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MINES BRANCH

GASOLINE SURVEY FOR SUMMER, 1955

by

P. B. SEELY, A. YATES and R. G. DRAPER

FUELS DIVISION

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PREFACE

Surveys of quality of the gasoline sold in Canada have been undertaken by the Fuels Division, Mines Branch, for the purpose of making available to the Government and to others who might desire it, reliable information regarding the characteristics of gasoline currently being sold in Canada.

This is the twenty-eighth in the series which was inaugurated in 1923. The sample collection was made from the principal centres of distribution in most of the provinces through the co-operation of the Department of National Health and Welfare, Ottawa.

The work was performed under the general direction of D. S. Montgomery, Senior Scientist.

A. Ignatieff,
Chief, Division of Fuels.

Ottawa, Canada,
December, 1955.

GASOLINE SURVEY FOR SUMMER, 1955.

by

P. B. Seely ^{1/}, A. Yates ^{1/} and R. G. Draper ^{1/}

CONTENTS

	<u>Page</u>
Summary	iii
Acknowledgements	iv
Introduction	1
Methods of Analysis	1
Discussion of Results	2
References	15

TABLES

I	Gasoline Survey Analyses by Cities for Summer, 1955.	6
II	Average of Gasoline Survey Analyses by Cities for Summer, 1955.	11
III	Summary of Data of Gasoline Survey Analyses for Canada for Summer, 1955.	12

ILLUSTRATIONS

<u>Fig.</u>		
I	Comparison of Group I Gasoline Characteristics from Summer Surveys of 1938 through 1955.	13
II	Comparison of Group II Gasoline Characteristics from Summer Surveys of 1938 through 1955.	14

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SUMMARY

In this report the results of the analyses of one hundred and seventeen samples of gasoline collected in July, 1955, are given in detail. Samples were taken in each province of Canada with the exception of Prince Edward Island.

The characteristics of the gasoline tested included the knock rating, distillation range, tetraethyllead content, A.P.I. and specific gravity, Reid vapour pressure, the sulphur and gum content, corrosion tendency and apparent colour. The analytical procedures employed conformed to the methods of the American Society for Testing Materials.

This survey indicated that the quality of gasoline sold throughout Canada was quite uniform, only relatively small regional variations were noted. The most significant observation was that the knock rating of the gasolines has increased since the last survey in 1952.

The premium grade gasoline has increased from 88.7 to 92.7 research octane numbers and the regular grade gasoline from 84.0 to 87.1 research octane numbers in three years. In motor octane numbers the premium grade gasoline has increased from 80.9 to 83.3 and the regular grade gasoline from 78.7 to 80.5 motor octane numbers during the same period.

ACKNOWLEDGEMENTS

As in the past, the inspectors of the Department of National Health and Welfare collected the gasoline samples in the cities across Canada other than Ottawa. The co-operation of the Director, Administrative Services, Food and Drug Division of the Department of National Health and Welfare is gratefully acknowledged in organizing the collection of the samples required in this survey.

INTRODUCTION

The study of the gasoline sold in Canada during the summer has been made annually, since 1923, at the Fuel Research Laboratories of the Division of Fuels, Mines Branch, with the exception of the years 1940, 1949, 1951, 1953 and 1954, and the results have been published in a series of reports (1). The present survey was conducted from June 20 to July 14, 1955. A total of 117 samples, representing 37 brands of gasoline sold by 20 wholesale dealers and distributors, were obtained from eleven principal cities representing all provinces except Prince Edward Island.

The purpose of this survey was not to ascertain whether the samples conform to any specification, either of the Government of Canada 2/, of any of the provinces, or of any other organization. It was intended as a means of securing information regarding the characteristics of gasoline actually being sold in Canada at the present time. The gasoline samples obtained were grouped according to their trade classification as group 1 or "premium", and group 2 or "regular" grade of gasoline.

METHODS OF ANALYSIS

The characteristics of the gasoline samples were tested generally according to the latest revision of the Methods of Testing 3/ of the American Society for Testing Materials (A. S. T. M.).

The knock characteristics were determined by both the research method D908, and the motor method D357 4/. The knock ratings are accordingly expressed as research octane and motor octane numbers.

The fuel sensitivity is expressed in octane numbers, as it is defined as research octane number minus motor octane number.

The tetraethyllead content was determined according to method D1269 "Polarographic Determination of Tetraethyllead in Gasoline", and is reported in millilitres per Imperial gallon.

The A. P. I. gravity was determined by means of the hydrometer at room temperature, according to method D287, and corrected to 60°F. using Table 5, "Reduction of Observed A. P. I. Gravity to A. P. I. Gravity at 60°F.," and then converted to Specific Gravity by means of Table 3 of the A. S. T. M. - I. P. Petroleum Measurement Tables (American Edition).

The Reid vapour pressure was determined according to method D323.

The sulphur content was determined according to method D90-34T, except that a modified apparatus 5/was used.

The gum content was determined according to method D381. When a sample was "oily", it was so reported and not included in the average.

The distillation range was determined according to method D86 and is reported on the per cent evaporated basis.

The corrosion test was made according to method D130.

The apparent color of each gasoline was observed.

DISCUSSION OF RESULTS

All the analytical results derived from the examination of the 117 gasoline samples are shown by cities in Table I. The samples are divided into two major groups, the premium grade or group I and the regular grade or group II gasolines.

On examining the data in this table the differences in quality of the gasoline supplied in any city are very small. The property that undergoes the greatest fluctuation is the gum content. This is due to the fact that some companies add solvent oil to their gasolines as a top cylinder lubricant.

In Table II only the average properties of the gasolines sold in each city are listed to emphasize any regional differences which may exist across Canada. It will be noted that in St. John's, Newfoundland, Halifax, N.S. and Saint John, N.B., the sulphur content of the regular grade of gasoline is slightly higher than in the other provinces which is probably due to the higher sulphur content of the crude oil. The lower sulphur content of the premium gasoline in these cities reflects the effect of more extensive refining.

The knock ratings reported in Table II were determined by two methods, The A. S. T. M. Research method and the A. S. T. M. Motor method. The average research knock rating of all the group 1 gasolines across Canada was 92.7 while that of the group 2 gasolines was 87.1 research octane numbers.

