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REPORTS OF INVESTIGATIONS



TWENTIETH SEMI-ANNUAL MOTOR GASOLINE SURVEY



BY

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REPORTS OF INVESTIGATIONS

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TWENTIETH SEMIANNUAL MOTOR GASOLINE SURVEY<sup>1</sup>

By E. C. Lane,<sup>2</sup> S. S. Taylor,<sup>3</sup> and C. J. Wilhelm<sup>4</sup>

The motor gasoline that is being marketed in the United States this summer is slightly more volatile than that sold a year ago. This increase in volatility is shown by a general lowering of the average distillation range of about 2°F.

During the past 10 years the Bureau of Mines has made semiannual surveys of the gasoline marketed in the United States, the survey just completed being the twentieth in the series. The 12 cities in which samples were collected have been chosen as representative of the more important marketing territories, as it is obviously impracticable to obtain a sample of every gasoline sold in the entire country.

The results of the 20 surveys are summarized in Tables 1 and 2 -- the "summer" surveys in Table 1 and the "winter" surveys in Table 2. In Table 3 average results are given for the survey for each individual district.

As in the past there is a distinct difference between "summer" and "winter" gasoline; that marketed this summer is less volatile than that sold during the winter. This difference is large at the lower end of the distillation range but practically negligible at the 50 per cent point and above.

In comparison with last summer, gasoline samples from Boston, New York, Washington, Pittsburgh, and San Francisco show decided improvement in volatility whereas those from Laramie show a decided decrease in volatility.

Distillation curves representing the present Federal specification for United States motor gasoline and the average of all samples in the present survey are given in Figure 1. The samples were tested in accordance with methods described in Bureau of Mines Technical Paper 323B;<sup>5</sup> the barometric pressure in millimeters

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- 1 - The Bureau of Mines will welcome reprinting of this article, provided the following footnote acknowledgment is used: "Reprinted from U. S. Bureau of Mines Reports of Investigations 2959."
  - 2 - Assistant petroleum chemist, U. S. Bureau of Mines.
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  - 4 - Junior engineer, U. S. Bureau of Mines.
  - 5 - U. S. Bureau of Mines, United States Government Specification for Lubricants and Liquid Fuels and Methods for Testing, Federal Specifications Board, Specification No. 2d Tech. Paper 323B, 1927, 121 pp. Obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 15 cents.

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of mercury at the time of distillation is given as a matter of record, except in the samples from Laramie, Wyo., and Denver, Colo. The analyses for each of these cities have been corrected for the difference in altitude between the city and Bartlesville, Okla., where the analyses were made. All temperatures are shown in degrees Fahrenheit.

On June 9, 1929, the Federal Specifications Board revised the distillation requirements for United States Motor Gasoline, this revised specification to become mandatory on all Government Departments on September 8, 1929. The revised requirements are as follows:

Distillation Range. - Method 100.13. When 10 per cent has been recovered in the receiver, the thermometer shall not read more than 80 degrees C. (176 degrees F.) nor less than 50 degrees C. (122 degrees F.); provided that, for each per cent distillation loss less than 4 per cent, obtained in the A. S. T. M. distillation, the minimum 10 per cent temperature requirements shall be lowered 3 degrees C. (5.4 degrees F.). The Government reserves the right by proper provision in the contract or purchase order\* to lower the maximum 10 per cent point either 9 degrees F. or 18 degrees F. Administrative action in this respect may be taken by contracting officers to meet the temperature conditions under which the equipment must operate. (See Footnote 1).

Note 1. - Contracting officers are advised that in general the expectation of freezing temperatures warrants the lowest maximum 10 per cent temperature.

Note 2. - When U. S. Government Motor Gasoline is to be used for some special purpose, such as that requiring tropical storage, the Government reserves the right to raise the lower limit at the 10 per cent point to not higher than 60 degrees C. (140 degrees F.) with the same corrections for distillation loss as given above. This limit, however, should not be applied unless absolutely necessary, since the gasoline so procured is less satisfactory for general purposes.

