Be	Index number °F.
		1st Drop °F	10% °F	20% °F	50% °F	70% °F	90% °F	End point °F					
<u>CALGARY, ALTA.</u>													
3863	Sunshine (o)	116	179	208	286	340	416	469	97.6	6	0.748	57.1	1398
3864	Union (q)	110	175	201	254	296	363	421	98.0	8	0.751	56.3	1710
3865	Premier (a)	110	166	192	263	307	365	408	97.6	44	0.736	60.2	1701
3866	Royal (n)	114	176	208	281	326	376	404	97.2	42	0.745	58.0	1771
Average		113	174	202	271	317	380	426	97.6	25	0.745	57.9	1770
<u>EDMONTON, ALTA.</u>													
3867	British Motor (d)	111	169	198	270	317	373	412	97.5	40	0.741	58.9	1749
3868	Premier (a)	122	179	204	281	326	376	412	97.3	45	0.745	57.9	1778
3869	North Star (n)	98	141	166	235	290	364	408	96.7	33	0.723	63.7	1604
3870	White Rose (b)	113	169	198	275	321	378	416	97.2	43	0.742	58.7	1757
Average		111	165	192	265	314	373	412	97.2	40	0.738	59.8	1721
<u>VANCOUVER, B.C.</u>													
3848	Premier (a)	121	187	210	268	312	376	430	97.4	14	0.756	55.3	1783
3849	General (p)	115	179	209	268	311	373	420	97.3	6	0.759	54.5	1760
3850	Shell (e)	115	174	206	274	323	383	430	97.6	5	0.754	55.6	1790
3851	Union (q)	99	153	187	260	306	376	430	96.5	6	0.748	57.2	1712
Average		113	173	203	268	313	377	428	97.2	8	0.754	55.7	1762
<u>VICTORIA, B.C.</u>													
3873	Shell (e)	107	172	203	274	324	387	435	97.2	9	0.754	55.7	1795
3874	Premier (a)	121	181	205	301	354	354	406	97.8	33	0.749	56.9	1709
3875	Union (q)	91	140	174	258	311	386	430	96.0	10	0.740	59.2	1699
Average		106	164	194	265	312	376	424	97.0	17	0.748	57.3	1735

TABLE II - AVERAGE RESULT OF ANALYSES BY CITIES

District	DISTILLATION RANGE							End point	Rec-very	Iod-ine val-ue.	Spec-ific grav-ity	Index number °F
	1st drop °F	10% °F	20% °F	50% °F	70% °F	90% °F	°F					
Halifax, N.S.	121	183	209	265	300	357	412	97.6	36	0.745	1726	
Montreal, Que.	107	157	181	245	289	348	401	97.6	16	0.736	1621	
Quebec, Que.	103	160	186	251	294	354	402	97.7	16	0.737	1647	
London, Ont.	113	170	195	262	306	367	418	97.5	28	0.757	1718	
St. John, N.B.	123	177	202	254	291	348	404	97.6	30	0.741	1676	
Toronto, Ont.	111	167	193	253	295	354	404	97.5	15	0.756	1666	
Vancouver, B.C.	113	173	203	268	313	377	428	97.2	8	0.754	1762	
Regina, Sask.	109	166	193	258	298	354	408	97.7	28	0.733	1677	
Winnipeg, Man.	109	160	189	256	300	359	415	97.8	30	0.733	1673	
Calgary, Alta.	113	174	202	271	317	380	426	97.6	25	0.745	1770	
Edmonton, Alta.	111	165	192	265	314	373	412	97.2	40	0.758	1721	
Victoria, B.C.	106	164	194	265	312	376	424	97.0	17	0.748	1735	
Ottawa, Ont.	103	135	183	250	295	355	403	97.0	15	0.737	1641	
Average*	110	164	191	256	300	360	410	97.4	21	0.759	1681	

*This is average value for all the samples tested.

Comparison of Results.

It is interesting to compare the above figures with others obtained in somewhat the same way. Table III gives the average results of 88 samples collected in Canada, presumably in 1916, and reported by the laboratories of the Department of Inland Revenue; the average of 48 samples collected in Canada during 1923; the average of 59 samples collected during 1924; the average of 73 samples collected during 1925; the average of 76 samples collected in 1926; the average of 128 samples collected in United States during July 1926, and reported by U.S. Bureau of Mines; and the essential features of the specification of motor gasoline adopted by the Specification Board of the United States for the use of the various departments and independent establishments of United States Government. It will be observed that the gasoline sold

- (8) Department of Inland Revenue, Canada, Bulletin 562 "Gasoline"
- (9) Investigations of Fuels and Fuel Testing, Mines Branch, 1923
- (10) Investigations of Fuels and Fuel Testing, Mines Branch, 1924
- (11) Investigations of Fuels and Fuel Testing, Mines Branch, 1925
- (12) U.S. Bureau of Mines, Report of Investigations, Serial No. 2636
- (13) U.S. Bureau of Mines, Technical Paper 323A.

in Canada during the present year shows an average of distinctly good quality when judged by the distillation range which is the ordinarily accepted standard.