The average motor octane rating was 83.3 for the premium gasolines and 80.5 for the regular grades.

The average octane values by both the research and motor methods, of the gasolines sold at filling stations throughout Canada during the summer of 1955, were the highest so far recorded in the history of this gasoline survey as is shown in Figures I and II. It will also be noted that the difference between the average knock rating of the group 1 and group 11 gasolines was 5.6 research octane numbers in the summer of 1955 as compared with 4.7 research octane numbers in 1952.

The relatively high elevation of the provinces of Saskatchewan and Alberta makes it possible to secure the same operating performance from gasoline with a knock rating two motor octane numbers lower than comparable fuel sold in the other provinces.

The average fuel sensitivity was 9.5 octane numbers for group 1 gasolines and 7.8 octane numbers for group 2 gasolines. This indicates that the premium grade gasolines are more sensitive to engine conditions than are the regular grade gasolines.

All of the gasolines tested in this survey were artificially colored and none gave a positive test for corrosion with the copper strip.

In Table III the analytical results of the analyses of the 117 samples are arranged so as to show the variations which may be expected to be found in the physical and chemical properties of the gasolines sold in Canada. The

average as well as the maximum and minimum of each physical or chemical property is given to show the scatter that may be encountered.

In Figures I and II the object is to show the change that has taken place in the major physical and chemical properties since 1938. On examining these figures it will be observed that the most pronounced change that has taken place is in the gradual increase in the knock rating of the gasolines.

TABLE I
GASOLINE SURVEY ANALYSES BY CITIES FOR SUMMER 1955

Sample No.	Group	Octane Number		Fuel Sensitivity 1/	Tetra-ethyl-lead 2/	GRAVITY					DISTILLATION RANGE, °F.										End Pt.	Residue %	Loss %	
		Research	Motor			Specific	Deg. A.P.I.	Reid V.P. lb.	Sulphur %	Gum 3/	I. B. P.	Per Cent Evaporated												
												5	10	20	30	50	70	90	95					
ST. JOHN'S, N.F.L.D.																								
1	I	92.9	82.5	10.4	3.43	0.732	61.7	8.7	0.10	1	102	116	127	144	160	203	256	327	363	391	1.3	1.7		
2	I	93.6	82.5	11.1	3.40	0.733	61.6	8.4	0.10	3	103	115	129	145	160	204	259	328	363	391	1.3	2.2		
3	I	92.2	82.7	9.5	2.18	0.734	61.2	9.5	0.09	2	96	110	124	147	170	218	272	348	400	470	2.3	2.2		
Average		92.9	82.6	10.3	3.00	0.733	61.5	8.9	0.10	2	100	114	127	145	163	208	262	334	375	417	1.6	2.0		
4	II	88.2	80.4	7.8	3.29	0.742	59.1	8.8	0.13	2	108	122	137	164	190	237	284	342	376	398	1.3	1.7		
HALIFAX, N.S.																								
5	I	93.1	83.8	9.3	3.59	0.732	61.9	8.1	0.10	8	98	114	126	142	157	198	248	317	352	380	1.0	1.0		
6	II	94.6	83.7	10.9	3.29	0.730	62.3	8.4	0.10	2	99	118	128	143	159	202	252	328	358	394	1.0	1.0		
7	I	92.5	83.2	9.3	3.20	0.730	62.2	7.9	0.11	4	110	124	133	148	160	197	247	313	344	380	1.0	1.0		
8	I	93.6	83.6	10.0	3.50	0.740	59.8	8.3	0.11	21*	101	118	134	158	181	225	272	340	372	410	1.2	1.4		
9	I	94.0	83.2	10.8	3.13	0.735	61.0	8.8	0.11	5	100	116	128	144	162	204	258	328	358	397	1.1	1.4		
Average		93.6	83.5	10.1	3.34	0.733	61.4	8.3	0.11	5	102	118	130	147	164	205	255	325	357	392	1.1	1.2		
10	II	88.9	81.8	7.1	3.18	0.738	60.2	9.8	0.16	2	112	126	138	160	184	232	278	340	370	405	1.0	1.0		
11	III	88.3	81.3	7.0	3.20	0.737	60.4	9.2	0.16	5	96	112	128	154	178	226	274	342	370	412	1.0	1.5		
12	III	87.3	81.5	5.8	3.23	0.718	65.6	8.1	0.12	4	116	125	132	144	158	192	238	302	338	383	1.2	0.8		
13	II	88.5	80.3	8.2	2.46	0.731	62.1	9.0	0.11	5	107	120	134	156	178	224	274	341	368	401	1.0	2.0		
14	II	88.7	81.5	7.2	3.30	0.734	61.4	9.2	0.15	3	100	118	131	152	174	216	267	344	373	404	1.0	1.0		
Average		88.3	81.3	7.1	3.07	0.732	61.9	9.1	0.14	4	106	120	133	153	174	218	266	334	364	401	1.0	1.3		
SAINT JOHN, N.B.																								
15	I	94.2	82.7	11.5	3.75	0.737	60.6	8.0	0.11	22*	102	119	133	152	169	205	250	320	356	388	1.1	2.1		
16	I	94.2	83.4	10.8	3.51	0.738	60.1	8.3	0.10	4	104	117	130	149	168	215	271	339	367	398	1.1	2.3		
17	I	93.9	83.0	10.9	3.22	0.738	60.2	8.0	0.10	3	94	113	128	148	170	215	264	329	358	386	1.1	1.9		
18	I	93.4	82.9	10.5	3.65	0.739	59.9	8.0	0.11	21	96	121	137	160	181	226	271	340	377	411	1.4	1.1		
19	I	94.1	83.0	11.1	3.20	0.742	59.2	7.8	0.11	11	101	120	133	151	171	221	273	340	366	395	1.4	0.6		
Average		94.0	83.0	11.0	3.47	0.739	60.0	8.0	0.11	10	99	118	132	152	172	216	266	334	365	396	1.2	1.6		
20	II	87.2	81.3	5.9	3.32	0.726	63.3	6.6	0.09	2	110	127	138	154	168	205	247	305	345	382	1.3	1.2		
21	III	88.7	81.3	7.4	3.29	0.731	62.0	8.8	0.14	2	93	114	128	148	166	208	262	337	368	400	1.2	1.3		
22	III	87.6	81.4	6.2	3.13	0.724	63.8	7.3	0.09	1	105	124	133	147	163	204	245	302	332	380	1.1	1.4		
23	III	87.6	80.0	7.6	2.19	0.730	62.4	8.0	0.11	5	102	118	135	156	175	220	265	329	364	405	1.2	0.8		
24	II	88.7	81.4	7.3	3.01	0.733	61.6	9.2	0.15	5	96	112	126	148	169	212	266	343	368	400	1.3	1.7		
Average		88.0	81.1	6.9	2.99	0.729	62.6	8.0	0.12	3	101	119	132	151	168	210	257	323	355	395	1.2	1.3		