\* Special attention is invited hereto.

When 50 per cent has been recovered in the receiver, the thermometer shall not read more than 140 degrees C. (284 degrees F.)

When 90 per cent has been recovered in the receiver, the thermometer shall not read more than 200 degrees C. (392 degrees F.)

The end point shall not be higher than 225 degrees C. (437 degrees F.)

At least 95 per cent shall be recovered as distillate in the receiver from the distillation.

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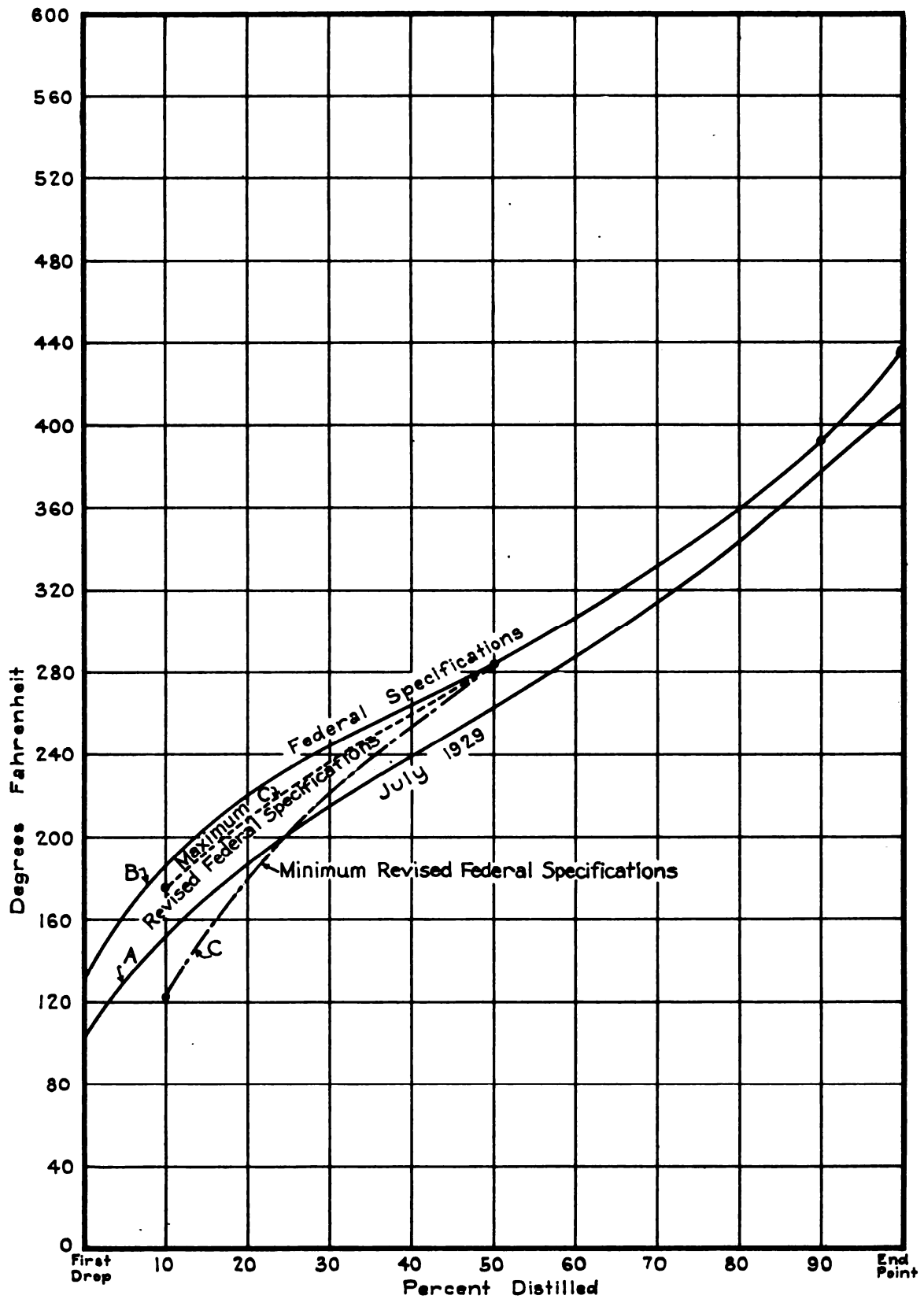