TABLE III - AVERAGE RESULTS FOR COMPARISON

	DISTILLATION RANGE						End point °F	Recovery	Iodine value	Sp. Gr.	Index number °F
	1st drop °F	10% °F	20% °F	50% °F	70% °F	90% °F					
Canada, 1916	125	170	192	237	270	330	380	17	0.732	1579
Canada, 1923	120	170	193	255	296	358	423	97.1	19	0.737	1695
Canada, 1924	113	173	195	249	288	347	410	97.4	18	0.736	1662
Canada, 1925	116	174	199	253	299	359	412	97.0	18	0.739	1701
Canada, 1926	110	164	191	256	300	360	410	97.4	21	0.739	1681
United States, July, 1926	100	---	194	266	---	382	421	96.7	--	0.750	----
U.S. Federal Specification	131	---	221	284	---	392	437	----	--	-----	----

In order to estimate the variations in quality of the gasoline being sold, the average of the 8 samples (approximately 10% of the total 76 samples) having the highest end point, and the average of the 8 samples having the lowest end point was obtained, as shown in Table IV and Table V.

TABLE IV - 10 PER CENT. OF SAMPLES HAVING MAXIMUM END POINTS.

Lab. No.	DISTILLATION RANGE						End point °F	Recovery	Iodine Value	Specific Gravity	Index number °F
	1st drop °F	10% °F	20% °F	50% °F	70% °F	90% °F					
3863	116	179	208	286	340	416	469	97.6	6	0.748	1898
3873	107	172	203	274	324	387	435	97.2	9	0.754	1795
3881	102	155	187	262	309	376	434	97.0	12	0.730	1723
3831	104	147	170	227	282	374	433	96.5	4	0.721	1633
3841	106	164	194	266	306	369	431	97.3	25	0.736	1730
3887	94	144	176	259	330	389	430	96.5	25	0.749	1738
3882	98	142	172	267	329	387	430	96.5	22	0.746	1727
3875	91	140	174	258	311	386	430	96.0	10	0.740	1699
Average	102	155	186	264	316	386	437	96.8	14	0.741	1744

TABLE V - 10 PER CENT OF SAMPLES HAVING MINIMUM END POINTS.

Lab. No.	1st drop °F	DISTILLATION RANGE					End point °F	Recovery	Iodine value	Specific Gravity	Index No. °F
		10% °F	20% °F	50% °F	70% °F	90% °F					
3839	97	149	177	239	286	352	390	96.8	4	0.724	1593
3817	105	150	175	234	275	327	385	98.0	4	0.723	1546
3814	106	155	174	219	260	323	383	97.5	6	0.721	1514
3884	104	151	172	221	260	317	380	97.2	5	0.719	1501
3822	108	155	177	226	259	318	376	97.4	6	0.724	1511
3920	103	160	185	243	281	332	375	97.2	15	0.745	1576
3921	91	140	167	231	270	322	372	97.1	3	0.718	1502
3843	105	160	181	230	264	316	367	97.5	2	0.723	1518
Average	102	153	176	230	269	326	379	97.3	6	0.725	1533

TABLE VI - DIFFERENCE BETWEEN MAXIMUM AND MINIMUM END POINTS.

	C A N A D A					UNITED STATES		
		August 1923	August 1924	August 1925	August 1926	July 1923	July 1924	July 1925
	1916	°F	°F	°F	°F	°F	°F	°F
Maximum 10%	432	446	459	458	457	471	457	458
Minimum 10%	322	381	358	366	379	400	396	399
Difference	110	65	101	92	58	71	61	59

Table VI shows the difference between the average end points of the maximum 10% and minimum 10% of samples collected in Canada in 1916¹⁴, in 1923, in 1924, in 1925 and 1926, together with similar figures obtained by the Bureau of Mines¹⁵ in the United States for the years 1923, 1924, and 1925. The difference between the two averages may be accepted for the purpose of comparison, as a measure of the variation in quality. It will be observed that in 1926 the variation in quality was less than that obtained in the survey of 1923.

(14) Investigations of Fuels and Fuel Testing, Mines Branch, 1923.

(15) U.S. Bureau of Mines, Report of Investigations, Serial No. 2740.

Summary

Seventy-six samples of gasoline were collected in August 1926, from thirteen widely separated Canadian cities, and may be accepted, therefore as representative of the gasoline sold in Canada at that time.

The analyses and detailed examination of these samples show that the average gasoline sold during 1926 was of good quality, being superior to that sold in 1925 and very nearly equal to that sold in 1924.

The average distillation curves show that the gasoline sold in Canada during August 1926 was superior to that sold in the United States during July 1926, and to the United States Federal specifications for U.S. Government motor gasoline.

The variation in quality was less during 1926 than that during 1925 or 1924.

