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DEPARTMENT OF MINES AND TECHNICAL SURVEYS  
MINES BRANCH  
OTTAWA

# GASOLINE SURVEY FOR SUMMER 1952

*by*

H. McD. CHANTLER, P.B. SEELY and R.G. DRAPER  
Fuels Division

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## PREFACE

The quality of the gasoline sold in Canada has been examined by the staff of the Division of Fuels of the Mines Branch each year since 1923, except 1940, 1949, and 1951. This was done by arranging for the collection of a number of samples from the principal centres of distribution in most of the provinces, and having them carefully analyzed by accepted methods at the Fuel Research Laboratories. The purpose of these surveys of quality was to make available to the Government, and to others who might desire it, reliable information regarding the characteristics of gasoline actually sold. Reports on the results obtained have been prepared and published from time to time and each year an effort has been made to increase the data and to present it in better form.

As with past surveys, inspectors of the Department of National Health and Welfare cooperated in the collection of the samples this year in the various cities, other than Ottawa, and the assistance of officials of that Department is gratefully acknowledged. The analytical work and the preparation of the report were under the supervision of Mr. H. McD. Chantler, and under the general direction of Mr. P.V. Rosewarne. In this report, the results of the analyses of one hundred and twelve samples of gasoline, collected in July of 1952, are given in detail. The analyses were made according to A.S.T.M. test methods and the characteristics tested included, colour, gravity, vapour pressure, volatility, per cent sulphur, corrosion tendency, gum content, knock rating, and amount of tetraethyllead added.

The knock-ratings were determined by two methods, namely, the A.S.T.M. motor method and the A.S.T.M. research method. Knock-ratings by the research method are included this year on account of the increasing use within the petroleum industry on this method of determining octane numbers. The results obtained by this method are seven or eight octane numbers higher for Group 1 gasolines than those obtained by the motor method. The average knock rating of both Group 1 and Group 2 gasolines by both methods was significantly higher in 1952 than in 1950, and is the highest on record in Canada. The changes in average knock ratings for the consecutive years can easily be followed on the graphs shown in the report. There has been comparatively little change in the volatility of either Group 1 or Group 2 gasolines since 1948 but what changes there are tend toward more volatile fuel.

R. E. Gilmore,  
Chief, Division of Fuels.

## TABLE OF CONTENTS

	<u>Page</u>
Introduction.....	1
Methods of Analysis.....	1
Results of Laboratory Examination.....	1
Knock Ratings.....	1
Maximum and Minimum Knock Ratings.....	1-2
Change in Knock Rating.....	2
Tetraethyllead Content.....	2
Volatility.....	2
Vapour Pressure.....	2
Sulphur.....	2
Gum.....	3
Gravity.....	3
Colour.....	3
Corrosion.....	3
Summary and Conclusions.....	3
References.....	4
Tabulated Results.....	5-10

## GASOLINE SURVEY FOR SUMMER 1952

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H. McD. Chantler, P.B. Seely and R. G. Draper.

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A 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, and 1951, and from the results obtained reports have been published for the years 1923 to 1950 (1). From June 19 to July 17, 1952, 112 samples representing 38 brands of motor fuel sold by 20 wholesale dealers and distributors were obtained from ten principal, distributing cities, representing all provinces except Newfoundland and Prince Edward Island. The generous cooperation of the Food and Drug Divisions, Department of National Health and Welfare in the collection of the samples is gratefully acknowledged.

The purpose of this survey is not to ascertain whether the samples of motor fuel conform with any specification, either of the Government of Canada (2), of any of the provinces, or of any other organization. It is intended as a means whereby information regarding the characteristics of gasoline actually being sold will become available. No effort, therefore, has been made to fit the results into predetermined groups; rather, it is desired that the actual analyses would define as clearly as possible the limits of the different groups of gasoline on the market. However, in this survey as well as in the 1950 survey, it was found that the groups determined by the analyses correspond to the grades which are known in the oil trade as "premium" and "regular" gasoline.

### Method of Analysis

The characteristics of the gasoline 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 distillation range was determined according to A.S.T.M. method D86 and is reported on the "per cent evaporated" basis. The "per cent evaporated" at any temperature is the sum of the "per cent recovered" and the distillation loss. The "per cent evaporated" temperatures were obtained from a plotted graph. The knock characteristics of the gasolines were determined by both the motor method, A.S.T.M. method D357(4), and the research method, A.S.T.M. method D908. The knock ratings are accordingly expressed as motor octane number and research octane number. Unless otherwise qualified in this report, octane number means motor octane number. The Reid vapour pressure was determined according to A.S.T.M. method D323. The sulphur content was determined according to A.S.T.M. method D90-34T, except that a modified apparatus (5), was used. The gum content was determined by A.S.T.M. method D381. The corrosion test was made according to A.S.T.M. method D130-30. The specific gravity was determined by means of the hydrometer at room temperature, according to A.S.T.M. method D287 and the result was calculated at 60°F. according to the National Standard Oil Tables (6). The equivalent gravity in degrees A.P.I. was obtained from the same tables. The apparent colour of the gasoline was observed. The tetraethyllead content was determined according to A.S.T.M. method D526-48T.

### Results of Laboratory Examination

The results of the laboratory examination of the gasolines collected are shown by cities in Table I and the samples are divided into two separate groups, viz: Group 1 and Group 2 gasolines. This table gives the motor and research octane number, tetraethyllead content, distillation characteristics, specific and A.P.I. gravity, Reid vapour pressure, sulphur content, and gum content of all the samples. Averages for group 1 and Group 2 gasolines are reported at the foot of each column in the table. Table II is a summary of the

average of gasoline survey analyses by cities and shows the average of all samples in Group 1 and Group 2. It also gives the average of all samples tested. Table III gives the minimum, maximum, and average figures for each characteristic of Group 1 and Group 2 gasolines. Table IV is a summary of summer gasoline survey results for Group 1 and Group 2 from 1937 through 1950 (except 1940, 1949, and 1951). Table V shows the average results obtained by examination of gasoline for the summers of twenty-seven years, from 1923 to 1952, (except 1940, 1949, and 1951). Figures I and II show graphically the distillation range, motor and research octane numbers, Reid vapour pressure and sulphur content given in Table IV from the year 1938.

A general discussion of the significance of the laboratory tests, together with the relationship between these tests and the actual operation of the fuel in the engine will be found in the report on Gasoline Surveys for 1930 and 1931 (7). Intervening changes in the significance of tests on motor fuels were discussed in the Gasoline Surveys for 1935 and 1936 (8). For further information on motor fuels, a report (9) entitled the Significance of Tests of Petroleum Products, prepared by A.S.T.M. Committee D-2 of American Society for Testing Materials; the co-ordinating Research Council Handbook (10) and other reports (11) (12) (13) (14) (15) (16) (17) (18) should be consulted.

### Knock Ratings

The knock ratings of the samples were determined in a Coordinating Fuel Research Engine (4), known more briefly as the "C.F.R. Engine". The knock ratings were determined by two methods, namely; the A.S.T.M. motor method D357 and the A.S.T.M. research method D908. The results are expressed in A.S.T.M. motor octane numbers and in A.S.T.M. research octane numbers. For purposes of brevity, throughout this report A.S.T.M. motor octane number is stated as motor octane number or simply as octane number and A.S.T.M. research octane number as research octane number.

According to the knock ratings, the samples fall into two groups, although there is some overlapping. The range in motor octane number of each group is as follows:

- Group 1. Gasolines with motor octane numbers of 79 and above.
- Group 2. Gasolines with motor octane numbers between 78 and 74.

The knock ratings of the individual samples are given in Table I and the group in which each sample falls is shown. Of the 112 samples of gasoline collected, 57 samples are Group 1 gasoline, and 55 samples are Group 2 gasoline.

### Maximum and Minimum Knock Ratings

The maximum and minimum of the knock ratings as determined by the motor and research methods of the samples tested are shown in Table III. The range in motor octane number of the group 1 gasoline is from a high of 84.8 to a low of 77.3. The corresponding range of group 1 gasolines in 1950 was from 84.7 to 76.0 motor octane numbers. For the group 2 gasoline samples the range in motor octane number is from a high of 82.1 to a low of 75.4. The corresponding range of group 2 gasolines in 1950 was from 80.5 to a low of 73.4 octane numbers. The range in research octane number of the group 1 gasolines is from a high of 90.7 to a low of 85.2. The corresponding range of group 1 gasolines in 1950 was from 91.2 to 82.5 research octane numbers. For the group 2 gasoline

samples the range in research octane numbers is from a high of 86.3 to a low of 79.6 research octane numbers. The corresponding range in group 2 gasolines in 1950 was from 86.0 to 77.4 research octane numbers.