Figure 1.- Distillation curve of average gasoline. A, Average for July, 1929; B, present Federal specifications; C, revised Federal specifications, effective Sept. 11, 1929



In order to compare the new specifications with the old, as well as with the average distillation curve for the gasolines reported in this survey, the revised specification is shown as dotted curves in Figure I.

The 10 per cent temperatures of the individual samples are not included in Table 4, but the averages for each city are given below:

Average 10 per cent temperature for 12 cities		
City		Average 10 per cent temperature, °F.
Boston	(12 samples)	152
New York	(12 samples)	155
Washington	(18 samples)	158
Pittsburgh	(18 samples)	157
Chicago	(18 samples)	155
New Orleans	(12 samples)	159
St. Louis	(18 samples)	152
Bartlesville	(12 samples)	152
Omaha	(18 samples)	157
Denver	( 6 samples)	145
Laramie	( 6 samples)	154
San Francisco	(12 samples)	154
Average for 12 cities (162 samples)		155

A study of the analyses of the 162 samples shows that only four samples, one in Washington, two in Pittsburgh, and one in New Orleans, failed to pass the maximum 10 per cent temperature requirement of the new specification. The highest 10 per cent temperature recorded was 199°F., and this sample also failed to pass the 50 per cent temperature requirement. No temperature below 122°F. was recorded at the 10 per cent point, the nearest being 124°F. and 126°F.

Table 1. - Average Results of Motor Gasoline SurveysSummer

Survey	Specific gravity	Degrees A.P.I.	First drop	20%	50%	90%	End point	Average b.p.	Percentage recovered
July, 1920	0.749	57.4	130	208	268	388	446	277	96.7
July, 1921	.747	57.9	125	202	262	377	433	270	96.7
July, 1922	.752	56.8	121	208	270	375	429	273	96.8
July, 1923	.751	56.9	125	206	269	382	436	273	95.8
July, 1924	.751	56.9	107	200	271	390	431	273	96.0
July, 1925	.754	56.2	108	204	275	387	427	275	96.2
July, 1926	.750	57.2	100	194	266	382	421	267	95.7
July, 1927	.748	57.7	102	193	267	381	417	267	96.4
July, 1928	.748	57.7	100	190	265	380	413	265	96.1
July, 1929	.748	57.7	102	187	263	378	410	264	96.1
Average	0.750	57.2	112	199	268	382	426	270	96.5

Table 2. - Average Results of Motor Gasoline SurveysWinter

Survey	Specific gravity	Degrees A.P.I.	First drop	20%	50%	90%	End point	Average b.p.	Percentage recovered
Jan., 1920	0.748	57.7	119	200	259	369	427	264	96.6
Jan., 1921	.744	58.7	113	197	261	377	431	264	95.9
Jan., 1922	.745	58.4	102	200	267	377	430	268	96.0
Jan., 1923	.744	58.8	107	201	267	375	427	268	96.0
Jan., 1924	.748	57.7	96	196	267	383	431	268	96.2
Jan., 1925	.746	58.2	95	195	266	382	425	267	96.2
Jan., 1926	.747	57.9	93	189	264	380	423	264	96.3
Jan., 1927	.748	57.7	92	185	264	383	421	264	96.5
Jan., 1928	.747	57.9	90	181	261	378	416	260	96.5
Jan., 1929	.746	58.2	87	179	263	380	414	260	96.1
Average	0.746	58.2	99	192	264	378	425	265	96.2