1/ - Fuel Sensitivity: Research minus Motor Octane Number.
 2/ - Millilitres per Imperial Gallon.
 3/ - Milligrams per 100 millilitres.
 * - Denotes an oily gum (not included in average).

TABLE I (continued)
GASOLINE SURVEY ANALYSES BY CITIES FOR SUMMER 1955

Sam- ple No.	Group	Octane Number Research Motor		Fuel Sensi- tivity 1/	Tetra- ethyl- lead 2/	GRAVITY					DISTILLATION RANGE, °F.										End Pt.	Res- idue %	Loss %	
						Spec- ific	Deg. A.P.I.	Reid V.P. lb.	Sul- phur %	Gum 3/	I. B. P.	Per Cent Evaporated												
												5	10	20	30	50	70	90	95					
MONTREAL, QUE.																								
25	I	94.0	84.0	10.0	2.45	0.728	62.8	10.9	0.06	4	94	100	120	145	172	220	260	319	--	371	0.8	4.2		
26	I	93.2	83.8	10.6	2.90	0.746	58.1	8.3	0.09	6	106	122	138	160	183	230	279	358	391	430	1.0	2.0		
27	I	92.9	82.8	10.1	1.74	0.731	62.0	9.5	0.06	3	103	114	127	149	171	216	259	318	348	390	1.1	1.9		
28	I	93.1	83.5	9.6	3.16	0.741	59.5	8.1	0.10	16	106	130	146	172	195	234	276	344	382	409	1.0	1.2		
29	I	94.2	83.7	10.5	3.42	0.743	59.0	8.7	0.12	10	104	123	143	172	200	235	278	356	382	416	0.9	2.6		
30	I	94.9	85.1	9.8	3.79	0.750	57.3	7.9	0.09	15*	106	119	136	162	186	244	291	348	388	417	1.2	1.6		
31	I	94.2	84.4	9.8	2.79	0.740	59.7	9.3	0.09	2	104	118	130	152	175	226	274	350	386	415	0.8	1.2		
Average		93.8	83.9	10.1	2.89	0.740	59.8	9.0	0.09	7	103	118	134	159	183	229	274	342	379	407	9.7	2.1		
32	II	88.5	82.0	6.5	1.45	0.724	63.8	9.9	0.05	4	107	115	126	146	168	214	254	310	335	365	0.9	2.3		
33	II	88.3	82.2	6.1	2.47	0.739	59.9	8.9	0.06	2	98	119	136	164	188	235	275	331	360	409	1.1	1.4		
34	II	88.0	81.3	6.7	1.37	0.735	61.0	10.0	0.04	1	107	116	131	158	186	232	270	324	355	396	1.0	2.5		
35	II	89.1	80.6	8.5	1.29	0.741	59.4	8.5	0.10	8	100	119	140	172	196	236	279	340	373	407	1.0	2.0		
36	II	89.6	81.3	8.3	1.27	0.737	60.4	9.9	0.09	7	98	116	134	164	192	234	274	340	374	408	1.2	2.8		
37	II	88.9	80.4	8.5	1.37	0.730	62.4	8.9	0.10	7	100	121	134	153	174	215	264	336	384	396	0.9	1.9		
38	II	88.9	82.9	6.0	3.29	0.733	61.6	9.6	0.07	1	101	120	136	160	185	230	270	330	368	406	1.1	1.4		
Average		88.8	81.5	7.2	1.79	0.734	61.2	9.4	0.07	4	102	118	134	160	184	228	269	330	364	398	1.0	2.0		
OTTAWA, ONT.																								
39	I	94.1	83.5	10.6	3.40	0.738	60.1	7.0	0.12	7	98	120	143	169	191	231	272	341	366	408	1.0	2.0		
40	I	94.2	83.6	10.6	2.39	0.728	63.0	11.0	0.07	5*	97	104	120	144	170	217	259	313	337	374	0.6	3.4		
41	I	93.2	82.8	10.4	3.49	0.740	59.8	7.8	0.13	67*	109	122	137	159	180	223	266	340	370	408	1.1	1.9		
42	I	94.0	83.7	10.3	3.47	0.743	59.0	7.3	0.11	6	106	130	148	174	194	233	270	340	371	404	0.8	1.2		
43	I	93.9	84.5	9.4	2.89	0.741	59.4	8.8	0.09	10	110	118	129	151	178	229	277	351	387	414	1.1	1.9		
44	I	93.6	83.9	9.7	2.47	0.737	60.4	9.7	0.08	16*	90	104	117	140	167	217	266	341	375	409	1.0	1.7		
45	I	90.4	82.8	7.6	1.57	0.740	59.8	9.3	0.04	7	96	108	122	146	168	216	267	347	389	445	1.0	2.0		
Average		93.3	83.5	10.1	2.81	0.738	60.2	8.7	0.09	7	101	115	131	155	178	224	268	339	371	409	0.9	2.0		
46	II	89.6	81.3	8.3	1.86	0.734	61.4	8.3	0.08	23*	112	126	141	165	186	225	263	319	351	408	0.7	1.8		
47	II	87.6	82.2	5.4	1.62	0.727	63.1	10.6	0.05	2	102	112	125	146	172	215	254	306	337	378	0.9	2.5		
48	II	87.5	79.6	7.9	2.09	0.736	60.7	6.7	0.10	2	108	124	137	160	182	229	283	343	370	401	0.8	1.2		
49	II	87.9	82.7	5.2	2.06	0.735	60.9	7.8	0.05	91*	110	120	134	157	183	229	274	335	375	410	1.1	1.9		
50	II	88.3	82.0	6.3	3.42	0.730	62.3	9.6	0.07	9	109	124	136	158	178	214	245	309	352	400	1.0	2.0		
51	II	88.3	81.3	7.0	1.40	0.735	60.9	10.0	0.05	4	102	111	123	154	181	228	268	325	366	402	1.0	3.0		
Average		88.2	81.5	6.7	2.07	0.733	61.5	8.8	0.07	4	107	119	133	157	180	223	264	323	358	400	0.9	2.1		

1/ - Fuel Sensitivity; Research minus Motor Octane Number.