Change in Knock Ratings

The average knock rating of the gasoline sold in Canada in thirteen summers, 1937 through 1952, excepting 1940, 1949, and 1951, are shown in Table IV and graphically from 1938, in Figure I for group 1 gasoline and in Figure II for group 2 gasoline. These results indicate that by the summer of 1941 the average knock rating of group 1 gasoline had risen to 79.0 motor octane number and for group 2 gasoline had risen to 73.6 motor octane number. For the years 1942 to 1945 war time restrictions (19) applied in Canada. Therefore by the summer of 1945, the average knock rating of group 1 motor fuel had fallen to 73.5 motor octane number and of group 2 motor fuel had fallen to 68.5 motor octane number.

Comparison of average knock ratings of motor fuels sold during the past summer with preceding summers since 1946 are as follows:-

<u>Group 1 gasoline</u>	<u>Motor Octane number</u>	<u>Research Octane number</u>
Summer 1946	77.8	-
Summer 1947	79.2	-
Summer 1948	79.0	-
Summer 1950	80.0	87.2
Summer 1952	80.9	88.7

Group 2 gasoline

Summer 1946	73.6	-
Summer 1947	75.0	-
Summer 1948	75.0	-
Summer 1950	77.6	82.4
Summer 1952	78.7	84.0

The above indicates that since the war, the average knock rating of group 1 motor fuel had risen from 77.8 motor octane number in 1946 to 80.9 motor octane number in 1952. During this same period group 2 motor fuel has risen from 73.6 motor octane number in 1946 to 78.7 motor octane number in 1952. The average research octane number of group 1 motor fuel has risen from 87.2 in 1950 to 88.7 in 1952; and for group 2 has risen from 82.4 in 1950 to 84.0 in 1952. The average octane values, by both motor and research methods, of motor fuels, sold at filling stations throughout Canada during the summer of 1952 are the highest in the history of these surveys.

The difference between the average knock rating of group 1 and group 2 motor fuels was 7.1 motor octane numbers in summer 1939, 5.4 in summer 1941, 4.0 in 1948, 2.4 in 1950, and only 2.2 motor octane numbers in summer 1952.

The average knock ratings of group 1 and group 2 motor fuels sold in the provinces of Saskatchewan and Alberta were about 2 octane numbers lower than for similar grades of motor fuel sold in the other provinces in the past summer.

Tetraethyllead Content

Tetraethyllead is used to improve the knock rating of gasolines. The tetraethyllead content of the individual samples and the average tetraethyllead content of group 1 and group 2 samples from each city are given in Table I and are summarized in Tables II and III. The maximum tetraethyllead content of group 1 gasoline was 3.58 millilitres and the minimum was 1.24 millilitres per Imperial gallon. For group 2, the maximum tetraethyllead content was 3.37 millilitres and the minimum was 0.86 millilitres per Imperial

gallon. The average tetraethyllead content of group 1 motor fuels was 2.44 millilitres in 1952 as compared with 2.78 in 1950, 2.80 in 1948, 2.61 in 1947 and 2.45 millilitres per Imperial gallon in the summer of 1946. In summer of 1952, the average tetraethyllead content of group 2 motor fuel was 2.02 millilitres as compared with 2.45 in 1950, 1.71 in 1948, 1.42 in 1947 and 1.40 millilitres per Imperial gallon in the summer of 1946.

The proportion of tetraethyllead used in both group 1 and group 2 motor fuels has shown a decided decrease in the summer of 1952 as compared with the summer of 1950.

Volatility

The volatility of the gasoline is indicated by the distillation range temperatures which are given in Tables I to V and are shown graphically in Figures I and II. The distillation temperatures are reported on the "per cent evaporated" basis, as was done in the gasoline survey reports between 1939 and 1950, rather than on the "per cent recovered" basis, as in gasoline survey reports previous to 1939. It is now accepted practice in the petroleum industry to report the distillation range of motor fuels on the "per cent evaporated" basis because these temperatures indicate more correctly the actual volatility of motor fuel as it occurs in engine operation.

The average volatility of the motor fuels was practically the same in the summer of 1952 as in the summer of 1950. The group 2 motor fuels showed a wider geographical variation in distillation range than the group 1 motor fuels. In 1952, group 1 gasolines had a higher average volatility than group 2 gasolines, as shown in Table III. The 10, 20, 30, and 50 per cent evaporation points in the distillation range of group 1 gasolines was approximately 3°F. lower than the same points in the distillation range of group 2 gasolines. Since 1946, the group 1 motor fuels have been more volatile than the group 2 motor fuels.

Vapour Pressure

The Reid vapour pressure for each of the samples tested is shown in Table I. The average Reid vapour pressure of all the samples tested in 1952 was 8.4 pounds. The average Reid vapour pressure in 1950, was also 8.4 pounds.

The range of vapour pressures was from a maximum of 10.8 pounds to a minimum of 6.6 pounds with 88 per cent falling between 8 to 10 pounds indicating a trend to more uniform vapour pressures for motor fuels. The average Reid vapour pressure for the group 1 motor fuels was 8.3 pounds and for the group 2 motor fuels was 8.4 pounds.

Sulphur

The sulphur content for each of the samples tested is shown in Table I. The average sulphur content of all the gasolines was 0.07 per cent by weight. In the four summers of 1945, 1946, 1947, and 1948, the average sulphur content for the motor fuels was also 0.07 per cent. The sulphur content in 1950 was 0.09 per cent. The sulphur content varied from a high of 0.16 per cent to a low of 0.03 per cent in 1952. Only one sample had a sulphur content exceeding 0.15 per cent. The average sulphur content of group 1 was 0.08 per cent and of group 2 motor fuels was 0.07 per cent. The motor fuels sold in the maritime provinces of Nova Scotia and New Brunswick, and in the Province of British Columbia, had a higher average sulphur content than the motor fuels in the other provinces of Canada. There was a decrease in the sulphur content of motor fuels in 1952, as compared with 1950.

### Gum

The existent gum in the samples of gasoline was determined by the air-jet evaporation method, A.S.T.M. D381 (3). With this method the gum is deposited as a hard, varnish-like substance, or as a tacky residue. If the gasoline contains non-volatile lubricating or solvent oil, the residue is oily rather than tacky, because it is gum plus oil. In all cases where the gum was oily, the weight in milligrams per 100 millilitres was recorded, with the following footnote - "denotes an oily gum and is not included in average".

The gum content of each of the samples examined is shown in Table I. The average gum content of the samples was 3 milligrams per 100 millilitres. This average does not include the oily gum found in 17 of the 112 samples tested. For the five summers of 1944 to 1948, the average gum content for the motor fuels was 4 milligrams; and in the summer of 1950 it was 5 milligrams per 100 millilitres. It is now generally accepted (2) that not over 7 milligrams of gum should be present in 100 millilitres of motor fuel. Nine samples had a gum content exceeding 7 milligrams and all of these samples were group 1 motor fuels. The highest gum content was 24 milligrams and the lowest was 1 milligram. The average gum content for group 1 gasolines was 4 milligrams and for group 2 was 3 milligrams per 100 millilitres.

In 1952, as in previous years, several of the oil companies added "solvent oil" to their motor fuels as a top-cylinder lubricant. The gum residue of these samples was therefore oily. Seventeen samples, or 15 per cent of the motor fuels tested in 1952 contained oil. The highest oily gum was 17 milligrams per 100 millilitres and the average oily gum content of the 17 samples was 6 milligrams per 100 millilitres of motor fuel.

### Gravity

The specific gravity at 60°F., and the equivalent gravity in degrees A.P.I. at 60°F., for each sample tested are shown in Table I. The average specific gravity of all the gasolines collected was 0.737, or 60.5 degrees A.P.I. This is equivalent to a weight of 7.37 pounds per Imperial gallon. The overall variation in specific gravity of the gasolines was from 0.721 to 0.750 or from 64.8 to 57.2 degrees A.P.I. The average specific gravity of group 1 motor fuels was 0.737, or 60.5 degrees A.P.I., and for group 2 motor fuels was 0.736, or 60.8 degrees A.P.I.

### Colour

The apparent colour of the gasoline was observed in all samples but is not reported in any of the tables. All of the samples of motor fuel in group 1 and group 2 were artificially coloured in 1952. Fifty-five of the 57 samples of group 1 motor fuel were dyed red and the other two samples were dyed blue. The group 2 motor fuels were dyed yellow or orange, - except for two samples which were dyed pink.

### Corrosion

The corrosion test was made on all the samples collected but is not reported in any of the tables. None of the 112 samples gave a positive test for corrosion with the copper strip.