Table 3. - Average Results of Motor Gasoline Survey, July, 1929

District	Specific gravity	Degrees A.P.I.	First drop	20%	50%	90%	End point	Average b.p.	Percentage recovered
Boston	0.746	58.2	100	185	259	364	399	257	96.3
New York	.743	58.9	106	189	264	371	405	261	96.0
Washington	.748	57.7	101	190	261	377	409	263	96.1
Pittsburgh	.749	57.4	101	188	257	378	410	261	95.9
Chicago	.746	58.2	102	186	265	382	413	265	96.1
New Orleans	.748	57.7	106	191	272	375	409	267	96.1
St. Louis	.743	58.9	101	185	268	388	419	268	96.3
Bartlesville	.741	59.5	102	183	270	389	421	270	95.6
Omaha	.745	58.4	107	188	265	379	412	265	96.8
Denver	.746	58.2	89	179	257	373	406	257	96.5
Laramie	.750	57.2	100	186	264	367	396	259	96.6
San Fran.	.753	56.4	99	189	260	378	410	262	96.0
Average	0.748	57.7	102	187	263	378	410	264	96.1



Table 4 -- Motor Gasoline Survey, July, 1929

Distillation data for samples from different cities, with average figures from each city.

Boston

Sample No.	Specific gravity	Degrees A.P.I.	First drop	20%	50%	90%	End point	Average b.p.	Percentage recovered	Bar., mm.
163	0.757	55.4	100	185	275	381	414	268	96.2	746
164	.747	57.9	99	187	273	376	421	265	96.5	746
165	.749	57.4	104	205	268	356	394	264	96.8	746
166	.750	57.2	104	205	273	356	390	266	97.0	746
167	.744	58.7	99	178	264	369	397	259	96.2	746
168	.750	57.2	99	192	271	385	412	269	96.6	746
169	.738	60.2	100	187	255	360	396	254	95.8	745
170	.744	58.7	93	176	253	358	378	249	94.8	744
171	.732	61.8	100	167	223	325	378	228	96.3	745
172	.758	55.2	99	193	279	401	424	277	95.8	745
173	.744	58.7	102	174	243	354	390	247	96.5	745
174	.743	58.9	100	165	234	349	399	238	97.0	745
Average	0.746	58.2	100	185	259	364	399	257	96.3	745

New York

175	0.745	58.4	108	192	268	383	424	270	96.2	744
176	.747	57.9	100	189	273	383	410	259	95.5	744
177	.751	56.9	111	208	280	376	417	275	97.0	744
178	.738	60.2	102	172	259	379	396	255	96.2	744
179	.743	58.9	97	189	275	392	424	271	94.0	744
180	.723	64.2	99	160	219	320	369	224	95.2	744
181	.747	57.9	109	201	277	367	392	269	96.9	744
182	.760	54.7	108	199	268	370	412	265	96.8	744
183	.751	56.9	108	203	275	376	417	271	96.9	744
184	.767	53.0	106	203	279	383	414	273	96.1	744
185	.741	59.5	111	189	252	363	401	257	96.8	744
186	.737	60.5	108	165	239	356	378	242	94.9	744
Average	0.743	58.9	106	189	264	371	405	261	96.0	744

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Table 4. -- Motor Gasoline Survey, July, 1929 - Continued