2/ - Millilitres per Imperial Gallon.

3/ - Milligrams per 100 millilitres.

* - Denotes an oily gum (not included in average).

TABLE I (continued)

GASOLINE SURVEY ANALYSES BY CITIES FOR SUMMER 1955

Sample No.	Group	Octane Number		Fuel Sensitivity 1/	Tetra-ethyl-lead 2/	GRAVITY		Reid V.P. lb.	Sulphur %	Gum 3/	DISTILLATION RANGE, °F.										End Pt.	Residue %	Loss %
		Research	Motor			Spec-ific	Deg. A.P.I.				Per Cent Evaporated												
		5	10			20	30				50	70	90	95									
TORONTO, ONT.																							
52	I	93.9	83.8	10.1	2.29	0.729	62.6	10.0	0.06	5	93	103	116	140	164	209	250	308	332	360	1.2	2.3	
53	I	94.8	85.6	9.2	3.23	0.741	59.4	9.9	0.05	3	101	113	132	162	187	238	282	334	357	390	1.0	2.6	
54	I	94.2	84.3	9.9	3.23	0.727	63.2	9.2	0.05	1	94	113	125	144	161	201	245	308	335	363	1.3	1.2	
55	I	93.6	83.5	10.1	3.63	0.740	59.7	8.1	0.11	25*	106	121	136	150	182	225	270	336	374	416	1.2	2.1	
56	I	93.9	84.5	9.4	2.68	0.737	60.4	10.3	0.09	12*	100	113	126	147	170	222	274	352	388	414	1.3	2.1	
57	I	91.4	82.7	8.7	1.73	0.737	60.5	9.6	0.04	2	106	120	133	155	177	214	267	335	375	437	1.3	0.7	
58	I	94.1	84.7	9.4	3.28	0.726	63.5	10.0	0.06	3	103	116	126	142	161	199	244	304	336	363	1.4	1.1	
Average		93.7	84.2	9.5	2.87	0.734	61.3	9.6	0.07	3	100	114	128	150	172	215	262	325	357	392	1.2	1.7	
59	II	87.8	81.3	6.5	1.59	0.728	62.8	10.2	0.05	1	100	111	125	150	175	220	260	316	340	373	1.3	1.7	
60	II	88.6	79.6	9.0	2.74	0.739	60.0	9.7	0.06	1	95	108	123	148	172	223	276	349	377	416	1.1	2.7	
61	II	88.6	83.4	5.2	3.17	0.731	62.2	9.0	0.06	164*	108	116	130	153	173	211	250	310	357	406	1.5	2.9	
62	II	86.9	79.3	7.6	1.37	0.732	61.7	8.4	0.10	3	112	128	139	160	180	223	269	353	389	434	1.4	0.6	
63	II	87.9	79.0	8.9	1.55	0.729	62.7	8.4	0.12	7	100	116	130	150	169	210	264	342	372	410	1.3	1.7	
64	II	87.6	81.1	6.5	1.62	0.737	60.4	10.3	0.04	1	95	113	131	150	187	233	276	330	365	406	1.4	2.1	
65	II	88.6	83.8	4.8	3.28	0.729	62.6	10.2	0.06	147*	100	111	125	148	171	212	251	315	350	414	1.2	2.4	
Average		88.0	81.1	6.9	2.19	0.732	61.8	9.5	0.07	3	101	115	129	153	175	219	264	331	364	408	1.3	2.0	
WINNIPEG, MAN.																							
66	I	92.6	82.5	10.1	0.92	0.722	64.5	9.6	0.06	2	93	113	122	152	188	221	251	317	351	391	0.9	2.6	
67	I	92.9	83.7	9.2	3.25	0.736	60.8	9.8	0.07	2	104	114	126	148	174	224	274	346	374	409	1.1	1.9	
68	I	92.9	83.5	9.4	3.44	0.735	60.9	9.9	0.08	4	100	114	126	150	174	224	274	341	372	410	1.1	1.4	
69	I	91.5	83.2	8.3	3.52	0.742	59.2	6.8	0.05	38#	106	128	142	164	190	240	290	355	378	424	1.3	0.7	
70	I	92.9	83.8	9.1	3.31	0.735	61.1	9.6	0.08	4	102	112	124	148	171	220	271	336	368	405	1.2	1.8	
71	I	92.9	83.7	9.2	3.33	0.735	60.9	10.2	0.08	4	96	109	122	148	172	222	272	338	367	406	1.0	1.5	
Average		92.6	83.4	9.2	2.96	0.734	61.2	9.3	0.07	3	100	115	129	153	178	225	272	339	368	407	1.1	1.6	
72	II	86.3	78.0	8.3	0.58	0.729	62.5	9.9	0.10	1	103	120	133	154	172	215	258	323	354	386	1.0	1.2	
73	II	87.1	82.4	4.7	2.36	0.727	63.1	10.0	0.06	4	103	116	132	155	180	218	256	316	350	392	0.9	1.8	
74	II	87.4	81.4	6.0	2.47	0.727	63.1	9.7	0.06	4	93	114	128	152	176	218	258	316	346	380	1.0	1.0	
75	II	85.4	80.4	5.0	2.68	0.739	59.9	8.3	0.04	11	100	119	136	166	194	240	288	348	370	405	1.2	1.8	
76	II	86.1	78.6	7.5	2.88	0.734	61.2	10.0	0.08	4	94	110	128	146	184	224	266	330	358	389	1.2	2.3	
77	II	87.3	81.8	5.5	2.52	0.728	62.9	9.9	0.06	5	90	111	126	150	175	218	258	312	348	385	1.0	1.5	
Average		86.6	80.4	6.2	2.25	0.731	62.1	9.6	0.07	5	97	115	130	154	180	222	264	324	354	389	1.0	1.6	

1/ - Fuel Sensitivity: Research minus Motor Octane Number.