### Summary and Conclusions

This gasoline survey comprises the analyses of 112 samples of motor fuel collected for the Fuel Research Laboratories during the period June 19, to July 17, 1952. The samples represent 38 brands of motor fuel sold by 20 wholesalers and distributors in ten principal distributing cities representing

all provinces except Newfoundland and Prince Edward Island. The samples may therefore be accepted as representative of the motor fuels sold in Canada during the summer of 1952.

For convenience and easy reference, summaries of the data obtained are tabulated and a comparison of gasoline characteristics is shown graphically. Group 1 is usually known as premium grade, and group 2 as regular grade motor fuel. These two groups differ principally in knock rating.

The knock ratings of the 1952 gasoline survey samples were determined by two methods, namely, the A.S.T.M. Motor Method and the A.S.T.M. Research Method. According to the motor method, the average knock rating of group 1 gasolines was 80.9 octane number, while in 1950 it was 80.0. The average knock rating of group 2 gasolines was 78.7 motor octane number in 1952, while in 1950 it was 77.6. According to the research method, the average knock rating of group 1 gasolines was 88.7 research octane number and for group 2 gasolines was 84.0 research octane number. The average octane values, by both the motor and research methods, of motor fuels sold at filling stations throughout Canada during the summer of 1952 are the highest in the history of these surveys.

The difference between the average knock rating of group 1 and group 2 motor fuels was only 2.2 motor octane numbers in the summer of 1952, or practically the same as in the summer of 1950. In 1952 the knock rating of group 1 and group 2 motor fuels sold in the provinces of Saskatchewan and Alberta was about 2 motor octane numbers lower than for similar grades of motor fuel sold in other provinces.

The average tetraethyllead content of the gasolines tested was 2.44 millilitres per Imperial gallon for group 1 motor fuels, and 2.02 millilitres per Imperial gallon for group 2 motor fuels.

The average volatility of the motor fuels sold in Canada was practically the same as the average volatility of motor fuels in the summer of 1950. Group 1 gasolines had a higher average volatility than Group 2 gasolines.

The average Reid vapour pressure of the motor fuels tested was 8.4 pounds in 1952 which is the same as in 1950. The average Reid vapour pressure of the group 1 motor fuels was 8.3 pounds and of group 2 was 8.4 pounds.

The average sulphur content of the gasolines was 0.07 per cent weight. The average sulphur content of the group 1 motor fuels was 0.08 per cent and of group 2 was 0.07 per cent. There was a decrease in the sulphur content of motor fuels in 1952, as compared with 1950. The motor fuels sold in the maritime provinces of Nova Scotia and New Brunswick and also in the province of British Columbia had a higher average sulphur content than the motor fuels in the other provinces of Canada.

The average gum content of all the gasolines not containing oil was 3 milligrams per 100 millilitres. The average gum content of the group 1 gasolines was 4 milligrams, and for group 2 gasolines was 3 milligrams.

Seventeen samples, or 15 per cent, of the motor fuels contained oil. These samples gave a gum residue which was "oily". The average oily gum content of these seventeen samples was 6 milligrams per 100 millilitres of motor fuel.

The average specific gravity of the gasolines was 0.737, or 60.5 degrees A.P.I. All the group 1 and group 2 motor fuels were artificially coloured.

None of the motor fuels tested in summer 1952 gave a positive test for corrosion with the copper strip.

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TABLE I  
GASOLINE SURVEY ANALYSES BY CITIES FOR SUMMER 1952

Sam- ple No.	Group	Octane Number	Tetra- ethyl- lead	DISTILLATION RANGE, °F.											GRAVITY						
				I. B. F.	Per Cent Evaporated									End Pt.	Res- idue %	Loss %	Spec- ific	Deg. A.P.I.	Reid V.P. lb.	Sul- phur %	Gum
					5	10	20	30	50	70	90	95									
<u>HALIFAX, N.S.</u>																					
1	I	80.9	88.5	1.81	99	113	130	160	186	236	284	344	374	410	1.2	1.8	0.739	60.0	8.8	0.09	9
2	I	80.8	89.4	1.75	95	112	131	160	185	231	276	341	378	410	1.0	2.0	0.738	60.2	8.6	0.08	4
3	I	80.8	87.6	2.78	98	117	135	164	192	243	287	347	376	410	1.2	1.8	0.742	59.2	8.5	0.13	7
4	I	80.9	89.9	3.02	101	121	137	162	185	233	281	344	366	392	1.0	1.0	0.737	60.5	7.5	0.08	4
5	I	81.5	89.5	3.12	98	116	134	160	186	236	284	343	374	404	1.2	1.8	0.738	60.2	8.5	0.11	10
Average		81.0	89.0	2.50	98	116	133	161	187	236	282	344	374	405	1.1	1.7	0.739	60.0	8.4	0.10	7
6	II	78.8	86.2	2.16	93	111	127	154	184	242	287	349	376	410	1.0	2.5	0.740	59.7	10.1	0.16	3
7	II	78.8	85.6	2.63	98	118	137	167	195	245	288	348	374	406	1.2	1.8	0.741	59.5	8.9	0.14	4
8	II	78.9	86.2	2.73	100	116	134	165	193	244	287	345	372	407	1.0	2.0	0.741	59.5	8.3	0.14	3
9	II	77.9	85.9	1.60	103	126	141	165	188	236	283	339	365	393	1.0	1.0	0.735	61.0	7.7	0.07	7
10	II	79.0	85.9	2.53	98	114	136	168	195	250	295	353	376	408	1.0	2.0	0.743	58.9	9.3	0.14	3
Average		78.7	86.0	2.33	98	117	135	164	191	243	288	347	373	405	1.0	1.9	0.740	59.7	8.9	0.13	4
<u>SAINT JOHN, N.B.</u>																					
11	I	81.4	90.0	1.74	98	118	134	162	188	236	281	338	366	393	1.0	2.0	0.740	59.7	9.1	0.06	2
12	I	81.5	90.0	2.61	99	112	130	158	182	228	274	338	367	406	1.0	2.0	0.735	61.0	10.2	0.09	3
13	I	81.8	89.5	2.39	100	112	128	154	178	230	277	340	372	408	1.3	2.2	0.739	60.0	9.8	0.09	11
14	I	80.9	89.6	2.61	104	124	140	165	188	234	282	348	373	398	1.0	1.0	0.736	60.8	6.7	0.08	11*
15	I	81.6	89.6	2.25	99	110	127	154	179	226	271	332	363	404	1.0	2.5	0.736	60.8	9.4	0.08	2
Average		81.4	89.7	2.32	100	115	132	159	183	231	277	339	368	402	1.1	1.9	0.737	60.5	9.0	0.08	5
16	II	80.5	85.9	1.58	106	121	137	165	191	233	270	324	351	388	1.0	2.5	0.734	61.3	9.1	0.04	2
17	II	80.4	86.2	2.81	100	117	136	166	198	250	293	348	375	408	1.0	2.0	0.743	58.9	8.6	0.14	2
18	II	80.0	85.4	2.56	96	115	132	161	190	243	288	349	375	410	1.2	2.3	0.740	59.7	9.7	0.15	2
19	II	78.6	85.8	1.95	108	130	145	168	190	235	281	339	365	398	1.2	0.8	0.734	61.3	6.8	0.08	4
20	II	80.2	85.9	2.77	104	124	143	171	197	248	294	349	374	408	1.0	2.5	0.743	58.9	8.7	0.13	2
Average		79.9	85.8	2.33	103	121	139	166	193	242	285	342	368	402	1.1	2.0	0.739	60.0	8.6	0.11	2
<u>MONTREAL, QUE.</u>																					
21	I	81.3	90.0	1.86	102	122	140	168	193	235	277	330	355	390	1.0	2.0	0.743	58.9	7.7	0.06	3
22	I	81.1	89.8	1.81	100	114	132	160	187	235	278	339	371	412	1.1	2.9	0.738	60.2	9.4	0.06	1
23	I	82.0	89.8	2.36	98	117	136	166	190	230	270	335	366	404	1.2	1.8	0.737	60.5	8.7	0.07	2
24	I	80.9	89.9	2.86	104	115	136	163	187	234	284	335	355	396	1.1	2.4	0.737	60.5	8.0	0.08	5
25	I	81.8	89.6	1.86	98	106	124	152	180	229	273	334	368	412	1.1	3.4	0.734	61.3	10.8	0.08	1
26	I	81.4	89.9	1.74	96	117	140	169	194	234	274	340	369	402	1.2	2.8	0.742	59.2	8.2	0.08	6
27	I	81.4	90.2	1.63	101	122	141	170	195	236	277	337	366	404	1.2	1.8	0.742	59.2	8.4	0.08	3
Average		81.4	89.9	2.02	100	116	136	164	189	233	276	336	364	403	1.1	2.4	0.739	60.0	8.7	0.07	3
28	II	78.4	85.4	1.49	110	134	151	176	200	238	276	332	358	388	1.2	1.3	0.739	60.0	6.9	0.05	4
29	II	78.9	85.7	1.44	94	117	138	169	194	235	272	332	358	396	1.0	2.0	0.736	60.8	8.2	0.05	5*
30	II	80.1	85.9	1.78	100	123	142	170	194	232	268	326	350	394	1.2	1.8	0.736	60.8	8.3	0.05	3
31	II	78.7	85.4	1.32	104	126	142	166	188	233	280	338	362	394	1.2	0.8	0.736	60.8	6.7	0.06	5
32	II	79.2	85.4	1.31	95	108	126	158	185	230	268	328	364	406	1.1	2.4	0.732	61.8	9.8	0.06	1
33	II	80.5	85.4	1.75	104	124	143	173	196	236	270	326	358	395	1.2	1.8	0.737	60.5	8.7	0.06	1
34	II	80.5	85.4	1.67	100	122	142	172	196	236	272	327	355	394	1.2	1.8	0.736	60.8	8.1	0.06	1
Average		79.5	85.5	1.54	101	122	141	169	193	234	272	330	358	395	1.2	1.7	0.736	60.8	8.1	0.06	3