Washington

Sample No.	Specific gravity	Degrees A.P.I.	First drop	20%	50%	90%	End Point	Average b.p.	Percentage recovered	Bar., mm.
187	0.787	48.3	106	180	235	381	412	255	96.8	746
188	.753	56.4	93	198	264	397	424	272	95.0	746
189	.763	54.0	100	207	275	392	423	276	96.8	746
190	.789	47.8	117	185	230	381	415	257	97.3	746
191	.746	58.2	100	176	252	363	394	251	96.0	746
192	.741	59.5	95	189	252	367	399	259	95.5	746
193	.748	57.7	97	192	271	379	408	266	96.2	746
194	.762	54.2	106	210	273	388	423	276	97.0	746
195	.782	49.5	113	189	279	403	433	280	97.1	746
196	.740	59.7	99	189	268	363	399	261	96.2	746
197	.745	58.4	97	174	250	361	392	250	95.2	745
198	.744	58.7	100	199	273	365	392	266	97.0	745
199	.754	56.2	106	199	271	392	423	273	96.2	745
200	.751	56.9	100	194	268	385	414	267	95.8	745
201	.757	55.4	97	183	268	367	394	260	95.2	745
202	.723	64.2	97	190	271	379	417	266	96.0	745
203	.746	58.2	100	162	219	315	370	223	96.5	745
204	.738	60.2	95	203	277	403	428	278	94.5	745
Average	0.748	57.7	101	190	261	377	409	263	96.1	746

Pittsburgh

205	0.742	59.2	93	198	273	392	424	271	95.0	746
206	.749	57.4	97	172	248	338	424	257	95.7	746
207	.788	48.1	111	187	239	379	415	257	97.0	746
208	.770	52.3	111	214	282	387	412	298	97.0	746
209	.765	53.5	108	212	279	396	432	281	96.3	745
210	.745	58.4	99	192	275	379	419	269	95.9	745
211	.722	64.5	93	158	216	306	358	217	96.3	745
212	.741	59.5	99	183	266	378	412	262	96.2	745
213	.789	47.8	120	176	198	343	392	231	97.5	745
214	.740	59.7	95	190	268	381	408	266	96.0	745
215	.725	63.7	93	172	250	394	408	255	92.5	745
216	.758	55.2	97	203	266	388	410	276	95.5	745
217	.761	54.4	108	210	279	392	424	253	95.9	744
218	.775	51.1	104	176	225	381	415	250	96.2	744
219	.753	56.4	104	192	271	385	414	268	95.4	744
220	.739	60.0	100	187	264	370	396	261	96.0	744
221	.777	50.6	100	176	221	369	405	245	96.1	746
222	.746	58.2	90	190	230	396	417	272	95.1	746
Average	0.749	57.4	101	188	257	378	410	261	95.9	745

Table 4. -- Motor Gasoline Survey, July, 1929 - Continued

Chicago

Sample No.	Specific gravity	Degrees A.P.I.	First drop	20%	50%	90%	End Point	Average b.p.	Percentage recovered	Bar., mm.
223	0.787	48.3	106	180	266	397	426	271	96.7	742
224	.753	56.4	102	194	284	399	452	279	96.6	742
225	.748	57.7	99	187	275	396	417	270	96.0	742
226	.751	56.9	102	198	288	396	417	278	96.0	742
227	.748	57.7	106	189	253	378	417	260	95.3	742
228	.752	56.7	108	192	280	399	430	277	97.0	742
229	.745	58.4	104	189	264	355	405	262	95.7	742
230	.745	58.4	99	181	268	338	414	266	95.0	742
231	.748	57.7	102	198	279	378	396	270	95.9	742
232	.738	60.2	100	165	244	347	376	242	95.0	742
233	.739	60.0	99	185	279	405	433	274	95.1	742
234	.742	59.2	104	189	275	396	426	274	96.5	742
235	.744	58.7	99	191	273	381	415	268	95.0	742
236	.725	63.7	99	172	230	327	375	233	95.8	742
237	.741	59.5	97	183	268	385	417	264	95.9	742
238	.748	57.7	104	190	277	396	425	274	95.3	742
239	.781	49.7	106	176	232	335	417	248	95.5	742
240	.733	61.5	100	189	252	353	397	254	95.1	742
Average	0.746	58.2	102	186	265	382	413	265	96.1	742