2/ - Millilitres per Imperial Gallon.

3/ - Milligrams per 100 millilitres.

* - Denotes an oily gum (not included in average).

- Dye.

TABLE I (continued)
GASOLINE SURVEY ANALYSES BY CITIES FOR SUMMER 1955

Sam- ple No.	Group	Octane Number		Fuel Sensi- tivity 1/ 2/	Tetra- ethyl- lead 2/	GRAVITY					DISTILLATION RANGE, °F.										End Pt.	Res- idue %	Loss %	
		Research	Motor			Spec- ific	Deg. A.P.I.	Reid V.P. lb.	Sul- phur %	Gum 3/	I. B. P.	Per Cent Evaporated												
												5	10	20	30	50	70	90	95					
<u>REGINA, SASK.</u>																								
78	I	92.6	81.5	11.1	0.91	0.720	64.9	10.1	0.07	5	94	111	135	168	190	220	250	314	339	392	1.1	3.4		
79	I	91.5	80.7	10.8	1.30	0.729	62.5	8.6	0.06	8	100	117	134	152	170	208	251	304	326	364	1.1	1.9		
80	I	91.5	80.8	10.7	0.51	0.735	61.0	9.6	0.05	3	96	113	126	148	172	222	274	343	371	410	1.3	2.2		
81	I	92.5	81.0	11.5	1.46	0.727	63.0	8.4	0.06	1	99	116	130	150	169	206	248	303	325	355	1.0	1.0		
82	I	91.5	80.9	10.6	0.53	0.736	60.7	8.9	0.06	3	94	108	124	146	170	218	272	340	368	410	1.1	2.3		
83	I	91.3	82.4	8.9	3.24	0.743	58.9	7.1	0.05	41*	100	119	136	162	186	238	289	353	381	420	1.2	2.6		
Average		91.8	81.2	10.6	1.32	0.732	61.8	8.8	0.06	4	97	114	131	154	176	219	264	326	352	392	1.1	2.2		
84	II	86.7	77.8	8.9	0.80	0.728	62.9	10.3	0.08	5	97	112	126	150	168	214	256	319	345	384	1.2	2.3		
85	II	86.7	76.6	10.1	0.30	0.732	61.8	9.4	0.07	3	101	118	134	156	180	225	266	335	366	395	1.0	1.7		
86	II	87.1	78.9	8.2	0.54	0.734	61.3	9.7	0.06	3	98	118	134	156	180	230	278	344	370	406	0.9	1.3		
87	II	86.5	77.0	9.5	0.32	0.734	61.3	9.0	0.08	1	96	108	124	150	174	220	264	324	350	392	1.2	2.4		
88	II	85.6	78.2	7.4	0.52	0.735	61.1	9.1	0.05	3	98	111	128	154	178	226	275	336	361	411	1.1	2.3		
89	II	85.5	80.0	5.5	2.65	0.740	59.6	8.5	0.04	12	104	118	136	166	192	240	288	344	370	402	1.1	2.5		
Average		86.3	78.1	8.3	0.85	0.734	61.3	9.3	0.06	4	99	114	130	155	179	226	271	334	360	398	1.1	2.1		
<u>CALGARY, ALTA.</u>																								
90	I	89.1	82.7	6.4	2.68	0.743	59.0	8.9	0.03	2	98	111	130	160	187	231	268	310	331	366	1.0	2.4		
91	I	89.6	85.8	3.8	2.41	0.744	58.7	8.2	0.02	3	100	124	140	166	188	230	265	306	332	362	0.9	1.1		
92	I	91.4	80.9	10.5	3.34	0.738	60.1	9.4	0.07	5	99	107	120	142	164	218	278	337	364	392	1.0	2.3		
93	I	89.4	82.5	6.9	3.62	0.746	58.2	7.1	0.09	29*	104	128	147	172	195	242	294	355	380	420	1.4	1.6		
Average		89.9	83.0	6.9	3.01	0.743	59.0	8.4	0.05	3	100	117	134	160	183	230	276	327	352	385	1.1	1.8		
94	II	84.4	77.5	6.9	2.71	0.739	59.9	9.7	0.05	3	96	114	132	165	194	240	280	330	350	376	1.0	2.4		
95	II	84.6	79.1	5.5	2.00	0.730	62.3	7.8	0.02	3	92	110	122	144	164	202	242	296	316	340	0.7	0.5		
96	II	85.0	79.1	5.9	3.33	0.730	62.3	8.9	0.10	3	100	112	124	150	173	228	270	330	348	376	1.0	1.8		
97	II	84.7	79.7	5.0	2.63	0.744	58.7	7.9	0.05	9	106	127	145	173	198	243	291	340	370	402	1.0	2.0		
Average		84.7	78.8	5.8	2.67	0.736	60.8	8.6	0.05	4	98	116	131	158	182	228	271	324	346	373	0.9	1.7		

1/ - Fuel Sensitivity: Research minus Motor Octane Number.

2/ - Millilitres per Imperial Gallon.

3/ - Milligrams per 100 millilitres.

* - Denotes an oily gum (not included in average).