Millilitres per Imperial gallon.  
Milligrams per 100 millilitres.  
\*Denotes an oily gum (not included in average)

TABLE I (continued)

GASOLINE SURVEY ANALYSES BY CITIES FOR SUMMER 1952

Sam- ple No.	Group	Octane Number Motor Research		Tetra- ethyl- lead	DISTILLATION RANGE, °F.										GRAVITY			Reid V.P. lb.	Sul- phur %	Gum		
					I. B. P.	Per Cent Evaporated									End Pt.	Res- idue %	Loss %				Spec- ific	Deg. A.P.I.
						5	10	20	30	50	70	90	95									
<u>OTTAWA, ONT.</u>																						
35	I	82.2	90.5	1.80	102	116	134	165	191	236	280	342	368	390	1.3	1.7	0.738	60.2	8.8	0.07	3	
36	I	82.0	90.2	1.86	100	115	133	164	189	238	280	340	365	392	1.4	2.1	0.737	60.5	9.3	0.06	6	
37	I	82.0	90.0	1.53	102	120	136	164	187	228	266	328	362	400	1.4	2.6	0.734	61.3	9.3	0.07	3	
38	I	81.2	89.5	2.85	98	131	150	174	193	240	290	346	369	396	1.2	1.3	0.736	60.8	6.8	0.08	13	
39	I	81.2	89.2	1.24	98	116	132	154	176	226	272	339	376	417	1.2	1.8	0.735	61.0	8.5	0.08	4	
40	I	82.5	90.7	1.75	98	110	124	150	172	219	268	350	384	429	1.2	1.8	0.736	60.8	9.4	0.04	3	
41	I	82.4	90.4	1.52	100	122	142	169	193	230	266	332	365	403	1.2	1.8	0.735	61.0	9.0	0.07	5	
Average		81.9	90.1	1.79	100	119	136	163	186	231	275	340	370	404	1.3	1.9	0.736	60.8	8.7	0.07	5	
42	II	79.5	85.4	1.35	100	114	134	164	186	230	272	324	356	377	1.4	2.6	0.732	61.8	9.4	0.04	4	
43	II	79.9	85.0	1.51	98	116	137	166	192	236	275	328	355	387	1.1	2.4	0.731	62.1	9.0	0.04	4	
44	II	81.8	86.3	2.62	106	121	140	166	190	230	268	318	352	396	1.2	2.3	0.732	61.8	8.0	0.06	2	
45	II	78.8	86.3	1.52	110	121	140	164	187	235	284	344	368	391	1.5	2.5	0.736	60.8	7.5	0.07	7	
46	II	79.6	84.5	1.48	104	114	133	166	195	239	276	331	362	398	1.2	2.8	0.730	62.3	8.5	0.06	2	
47	II	80.5	85.9	1.50	104	120	141	170	193	228	258	312	347	387	1.2	2.8	0.731	62.1	8.6	0.05	1	
Average		80.0	85.6	1.66	104	118	138	166	191	233	272	326	357	389	1.3	2.6	0.732	61.8	8.5	0.05	3	
<u>TORONTO, ONT.</u>																						
48	I	82.0	88.8	2.00	102	120	141	171	197	238	276	335	369	404	1.2	2.8	0.736	60.8	9.2	0.06	3*	
49	I	81.2	89.8	1.63	102	118	140	168	190	237	280	337	362	396	1.2	2.3	0.738	60.2	9.2	0.06	2	
50	I	81.2	89.6	1.95	100	126	143	165	188	234	276	336	360	391	1.2	0.8	0.736	60.8	8.4	0.07	4*	
51	I	80.2	86.7	2.31	106	131	147	167	185	217	251	307	338	380	1.2	0.3	0.730	62.3	7.5	0.04	3	
52	I	79.9	88.6	3.41	99	120	136	159	181	230	280	348	373	397	1.3	1.7	0.739	60.0	8.4	0.09	17*	
53	I	80.8	89.0	2.25	106	128	142	167	192	243	292	350	371	394	1.2	1.3	0.741	59.5	7.9	0.08	5	
54	I	81.2	89.8	1.54	100	109	128	156	180	229	272	336	362	401	1.1	2.9	0.736	60.8	9.6	0.10	4	
55	I	81.8	89.2	1.40	106	118	130	149	171	218	270	351	386	424	1.1	1.4	0.738	60.2	8.5	0.03	24	
Average		81.0	88.9	2.06	103	121	138	163	186	231	275	338	365	398	1.2	1.7	0.737	60.5	8.6	0.07	8	
56	II	79.9	85.3	1.56	98	116	138	168	193	235	273	331	355	396	1.1	2.9	0.736	60.8	8.8	0.05	4	
57	II	79.6	85.4	1.49	103	114	133	162	188	233	272	329	356	390	1.0	3.0	0.735	61.0	8.9	0.04	2	
58	II	79.1	85.7	2.60	106	116	131	160	184	227	272	330	360	389	1.0	2.0	0.733	61.5	9.1	0.06	7	
59	II	80.1	86.3	3.10	100	108	131	161	183	223	264	328	356	390	1.1	2.4	0.735	61.0	8.2	0.06	7*	
60	II	78.7	86.1	1.56	104	115	139	166	188	234	281	342	366	395	1.1	1.9	0.736	60.8	7.3	0.06	8	
61	II	79.4	84.8	1.31	106	112	129	156	183	230	271	328	352	394	1.0	4.0	0.733	61.5	9.4	0.05	5	
Average		79.5	85.6	1.94	103	114	134	162	187	230	272	331	358	392	1.1	2.7	0.735	61.0	8.6	0.05	5	

Millilitres per Imperial gallon.  
 Milligrams per 100 millilitres.  
 \*Denotes an oily gum (not included in average)



TABLE I (continued)