New Orleans

241	0.730	62.3	97	175	237	335	381	258	96.0	745
242	.739	60.0	100	185	262	360	396	257	95.8	745
243	.769	52.5	104	201	279	376	403	273	96.0	745
244	.750	57.2	109	191	289	388	419	278	96.7	756
245	.750	57.2	104	190	284	383	414	274	96.3	745
246	.736	60.8	104	171	235	353	410	243	96.2	745
247	.745	58.4	104	183	266	372	406	260	95.2	745
248	.746	58.2	102	187	275	392	425	271	95.8	744
249	.747	57.9	108	194	264	370	417	265	97.1	744
250	.768	52.7	135	225	302	338	410	292	97.5	744
251	.748	57.7	104	191	282	381	405	271	95.0	744
252	.748	57.7	102	191	291	391	421	279	96.0	744
Average	0.748	57.7	106	191	272	375	409	267	96.1	745

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Table 4. -- Motor Gasoline Survey, July, 1929 - Continued

St. Louis

Sample No.	Specific gravity	Degrees A.P.I.	First drop	20%	50%	90%	End Point	Average b.p.	Percentage recovered	Bar. mm.
253	0.744	58.7	99	199	280	406	439	280	96.0	743
254	.739	60.0	93	174	252	349	381	247	96.0	743
255	.749	57.4	104	194	280	378	403	271	96.0	743
256	.747	57.9	109	205	273	387	415	274	96.8	743
257	.744	58.7	104	185	261	374	412	261	96.7	743
258	.746	53.2	106	189	286	397	428	278	95.9	743
259	.752	56.7	93	180	257	387	414	260	95.0	746
260	.723	64.2	95	154	226	383	424	243	96.6	746
261	.756	55.7	99	196	286	401	426	282	97.1	746
262	.744	58.7	100	185	280	414	435	279	95.8	746
263	.744	58.7	99	183	261	374	406	259	95.9	746
264	.768	52.7	109	169	253	394	428	264	97.4	746
265	.739	60.0	99	178	259	369	405	257	96.5	746
266	.747	57.9	102	133	279	406	433	276	96.5	746
267	.745	58.4	97	187	284	405	433	278	96.1	745
268	.736	60.8	102	130	259	365	399	265	96.2	745
269	.747	57.9	106	190	282	405	435	279	96.3	745
270	.747	57.9	104	199	271	381	419	271	96.8	745
Average	0.743	58.9	101	185	268	388	419	268	96.3	745

Bartlesville

271	0.725	63.7	100	160	230	385	419	276	96.2	748
272	.739	60.0	106	185	271	397	433	272	96.3	748
273	.744	58.7	104	203	270	387	423	273	96.0	747
274	.744	58.7	97	196	270	396	424	274	95.0	747
275	.747	57.9	100	176	268	385	417	265	95.5	747
276	.739	60.0	95	174	297	408	448	279	95.0	747
277	.741	59.5	99	187	270	379	410	265	95.3	747
278	.739	60.0	103	198	253	356	396	257	96.8	747
279	.748	57.7	106	190	286	410	437	282	96.0	747
280	.746	58.2	99	178	273	392	424	269	95.0	747
281	.736	60.8	102	183	250	369	399	257	95.2	747
282	.746	58.2	102	199	293	399	426	282	95.4	747
Average	0.741	59.5	102	186	270	389	421	270	95.6	747

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Table 4. -- Motor Gasoline Survey, July, 1929, - Continued