TABLE I (continued)
GASOLINE SURVEY ANALYSES BY CITIES FOR SUMMER 1955

Sam- ple No.	Group	Octane Number		Fuel Sensi- tivity	Tetra- ethyl- lead	GRAVITY					DISTILLATION RANGE, °F.										End Pt.	Res- idue %	Loss %
		Research	Motor			Spec- ific	Deg. A.P.I.	Reid V.P. lb.	Sul- phur %	Gum 3/	Per Cent Evaporated												
		1/	2/			1/	2/	3/	I. B. P.	5	10	20	30	50	70	90	95						
<u>EDMONTON, ALTA.</u>																							
98	I	90.0	82.9	7.1	2.60	0.726	63.3	10.4	0.04	4	96	104	118	141	163	209	256	319	340	392	1.0	2.7	
99	I	91.1	82.5	8.6	2.19	0.739	59.9	8.4	0.04	5	100	113	127	148	168	212	268	340	368	402	1.2	1.8	
100	I	90.5	82.1	8.4	1.55	0.736	60.7	8.5	0.04	2	101	114	126	146	165	214	271	338	373	401	1.1	1.6	
101	I	89.4	82.4	7.0	3.79	0.748	57.8	6.5	0.05	37	106	131	147	171	195	240	292	354	380	418	1.4	1.4	
Average		90.2	82.5	7.8	2.53	0.737	60.4	8.4	0.04	12	101	115	129	151	173	219	272	338	365	403	1.2	1.9	
102	II	85.0	80.0	5.0	2.45	0.726	63.4	9.7	0.04	4	100	110	125	149	175	216	255	304	333	372	0.9	2.5	
103	II	84.9	78.6	6.3	1.28	0.737	60.6	8.3	0.05	6	104	117	131	154	176	223	271	340	376	398	1.2	2.0	
104	II	85.0	78.8	6.2	1.01	0.734	61.4	8.5	0.03	2	96	113	127	149	170	215	264	331	357	396	1.1	1.6	
105	II	84.4	78.6	5.8	2.66	0.743	58.9	7.0	0.04	10	105	127	145	171	197	243	290	347	368	404	1.1	1.7	
Average		84.8	79.0	5.8	1.85	0.735	61.1	8.4	0.04	5	101	117	132	156	179	224	270	330	358	392	1.1	1.9	
<u>VANCOUVER, B.C.</u>																							
106	I	92.5	84.1	8.4	2.98	0.730	62.2	10.3	0.06	11	96	112	126	149	172	217	264	328	359	403	1.5	1.5	
107	I	88.4	83.3	5.1	3.18	0.731	62.1	9.0	0.07	2	97	121	136	159	181	224	265	322	363	382	1.3	1.2	
108	I	94.2	84.6	9.6	3.32	0.734	61.4	9.6	0.07	2	100	119	132	153	174	217	265	329	362	391	1.4	1.1	
109	I	92.9	83.8	9.1	3.32	0.729	62.6	9.5	0.07	10	95	111	125	146	165	205	247	321	360	394	1.4	2.1	
110	I	92.9	83.7	9.2	3.20	0.728	62.9	9.3	0.07	32*	103	119	132	152	172	209	259	322	358	396	1.3	1.2	
111	I	92.9	84.8	8.1	3.18	0.735	61.0	9.8	0.06	5	97	109	124	148	173	220	267	332	375	415	1.3	2.2	
Average		92.3	84.0	8.2	3.20	0.731	62.0	9.6	0.07	6	98	115	129	151	173	215	261	326	363	397	1.4	1.5	
112	II	85.0	80.0	5.0	2.29	0.726	63.5	10.5	0.02	1	98	112	127	151	177	218	256	310	347	383	1.3	1.7	
113	II	84.9	81.9	3.0	3.21	0.729	62.7	9.2	0.06	1	96	118	136	161	183	224	260	313	343	374	1.3	1.7	
114	II	85.0	81.9	3.1	3.12	0.729	62.7	9.9	0.06	1	100	121	137	164	185	226	262	315	352	370	1.2	1.3	
115	II	85.6	80.0	5.6	2.76	0.730	62.4	9.3	0.08	1	96	112	130	158	182	222	259	310	340	388	1.2	2.4	
116	II	85.2	80.0	5.2	3.14	0.728	62.8	9.2	0.08	19*	100	110	128	155	179	220	254	305	338	383	1.2	3.5	
117	II	84.3	80.5	3.8	1.99	0.730	62.3	9.9	0.05	3	98	105	122	150	178	221	259	312	341	391	1.1	3.6	
Average		85.0	80.7	4.3	2.75	0.729	62.7	9.7	0.07	1	98	113	130	156	181	222	258	311	343	381	1.2	2.4	

1/ - Fuel Sensitivity: Research minus Motor Octane Number.
2/ - Millilitres per Imperial Gallon.
3/ - Milligrams per 100 millilitres.
* - Denotes an oily gum (not included in average).