CASOLINE SURVEY ANALYSES BY CITIES FOR SUMMER 1952

Sam- ple No.	Group	Octane Number Motor Research		Tetra- ethyl- lead	DISTILLATION RANGE, °F.										GRAVITY			Reid V.P.	Sul- phur %	Gum %	
					I. B. P.	Per Cent Evaporated							End Res- idue %	Loss %	Spec- ific	Deg- A.P.I.					
						5	10	20	30	50	70	90					95				
<u>WINNIPEG, MAN.</u>																					
62	I	81.2	88.9	1.88	100	123	141	166	191	236	282	346	373	402	1.2	1.8	0.739	60.0	7.8	0.07	3
63	I	81.0	88.4	1.65	94	111	128	152	176	229	280	342	365	390	1.0	2.0	0.737	60.5	8.9	0.05	2
64	I	81.1	89.2	1.84	100	118	130	151	178	230	284	344	365	390	0.8	1.2	0.738	60.2	8.6	0.06	2
65	I	80.5	89.1	2.27	104	132	146	170	194	242	291	349	372	400	1.2	0.8	0.739	60.0	6.6	0.08	3
66	I	79.8	87.5	3.21	100	114	133	162	190	238	284	348	374	404	1.0	2.5	0.744	58.7	8.7	0.08	1
67	I	81.1	89.0	1.85	98	119	133	156	182	234	286	351	372	396	1.1	1.4	0.738	60.2	8.7	0.06	6*
Average		80.8	88.7	2.12	99	120	135	160	185	235	285	347	370	397	1.1	1.6	0.739	60.0	8.2	0.07	2
68	II	79.5	85.3	2.71	98	118	136	162	187	228	271	331	359	397	1.2	1.8	0.734	61.3	8.5	0.07	2
69	II	78.3	84.1	1.15	100	118	133	158	183	229	278	334	357	385	1.1	1.4	0.736	60.8	8.2	0.05	3*
70	II	78.4	84.4	1.37	103	123	136	157	182	229	280	334	356	386	0.8	2.2	0.734	61.3	8.6	0.04	3*
71	II	77.9	86.1	1.69	108	127	144	168	192	238	284	347	371	397	1.0	1.0	0.736	60.8	6.6	0.08	2
72	II	76.4	83.3	1.40	100	114	133	156	177	218	261	340	370	401	1.0	2.0	0.732	61.8	8.9	0.07	4*
73	II	78.5	84.2	1.36	103	119	134	159	183	233	278	335	358	388	1.0	2.0	0.735	61.0	8.3	0.04	5*
Average		78.2	84.6	1.61	102	120	136	160	184	229	275	337	362	392	1.0	1.7	0.735	61.0	8.2	0.06	2
<u>REGINA, SASK.</u>																					
74	I	78.2	85.9	3.42	98	112	128	158	184	234	274	324	346	377	1.0	2.0	0.732	61.8	8.2	0.10	4*
75	I	79.2	87.0	3.33	100	110	128	153	180	235	284	344	369	405	1.0	3.0	0.733	61.5	8.4	0.06	3
76	I	79.2	85.9	3.20	100	116	133	155	180	230	274	337	366	398	1.2	2.3	0.732	61.8	8.2	0.05	12*
77	I	78.9	87.0	3.08	99	114	132	154	178	231	281	340	366	402	1.2	2.3	0.731	62.1	7.6	0.06	3
78	I	77.3	85.2	2.41	104	116	133	163	190	242	291	346	372	404	1.2	2.3	0.737	60.5	6.7	0.04	1
79	I	80.1	87.3	3.18	108	127	146	177	202	248	294	344	364	394	1.0	1.5	0.741	59.5	8.4	0.05	1
Average		78.8	86.4	3.10	102	116	133	160	186	237	283	339	364	397	1.1	2.2	0.734	61.3	7.9	0.06	2
80	II	77.8	82.5	3.37	104	120	138	165	189	234	271	318	338	366	1.0	2.0	0.731	62.1	7.6	0.09	1
81	II	77.9	80.4	2.72	100	118	135	160	182	220	256	305	336	376	1.2	1.3	0.722	64.5	8.6	0.05	1
82	II	78.0	80.7	2.70	98	120	134	160	182	220	255	308	337	377	1.0	2.0	0.721	64.8	8.9	0.04	1
83	II	77.9	80.2	2.71	98	115	133	158	181	220	253	308	338	378	1.2	1.8	0.721	64.8	8.8	0.05	1
84	II	75.4	79.6	2.39	98	114	137	171	200	251	301	362	386	418	1.0	3.0	0.741	59.5	8.8	0.04	1
85	II	77.1	81.0	1.72	100	121	144	179	207	255	304	349	366	395	1.0	2.0	0.745	58.4	7.9	0.05	1
Average		77.4	80.7	2.60	100	118	137	166	190	233	273	325	350	385	1.1	2.0	0.730	62.3	8.4	0.05	1

Millilitres per Imperial gallon.

Milligrams per 100 millilitres.

\* Denotes an oily gum (not included in average)

TABLE I (continued)  
GASOLINE SURVEY ANALYSES BY CITIES FOR SUMMER 1952

Sam- ple No.	Group	Octane Number Motor Research		Tetra- ethyl- lead	DISTILLATION RANGE, °F.										GRAVITY		Reid V.P.	Sul- phur %	Gum %		
					Per Cent Evaporated										End Res- idue %	Loss %				Spec- ific	Deg. A.P.I.
					I. B. P.	5	10	20	30	50	70	90	95								
<u>CALGARY, ALTA.</u>																					
86	I	78.4	85.9	3.58	100	118	136	163	188	235	278	329	352	380	1.0	2.0	0.734	61.3	7.7	0.10	2
87	I	77.8	86.3	2.76	100	123	143	171	195	234	275	324	344	373	1.0	2.0	0.735	61.0	8.2	0.06	1
88	I	78.3	86.9	3.30	102	115	128	148	172	232	288	345	364	385	1.0	2.0	0.735	61.0	8.1	0.09	5*
89	I	81.4	87.3	3.15	104	127	146	177	203	248	296	343	364	393	0.5	2.0	0.741	59.5	7.8	0.05	6
Average		79.0	86.6	3.20	101	121	138	165	189	237	284	335	356	383	0.9	2.0	0.736	60.8	8.0	0.07	3
90	II	75.5	81.7	1.17	96	107	126	153	181	230	269	315	332	362	1.0	3.0	0.728	62.9	9.9	0.08	1
91	II	75.7	80.4	2.23	108	126	146	175	200	238	272	318	336	364	0.8	2.2	0.737	60.5	7.9	0.05	4*
92	II	76.3	80.4	2.88	99	119	133	162	192	247	289	337	356	384	1.1	1.9	0.735	61.0	9.2	0.06	6*
93	II	77.7	80.2	2.02	110	128	146	176	206	258	305	356	374	399	1.2	1.8	0.746	58.2	7.7	0.05	12
Average		76.3	80.7	2.08	103	120	138	167	195	243	284	332	350	377	1.0	2.2	0.737	60.5	8.7	0.06	7
<u>EDMONTON, ALTA.</u>																					
94	I	80.5	86.6	3.22	104	119	133	154	175	216	264	340	370	399	1.0	1.0	0.730	62.3	8.0	0.05	4
95	I	80.5	87.3	3.46	112	128	140	160	180	220	267	342	369	402	1.2	0.8	0.732	61.8	8.1	0.05	7*
96	I	80.8	86.4	2.43	106	120	139	170	199	248	295	347	368	399	1.0	2.0	0.741	59.5	7.9	0.04	19
Average		80.6	86.8	3.04	107	122	137	161	185	228	275	343	369	400	1.1	1.3	0.734	61.3	8.0	0.05	11
97	II	76.4	80.8	1.96	109	125	141	166	193	240	288	346	372	397	1.1	1.9	0.737	60.5	7.6	0.04	3
98	II	76.8	81.3	0.86	98	113	129	154	181	231	279	348	373	408	1.0	2.0	0.733	61.5	9.9	0.08	5
99	II	75.9	80.4	1.93	106	132	150	172	189	238	288	348	373	399	1.0	2.0	0.738	60.2	7.9	0.05	3
100	II	76.8	80.4	1.96	98	118	140	171	200	253	302	357	376	398	1.0	2.0	0.745	58.4	8.6	0.03	12
Average		76.5	80.7	1.68	103	122	140	166	191	241	289	349	374	401	1.0	2.0	0.738	60.2	8.5	0.05	6
<u>VANCOUVER, B. C.</u>																					
101	I	81.8	90.5	1.85	103	124	136	156	176	222	274	334	363	398	1.0	1.0	0.737	60.5	7.4	0.08	2
102	I	81.0	88.6	3.17	112	130	146	166	186	227	266	319	346	390	1.0	1.0	0.738	60.2	6.6	0.14	3
103	I	80.7	88.6	3.07	108	132	146	166	187	229	269	326	358	400	1.0	1.0	0.738	60.2	6.6	0.15	3
104	I	82.2	90.3	3.49	112	126	145	173	195	240	284	341	362	385	1.0	2.0	0.750	57.2	7.2	0.13	1
105	I	80.5	88.9	3.35	107	124	140	167	192	233	274	338	362	389	1.2	1.3	0.742	59.2	8.0	0.14	2
106	I	84.8	88.5	3.41	106	120	134	156	179	221	266	327	354	388	1.2	1.3	0.737	60.5	8.2	0.07	2
Average		81.8	89.2	3.06	108	126	141	164	186	229	272	331	358	392	1.1	1.3	0.740	59.7	7.3	0.12	2
107	II	77.3	81.5	2.07	108	131	158	192	213	245	276	324	348	382	1.0	2.0	0.739	60.0	8.0	0.15	4
108	II	80.5	82.6	2.48	104	128	148	178	202	239	274	325	356	394	1.1	1.4	0.744	58.7	7.1	0.08	2
109	II	79.7	82.4	3.27	110	128	147	177	203	247	285	344	372	400	1.1	1.9	0.747	57.9	7.5	0.14	1
110	II	80.0	84.5	2.74	111	127	144	173	199	248	294	343	367	396	1.0	2.0	0.748	57.7	7.2	0.14	1
111	II	77.9	83.1	2.09	100	125	146	175	199	236	270	320	341	368	1.0	2.0	0.738	60.2	8.0	0.10	1
112	II	82.1	83.0	2.22	98	108	126	150	174	223	273	350	380	413	1.0	3.0	0.735	61.0	8.7	0.04	1
Average		79.6	82.9	2.48	105	125	145	174	198	240	279	334	361	392	1.0	2.1	0.742	59.2	7.8	0.11	2