Omaha

Sample No.	Specific gravity	Degrees A.P.I.	First drop	20%	50%	90%	End Point	Average b.p.	Percentage recovered	Bar. mm.
283	0.739	60.0	100	194	271	394	426	272	95.9	745
284	.751	56.9	99	176	271	405	435	271	95.8	745
285	.741	59.5	103	185	266	373	410	264	96.2	745
286	.725	63.7	100	167	223	306	358	224	95.5	745
287	.752	56.7	108	160	234	381	417	250	96.8	745
288	.747	57.9	104	205	289	401	423	284	96.0	745
289	.756	55.7	108	196	279	405	433	281	96.7	745
290	.743	58.9	106	190	266	397	439	271	96.1	745
291	.746	58.2	111	199	273	372	401	268	96.6	745
292	.742	59.2	106	185	284	392	412	273	95.8	745
293	.743	58.9	108	190	284	388	417	274	95.8	745
294	.745	58.4	113	205	271	385	415	272	96.0	745
295	.740	59.7	108	203	259	358	396	261	96.5	744
296	.735	60.8	102	180	250	345	397	247	96.6	744
297	.750	57.2	104	180	270	397	430	271	96.0	744
298	.752	56.7	120	196	268	372	406	267	98.0	744
299	.746	58.2	106	183	255	376	417	269	95.3	744
300	.750	57.2	109	192	261	372	415	265	96.9	744
Average	0.745	58.4	107	183	265	379	412	265	96.8	745

Denver<sup>1</sup>

301	0.744	58.7	84	180	260	368	402	255	95.3	
302	.747	57.9	84	189	257	375	399	260	96.6	
303	.742	59.2	88	174	242	357	402	246	96.8	
304	.737	60.5	84	156	239	384	418	250	96.5	
305	.755	55.9	93	189	277	383	412	268	96.8	
306	.750	57.2	99	188	266	372	402	262	96.9	
Average	0.746	58.2	89	179	257	373	406	257	96.5	

1 - Distillation data corrected for difference in altitude between this city and Bartlesville, Okla.

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Table 4. -- Motor Gasoline Survey, July, 1929 - Continued

Laramie<sup>1</sup>

Sample No.	Specific gravity	Degrees A.P.I.	First drop	20%	50%	90%	End point	Average b.p.	Percentage recovered	Bar., mm.
307	0.751	56.9	103	187	265	372	396	251	97.0	
308	.751	56.9	108	139	264	367	396	261	97.0	
309	.751	56.9	103	185	264	355	396	259	96.8	
310	.751	56.9	101	189	267	367	399	262	97.0	
311	.744	53.7	90	177	258	365	390	253	95.0	
312	.751	56.9	96	187	265	365	397	259	96.8	
Average	0.750	57.2	100	186	264	367	396	259	96.6	

San Francisco District<sup>2</sup>

313	0.755	55.9	97	194	270	399	426	272	95.6	742
314	.759	54.9	100	194	268	383	417	268	96.0	742
315	.764	53.7	97	193	282	379	417	255	96.2	744
316	.751	56.9	95	199	261	369	401	260	96.0	744
317	.764	53.7	99	201	258	405	428	278	95.9	744
318	.740	59.7	100	165	226	325	372	230	97.1	744
319	.754	56.2	97	196	275	590	412	271	95.5	744
320	.745	53.4	99	171	255	333	410	256	94.9	744
321	.752	56.7	97	189	264	390	415	255	95.2	744
322	.749	57.4	106	185	261	365	394	258	96.4	744
323	.751	56.9	100	194	255	363	401	259	96.7	744
324	.748	57.7	97	181	259	383	424	261	95.0	744
Average	0.753	56.4	99	189	260	378	410	262	96.0	744

1 - Distillation data corrected for difference in altitude between this city and Bartlesville, Oklahoma.

2 - Including Berkeley and Oakland.