TABLE II
AVERAGE OF GASOLINE SURVEY BY CITIES FOR SUMMER 1955

CITY	No. of Samples	Group	Octane Number		Fuel Sensitivity 1/	Tetra-ethyl 2/	Gravity at 60°F.		Reid V.P. lb.	Sulphur %	Gum 3/	I. B. P.	DISTILLATION RANGE, °F.					End Pt.	Residue %	Loss %
			Research	Motor			Spec-ific	Deg. A.P.I.					Per Cent Evaporated							
													10	20	50	70	90			
St. John's, Nfld....	3	I	92.9	82.6	10.3	3.00	0.733	61.5	8.9	0.10	2	100	127	145	208	262	334	417	1.6	2.0
Halifax, N.S.....	5	I	93.6	83.5	10.1	3.34	0.733	61.4	8.3	0.11	5	102	130	147	205	255	325	392	1.1	1.2
Saint John, N.B.....	5	I	94.0	83.0	11.0	3.47	0.739	60.0	8.0	0.11	10	99	132	152	216	266	334	396	1.2	1.6
Montreal, Que.....	7	I	93.8	83.9	10.0	2.89	0.740	59.8	9.0	0.09	7	103	134	159	229	274	342	407	1.0	2.1
Ottawa, Ont.....	7	I	93.3	83.5	10.1	2.81	0.738	60.2	8.7	0.09	7	101	131	155	224	268	339	409	0.9	2.0
Toronto, Ont.....	7	I	93.7	84.2	9.5	2.87	0.734	61.3	9.6	0.07	3	100	128	150	215	262	325	392	1.2	1.7
Winnipeg, Man.....	6	I	92.6	83.4	9.2	2.96	0.734	61.2	9.3	0.07	3	100	129	153	225	272	339	407	1.1	1.6
Regina, Sask.....	6	I	91.8	81.2	10.6	1.32	0.732	61.8	8.8	0.06	4	97	131	154	219	264	326	392	1.1	2.2
Calgary, Alta.....	4	I	89.9	83.0	6.9	3.01	0.743	59.0	8.4	0.05	3	100	134	160	230	276	327	385	1.1	1.8
Edmonton, Alta.....	4	I	90.2	82.5	7.8	2.53	0.737	60.4	8.4	0.04	12	101	129	151	219	272	338	403	1.2	1.9
Vancouver, B.C.....	6	I	92.3	84.0	8.2	3.20	0.731	62.0	9.6	0.07	6	98	129	151	215	261	326	397	1.4	1.5
Average Group I	(60)		92.7	83.3	9.5	2.82	0.736	60.8	8.9	0.08	6	100	130	151	219	267	332	400	1.2	1.8
St. John's, Nfld....	1	II	88.2	80.4	7.8	3.29	0.742	59.1	8.8	0.13	2	108	137	164	237	284	342	398	1.3	1.7
Halifax, N.S.....	5	II	88.3	81.3	7.0	3.07	0.732	61.9	9.1	0.14	4	106	133	153	218	266	334	401	1.0	1.3
Saint John, N.B.....	5	II	88.0	81.1	6.9	2.99	0.729	62.6	8.0	0.12	3	101	132	151	210	257	323	395	1.2	1.3
Montreal, Que.....	7	II	88.8	81.5	7.2	1.79	0.734	61.2	9.4	0.07	4	102	134	160	228	269	330	398	1.1	2.0
Ottawa, Ont.....	6	II	88.2	81.5	6.7	2.07	0.733	61.5	8.8	0.07	4	107	133	157	223	264	323	400	0.9	2.1
Toronto, Ont.....	7	II	88.0	81.1	6.9	2.19	0.732	61.8	9.5	0.07	3	101	129	153	219	264	331	408	1.3	2.0
Winnipeg, Man.....	6	II	86.6	80.4	6.2	2.25	0.731	62.1	9.6	0.07	5	97	130	154	222	264	324	389	1.0	1.1
Regina, Sask.....	6	II	86.3	78.1	7.1	0.85	0.734	61.3	9.3	0.06	4	99	130	155	226	271	334	398	1.1	2.1
Calgary, Alta.....	4	II	84.7	78.8	5.8	2.67	0.736	60.8	8.6	0.05	4	98	131	158	228	271	324	373	0.9	1.7
Edmonton, Alta.....	4	II	84.8	79.0	5.8	1.85	0.735	61.1	8.4	0.04	5	101	132	156	224	270	330	392	1.1	1.9
Vancouver, B.C.....	6	II	85.0	80.7	4.3	2.75	0.729	62.7	9.7	0.07	1	98	130	156	222	258	311	381	1.2	2.4
Average Group II	(57)		87.1	80.5	7.8	2.23	0.732	61.7	9.1	0.08	4	101	132	154	222	266	327	395	1.1	1.9
Average of all Samples.....	(117)						0.734	61.2	9.0	0.08	5	101	131	154	221	266	330	397	1.1	1.8

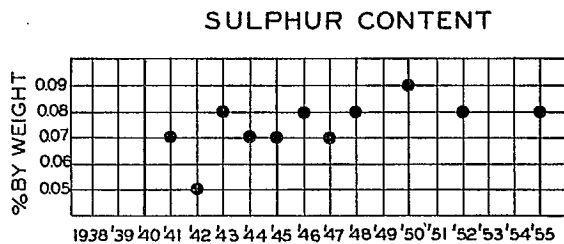
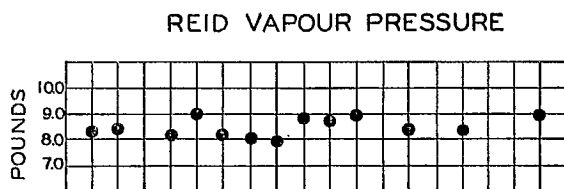
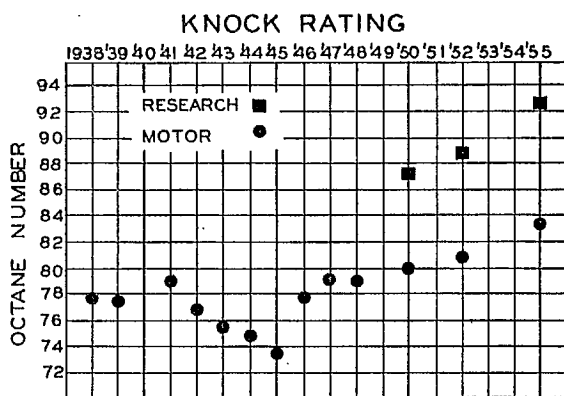
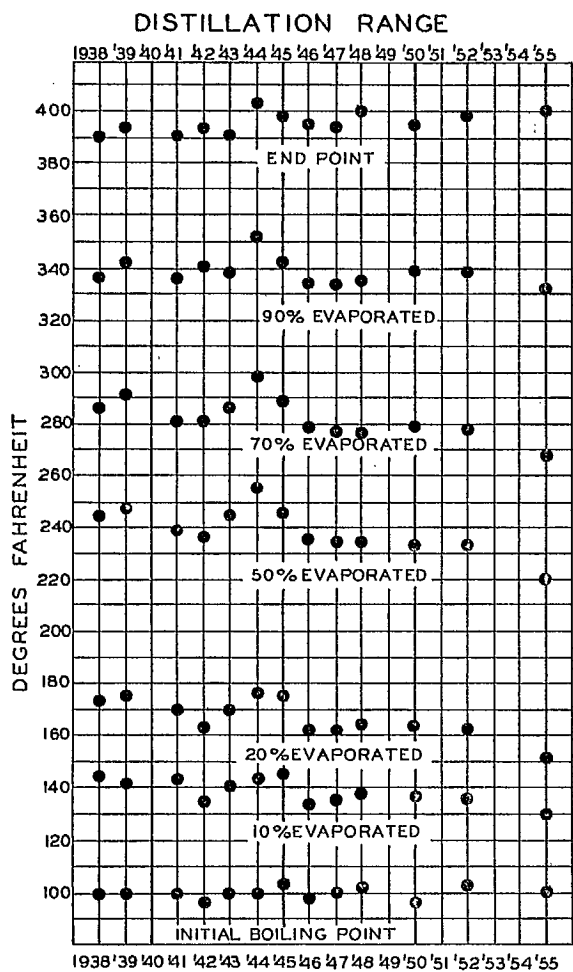
1/ - Fuel Sensitivity: Research minus Motor Octane Number.
2/ - Millilitres per Imperial Gallon.
3/ - Milligrams per 100 Millilitres.