Millilitres per Imperial gallon  
Milligrams per 100 millilitres  
\*Denotes an oily gum (not included in average)

**TABLE II**  
**AVERAGE OF GASOLINE SURVEY ANALYSES BY CITIES FOR SUMMER 1952**

CITY	No. of Samples	Group	Octane Number Motor Research		Tetra-ethyl-lead*	DISTILLATION RANGE, °F.						Gravity at 60°F.		Reid V.P. lb.	Sul-phur %	Gum**			
						I.	Per Cent Evaporated					End Pt.	Res- idue %				Loss %	Spec- ific	Deg. A.P.I.
							F.	10	20	50	70								
Halifax, N.S.....	5	I	81.0	89.0	2.50	98	133	161	236	282	344	405	1.1	1.7	0.739	60.0	8.4	0.10	7
Saint John, N.B..	5	I	81.4	89.7	2.32	100	132	159	231	277	339	402	1.1	1.9	0.737	60.5	9.4	0.08	5
Montreal, Que....	7	I	81.4	89.9	2.02	100	136	164	233	276	336	403	1.1	2.4	0.739	60.0	8.7	0.07	3
Ottawa, Ont.....	7	I	81.9	90.1	1.79	100	136	163	231	275	340	404	1.3	1.9	0.736	60.8	8.7	0.07	5
Toronto, Ont.....	8	I	81.0	88.9	2.06	103	138	163	231	275	338	398	1.2	1.7	0.737	60.5	8.6	0.07	8
Winnipeg, Man....	6	I	80.8	88.7	2.12	99	135	160	235	285	347	397	1.1	1.6	0.739	60.0	8.2	0.07	2
Regina, Sask.....	6	I	78.8	86.4	3.10	102	133	160	237	283	339	397	1.1	2.2	0.734	61.3	7.9	0.06	2
Calgary, Alta....	4	I	79.0	86.6	3.20	101	138	165	237	284	335	383	0.9	2.0	0.736	60.8	8.0	0.07	3
Edmonton, Alta...	3	I	80.6	86.8	3.04	107	137	161	228	275	343	400	1.1	1.3	0.734	61.3	8.0	0.05	11
Vancouver, B.C...	6	I	81.8	89.2	3.06	108	141	164	229	272	331	392	1.1	1.3	0.740	59.7	7.3	0.12	2
Average Group I	(57)		80.9	88.7	2.44	102	136	162	233	278	339	398	1.1	1.8	0.737	60.5	8.3	0.08	4
Halifax, N.S.....	5	II	78.7	86.0	2.33	98	135	164	243	288	347	405	1.0	1.9	0.740	59.7	8.9	0.13	4
Saint John, N.B..	5	II	79.9	85.8	2.33	103	139	166	242	285	342	402	1.1	2.0	0.739	60.0	8.6	0.11	2
Montreal, Que....	7	II	79.5	85.5	1.54	101	141	169	234	272	330	395	1.2	1.7	0.736	60.8	8.1	0.06	3
Ottawa, Ont.....	6	II	80.0	85.6	1.66	104	138	166	233	272	326	389	1.3	2.6	0.732	61.8	8.5	0.05	3
Toronto, Ont.....	6	II	79.5	85.6	1.94	103	134	162	230	272	331	392	1.1	2.7	0.735	61.0	8.6	0.05	5
Winnipeg, Man....	6	II	78.2	84.6	1.61	102	136	160	229	275	337	392	1.0	1.7	0.735	61.0	8.2	0.06	2
Regina, Sask.....	6	II	77.4	80.7	2.60	100	137	166	233	273	325	385	1.1	2.0	0.730	62.3	8.4	0.05	1
Calgary, Alta....	4	II	76.3	80.7	2.08	103	138	167	243	284	332	377	1.0	2.2	0.737	60.5	8.7	0.06	7
Edmonton, Alta...	4	II	76.5	80.7	1.68	103	140	166	241	289	349	401	1.0	2.0	0.738	60.2	8.5	0.05	6
Vancouver, B.C...	6	II	79.6	82.9	2.48	105	145	174	240	279	334	392	1.0	2.1	0.742	59.2	7.8	0.11	2
Average Group II	(55)		78.7	84.0	2.02	102	138	166	236	278	334	393	1.1	2.1	0.736	60.8	8.4	0.07	3
Average of all Samples.....	(112)	--	--	--	--	102	137	164	234	278	337	396	1.1	2.0	0.737	60.5	8.4	0.07	3

\*Millilitres per Imperial gallon.

\*\*Milligrams per 100 millilitres.

**TABLE III**  
**SUMMARY OF DATA OF GASOLINE SURVEY ANALYSES FOR CANADA FOR SUMMER 1952**

Test	GROUP I			GROUP II		
	Motor Minimum	Octane Average	No. 79 and above Maximum	Motor Minimum	Octane Average	No. 78 to 74 Maximum
Specific Gravity at 60°F.....	0.730	0.737	0.750	0.721	0.736	0.748
Gravity, degrees A.P.I.....	57.2	60.5	62.3	57.7	60.8	64.8
Reid Vapour Pressure, lb.....	6.6	8.3	10.8	6.6	8.4	10.1
Sulphur, per cent by wt.....	0.03	0.08	0.15	0.03	0.07	0.16
Gum, milligrams per 100 millilitres	1	4	24	1	3	12
Tetraethyllead, millilitres per Imperial gallon.....	1.24	2.44	3.58	0.86	2.02	3.37
Octane Number, Motor.....	77.3	80.9	84.8	75.4	78.7	82.1
Octane Number, Research.....	85.2	88.7	90.7	79.6	84.0	86.3
Distillation range, Initial Boiling Point, °F.....	94	102	112	93	102	111
5% evaporated, °F.....	106	119	132	107	120	134
10% evaporated, °F.....	124	136	150	126	138	158
20% evaporated, °F.....	148	162	177	150	166	192
30% evaporated, °F.....	171	186	203	174	191	213
50% evaporated, °F.....	217	233	248	218	236	258
70% evaporated, °F.....	251	278	296	253	278	305
90% evaporated, °F.....	307	339	351	305	334	362
95% evaporated, °F.....	338	366	386	332	360	386
End Point, °F.....	373	398	429	362	393	418
Residue, per cent by vol.....	0.5	1.1	1.4	0.8	1.1	1.5
Distillation loss, per cent by volume.....	0.3	1.8	3.4	0.8	2.1	4.0
Number of samples	-	57	-	-	55	-