Table 5.-- Comparison of July, 1928, and July, 1929, surveys

District	Date	First Drop	20%	50%	90%	End point	Average b.p.
Boston	July, 1928	99	196	269	375	410	266
	July, 1929	100	185	259	364	399	257
	Difference	+1	-11	-10	-11	-11	-9
New York	July, 1928	100	193	267	378	412	265
	July, 1929	106	189	264	371	405	261
	Difference	+6	-4	-3	-7	-7	-4
Washington	July, 1928	107	192	259	382	415	266
	July, 1929	101	190	261	377	409	263
	Difference	-6	-2	+2	-5	-6	-3
Pittsburgh	July, 1928	102	191	262	382	413	264
	July, 1929	101	188	257	378	410	261
	Difference	-1	-3	-5	-4	-3	-3
Chicago	July, 1928	97	189	265	381	411	265
	July, 1929	102	186	265	382	413	265
	Difference	+5	-3	---	+1	+2	---
New Orleans	July, 1928	101	187	269	382	415	266
	July, 1929	106	191	272	375	409	267
	Difference	+5	+4	+3	-7	-6	+1
St. Louis	July, 1928	100	191	271	384	413	268
	July, 1929	101	185	268	388	419	268
	Difference	+1	-6	-3	+4	+6	---
Bartlesville	July, 1928	101	185	269	385	420	267
	July, 1929	102	186	270	389	421	270
	Difference	+1	+1	+1	+4	+1	+3
Omaha	July, 1928	101	187	266	384	412	266
	July, 1929	107	188	265	379	412	265
	Difference	+6	+1	-1	-5	---	-1
Denver	July, 1928	90	181	255	363	402	254
	July, 1929	89	179	257	373	406	257
	Difference	-1	-2	+2	+10	+4	+3
Laramie	July, 1928	89	173	245	350	390	244
	July, 1929	100	186	264	367	396	259
	Difference	+11	+13	+19	-17	+6	+15
San Francisco	July, 1928	102	197	269	337	414	268
	July, 1929	99	189	260	378	410	262
	Difference	-3	-8	-9	-9	-4	-6

Table 6. -- Comparison of January, 1929, and July, 1929,  
Surveys -- Continued

District	Date	First drop	20%	50%	90%	End point	Average b.p.
Boston	Jan., 1929	88	183	266	369	408	260
	July, 1929	100	185	259	364	399	257
	Difference	+12	+2	-7	-5	-9	-3
New York	Jan., 1929	86	181	255	376	410	259
	July, 1929	106	189	264	371	405	261
	Difference	+20	+8	-1	+5	-5	-2
Washington	Jan., 1929	93	185	258	372	410	259
	July, 1929	101	190	261	377	409	263
	Difference	+8	+5	-3	+5	-5	+4
Pittsburgh	Jan., 1929	90	184	256	378	412	259
	July, 1929	101	188	257	378	410	261
	Difference	+11	+4	+1	---	-2	+2
Chicago	Jan., 1929	86	175	262	334	413	259
	July, 1929	102	186	265	332	413	265
	Difference	+16	+11	+3	-2	---	+6
New Orleans	Jan., 1929	83	182	275	381	415	266
	July, 1929	106	191	272	375	409	267
	Difference	+18	+9	-3	-6	-6	+1
St. Louis	Jan., 1929	85	177	268	390	418	264
	July, 1929	101	185	268	338	419	268
	Difference	+16	+8	---	-2	+1	+4
Bartlesville	Jan., 1929	87	175	267	392	421	264
	July, 1929	102	186	270	389	421	270
	Difference	+15	+11	+3	-3	---	+6
Omaha	Jan., 1929	84	175	264	335	418	261
	July, 1929	107	188	265	379	412	265
	Difference	+23	+13	+1	-6	-6	+4
Denver	Jan., 1929	80	174	259	371	404	254
	July, 1929	89	179	257	373	406	257
	Difference	+9	+5	-2	+2	+2	+3
Laramie	Jan., 1929	77	161	247	359	399	243
	July, 1929	100	186	264	367	396	259
	Difference	+23	+25	+17	+8	-3	+16
San Francisco	Jan., 1929	89	185	264	384	420	263
	July, 1929	99	189	260	378	410	262
	Difference	+10	+4	-4	-6	-10	-1