TABLE III

SUMMARY OF DATA OF GASOLINE SURVEY ANALYSES FOR CANADA FOR SUMMER 1955

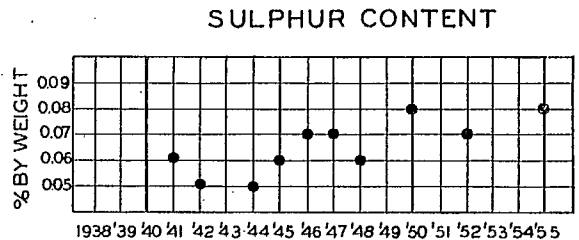
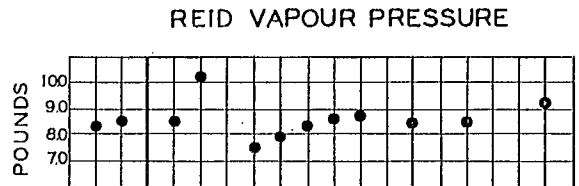
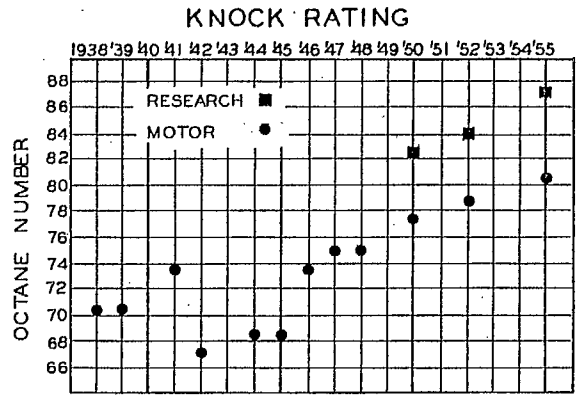
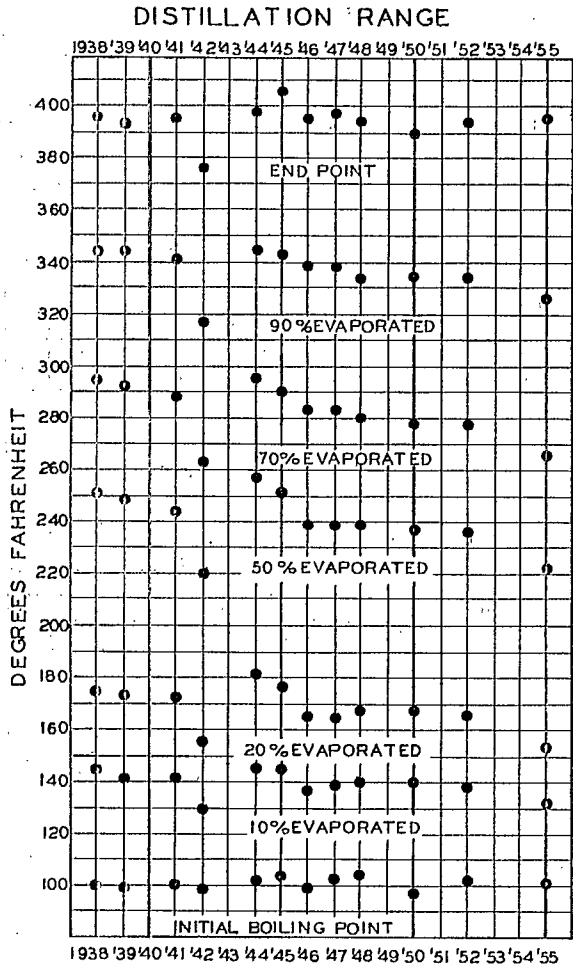
Test	GROUP I			GROUP II		
	Minimum	Average	Maximum	Minimum	Average	Maximum
Specific Gravity at 60°F.....	0.720	0.736	0.750	0.718	0.732	0.744
Gravity, Degrees A.P.I.....	57.3	60.8	64.9	58.7	61.7	65.6
Reid Vapour Pressure, lb.....	6.5	8.9	11.0	6.6	9.1	10.6
Sulphur, percent by wt.....	0.02	0.08	0.13	0.02	0.08	0.16
Gum, milligrams per 100 millilitres.....	1	6	37	1	4	12
Tetraethyllead, ml. per Imp. Gallon.....	0.53	2.82	3.79	0.30	2.23	3.42
Octane Number, Motor.....	80.8	83.3	85.8	76.6	80.5	83.8
Octane Number, Research.....	88.4	92.7	94.9	84.3	87.1	89.6
Fuel Sensitivity.....	3.8	9.5	11.5	3.0	7.8	10.1
Distillation Range:						
Initial Boiling Point.....	90	100	110	92	101	116
5% evaporated, °F.....	100	116	131	105	117	128
10% evaporated, °F.....	116	130	148	122	132	145
20% evaporated, °F.....	140	151	174	144	154	173
30% evaporated, °F.....	157	175	200	158	179	198
50% evaporated, °F.....	197	219	244	192	222	243
70% evaporated, °F.....	244	267	294	238	266	291
90% evaporated, °F.....	303	332	358	296	327	353
95% evaporated, °F.....	325	364	400	316	358	389
End Point, °F.....	360	400	470	340	395	434
Residue, per cent by vol.....	0.6	1.2	2.3	0.7	1.1	1.5
Distillation loss, per cent by vol.....	0.6	1.8	4.2	0.5	1.9	3.6
Number of samples		60			57	

FIGURE I



GROUP I GASOLINE
GRAPHIC COMPARISON OF GASOLINE CHARACTERISTICS
WITH PREVIOUS SURVEYS

FIGURE II



GROUP II GASOLINE
GRAPHIC COMPARISON OF GASOLINE CHARACTERISTICS
WITH PREVIOUS SURVEYS

REFERENCES

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