TABLE IV

SUMMARY OF DATA OF GASOLINE SURVEY ANALYSES BY GROUPS FOR CANADA FOR SUMMERS, 1937 THROUGH 1952

Year	GROUP	No. of Octane No. Samples	Motor Octane No.	Research Octane No.	Tetra-ethyl-lead*	DISTILLATION RANGE, °F.						End Pt.	Res-idue %	Loss %	GRAVITY At 60°F.		Reid V.P. lb.	Sul-phur %	Gum	
						I. B. P.	Per 10	Cent 20	Evaporated 50	70	90				Spec-ific	Deg. A.P.I.				
1937	I	75 & above	14	77.6	--	--	99	144	173	246	291	344	392	1.1	1.9	0.740	59.7	8.2	--	--
1938	I	75 & above	14	77.8	--	--	100	145	174	246	287	337	391	0.9	1.5	0.739	60.0	8.2	--	--
1939	I	75 & above	13	77.4	--	--	100	142	175	248	291	342	394	1.0	2.0	0.741	59.5	8.3	--	--
1940*		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1941	I	77 & above	23	79.0	--	--	91	143	170	239	281	337	391	0.9	1.8	0.743	58.9	8.1	0.07	--
1942	I	78 to 75	32	76.9	--	--	97	135	163	237	281	341	394	1.0	2.0	0.736	60.8	9.0	0.05	--
1943	I	78 to 75	32	75.7	--	--	100	140	170	246	287	339	391	1.0	1.7	0.741	59.5	8.1	0.08	6
1944	I	76 to 74	45	74.8	--	--	100	143	177	255	298	352	403	1.2	1.8	0.745	58.4	8.0	0.07	4
1945	I	74 to 73	64	73.5	--	--	103	145	176	247	289	343	399	1.2	1.7	0.741	59.5	7.9	0.07	3
1946	I	77 & above	17	77.8	2.45	--	98	134	162	236	279	335	396	1.3	1.9	0.737	60.5	8.8	0.08	4
1947	I	78 & above	24	79.2	2.61	--	100	136	162	234	277	334	394	1.2	1.9	0.734	61.3	8.7	0.07	3
1948	I	78 & above	25	79.0	2.80	--	102	138	164	234	276	336	400	1.4	2.0	0.737	60.5	8.9	0.08	5
1949*		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1950	I	79 & above	62	80.0	87.2	2.78	97	137	163	233	279	339	395	1.2	0.9	0.738	60.2	8.4	0.09	6
1951*		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1952	I	79 & above	57	80.9	88.7	2.44	102	136	162	233	278	339	398	1.1	1.8	0.737	60.5	8.3	0.08	4
1937	II	74 to 65	39	70.1	--	--	98	145	175	251	296	345	391	1.0	1.9	0.741	59.5	7.9	--	--
1938	II	74 to 65	41	70.2	--	--	100	145	175	251	295	344	395	1.0	1.6	0.741	59.5	8.2	--	--
1939	II	74 to 65	43	70.3	--	--	99	141	173	249	292	344	392	0.9	2.1	0.739	60.0	8.4	--	--
1940*		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1941	II	76 to 70	53	73.6	--	--	100	141	173	244	288	341	395	1.0	1.9	0.741	59.5	8.4	0.06	--
1942	II	70 to 65	9	67.1	--	--	98	129	155	220	263	317	377	0.9	2.4	0.721	64.8	10.1	0.05	--
1943*		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1944	II	70 to 66	16	68.6	--	--	101	146	181	258	296	345	397	1.2	1.6	0.738	60.2	7.4	0.05	4
1945	II	70 to 66	21	68.5	--	--	103	145	177	251	290	343	405	1.4	1.7	0.739	60.0	7.9	0.06	5
1946	II	76 to 70	41	73.6	1.40	--	99	137	166	239	283	339	394	1.2	1.8	0.738	60.2	8.2	0.07	4
1947	II	77 to 70	37	75.0	1.42	--	102	139	166	239	283	339	396	1.1	1.8	0.737	60.5	8.5	0.07	4
1948	II	77 to 70	36	75.0	1.71	--	103	140	168	239	280	334	393	1.3	2.0	0.735	61.0	8.6	0.06	4
1949*		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1950	II	78 to 72	54	77.6	82.4	2.45	97	140	168	237	278	334	390	1.2	1.0	0.735	61.0	8.4	0.08	4
1951*		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1952	II	78 to 74	55	78.7	84.0	2.02	102	138	166	236	278	334	393	1.1	2.1	0.736	60.8	8.4	0.07	3

TABLE V

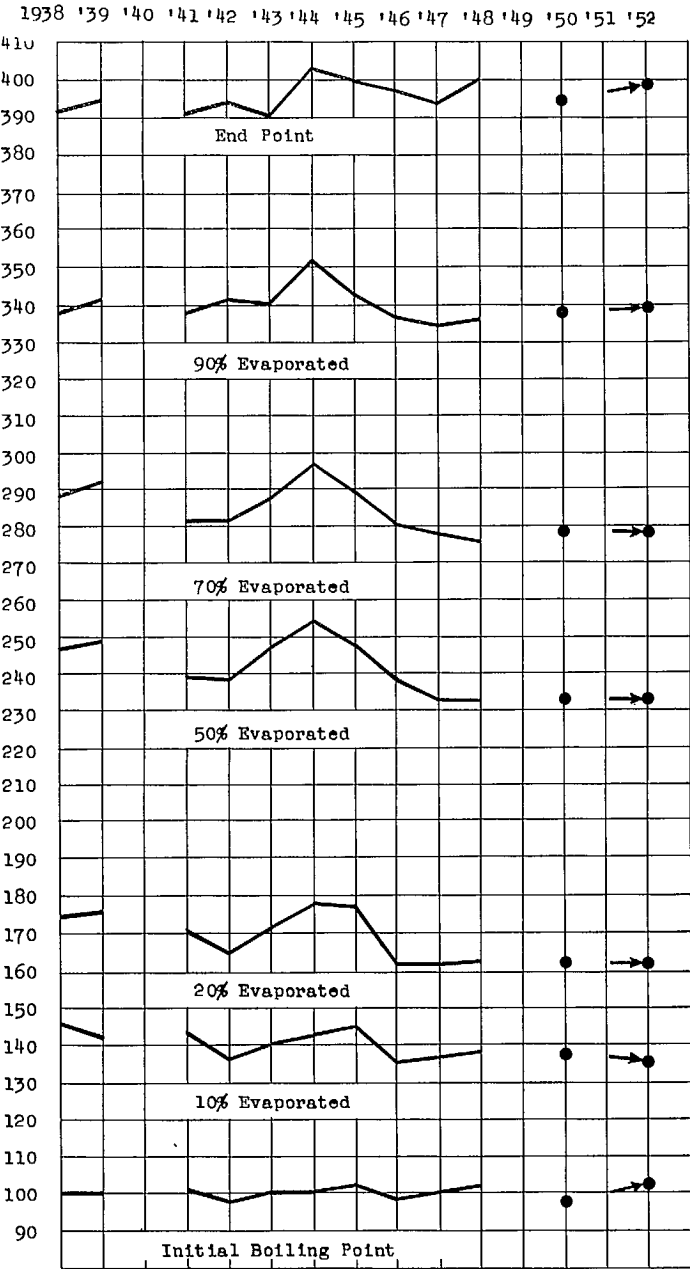
AVERAGE OF GASOLINE SURVEY ANALYSES FOR CANADA FOR SUMMERS, 1923 THROUGH 1952.

Year	DISTILLATION RANGE, °F.						End Pt.	Res-idue %	Loss %	GRAVITY At 60°F.		Reid V.P. lb.	Sul-phur %
	I. B. P.	Per 10	Cent 20	Evaporated 50	70	90				Spec-ific	Deg. A.P.I.		
1923	120	163	189	251	294	351	423	1.1	1.8	0.737	60.5	--	--
1924	113	169	192	246	285	341	410	1.1	1.5	0.736	60.8	--	--
1925	116	168	195	254	295	352	412	1.1	1.9	0.739	60.0	--	--
1926	110	158	187	253	296	354	410	1.1	1.5	0.739	60.0	--	--
1927	107	156	184	255	299	359	416	1.1	1.9	0.741	59.5	--	--
1928	107	155	182	251	294	353	409	1.1	1.6	0.737	60.5	--	--
1929	102	147	176	250	296	355	411	1.1	1.9	0.736	60.8	--	--
1930	101	149	178	250	297	356	406	1.1	1.7	0.741	59.5	--	0.07
1931	104	151	181	254	299	359	406	1.3	1.8	0.741	59.5	--	0.05
1932	102	151	181	251	297	357	408	1.2	0.9	0.742	59.2	7.4	--
1933	101	147	176	249	292	345	396	1.2	1.3	0.739	60.0	6.9	--
1934	101	144	172	244	287	346	395	1.2	1.3	0.738	60.2	7.5	--
1935	101	143	171	240	281	337	393	1.1	1.5	0.735	61.0	7.7	0.06
1936	101	145	173	242	283	335	388	1.0	1.4	0.736	60.8	7.7	--
1937	98	143	173	248	293	343	391	1.0	1.9	0.739	60.0	8.0	--
1938	99	145	174	248	291	342	393	0.9	1.6	0.740	59.7	8.2	--
1939	99	142	173	249	292	343	393	0.9	2.1	0.740	59.7	8.3	--
1940*		--	--	--	--	--	--	--	--	--	--	--	--
1941	101	143	172	243	285	338	392	0.9	1.9	0.741	59.5	8.2	0.06
1942	97	135	161	234	277	333	390	1.0	2.0	0.733	61.5	9.2	0.05
1943	100	140	170	246	287	339	391	1.0	1.7	0.741	59.5	8.1	0.08
1944	100	142	177	257	298	352	401	1.2	1.7	0.743	58.9	7.9	0.06
1945	103	144	175	247	289	345	401	1.2	1.7	0.740	59.7	7.9	0.07
1946	99	137	166	238	282	338	394	1.2	1.8	0.737	60.5	8.4	0.07
1947	101	138	165	237	280	337	395	1.1	1.9	0.736	60.8	8.6	0.07
1948	103	139	166	237	278	335	396	1.3	2.0	0.736	60.8	8.7	0.07
1949*		--	--	--	--	--	--	--	--	--	--	--	--
1950	97	138	165	235	279	337	394	1.2	0.9	0.737	60.5	8.4	0.09
1951*		--	--	--	--	--	--	--	--	--	--	--	--
1952	102	137	164	234	278	337	396	1.1	2.0	0.737	60.5	8.4	0.07

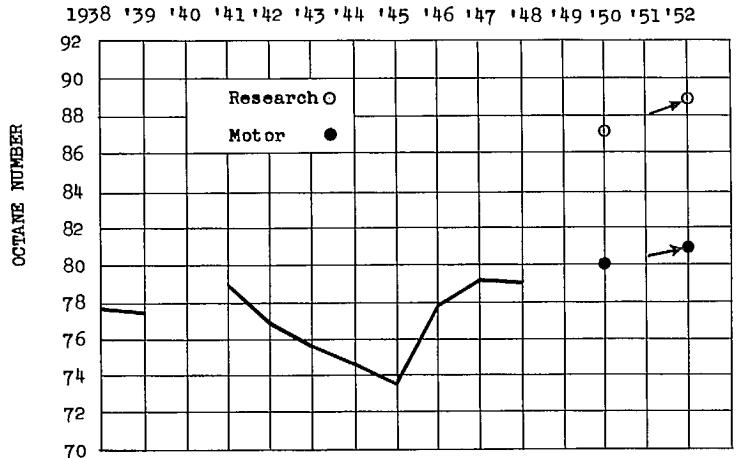
\*No survey.  
Millilitres per Imperial gallon.

Milligrams per 100 millilitres.  
Estimated.

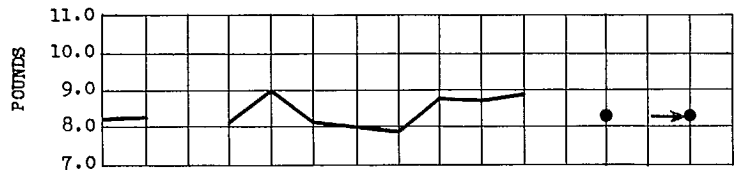
DISTILLATION RANGE



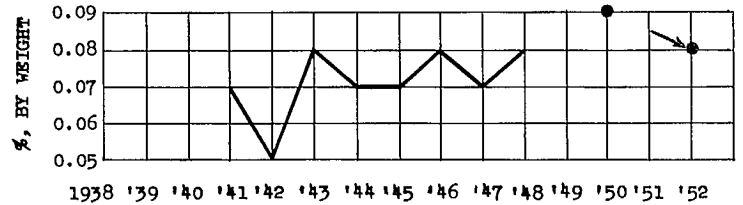
KNOCK RATING



REID VAPOUR PRESSURE



SULPHUR CONTENT



1938 '39 '40 '41 '42 '43 '44 '45 '46 '47 '48 '49 '50 '51 '52

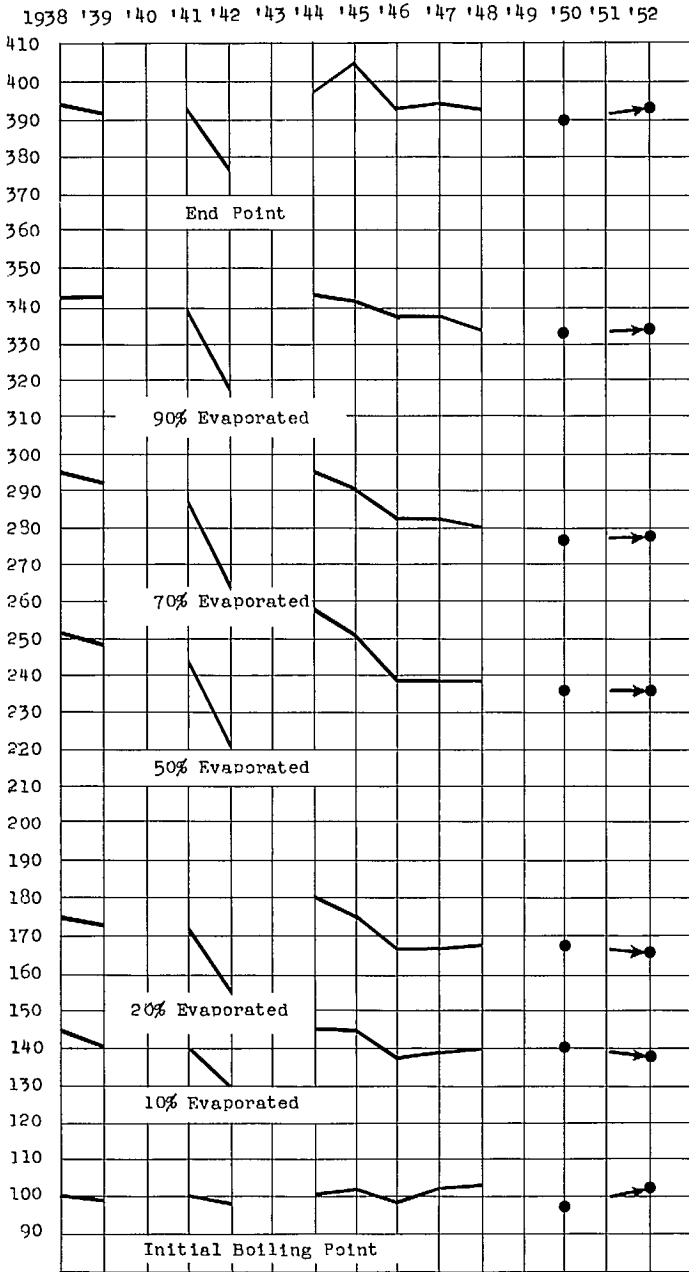
GROUP I GASOLINE

FIGURE I - COMPARISON OF GASOLINE CHARACTERISTICS FROM SUMMER

SURVEYS OF 1938 THROUGH 1952

NOTE: No Survey was made in 1940, 1949, and 1951, for Group I.

DISTILLATION RANGE



1938 '39 '40 '41 '42 '43 '44 '45 '46 '47 '48 '49 '50 '51 '52

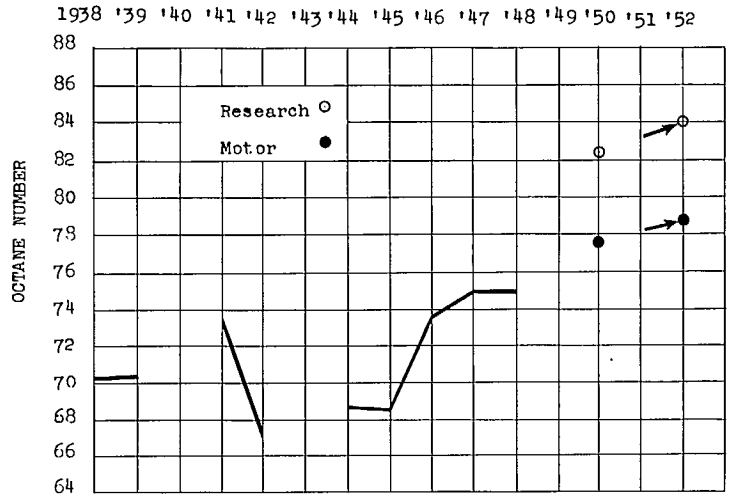
GROUP II GASOLINE

FIGURE II - COMPARISON OF GASOLINE CHARACTERISTICS FROM SUMMER

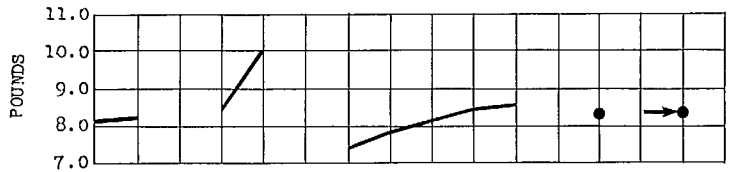
SURVEYS OF 1938 THROUGH 1952

NOTE: No Survey was made in 1940, 1943, 1949, and 1951, for Group II.

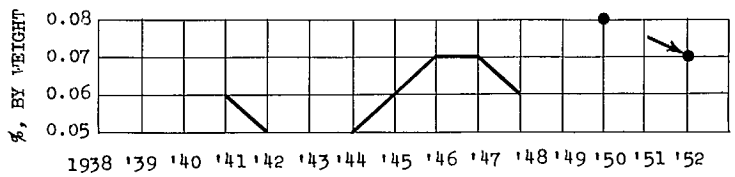
KNOCK RATING



REID VAPOUR PRESSURE



SULPHUR CONTENT



1938 '39 '40 '41 '42 '43 '44 '45 '46 '47 '48 '49 '50 '51 '52

