

SR 622(2b)
C 212ms

Dept. of Mines & Resources
MINES BRANCH
AUG 1 1969 ✓
LIBRARY
OTTAWA, CANADA.

MEMORANDUM SERIES
MINES BRANCH,
DEPARTMENT OF MINES,
OTTAWA, CANADA. 1928

No. 31

By
P. V. Rosewarne (1) and R. J. Offord (2)

GASOLINE SURVEY FOR 1927

An annual survey of the gasoline used in Canada has been conducted by the Fuels and Fuel Testing Division of the Mines Branch during the past four years. (1) This report covers a similar survey for 1927. During the latter part of August, 83 samples were collected (2) from wholesalers or distributors in the following cities: Halifax, St. John, Quebec, Montreal, Ottawa, Toronto, London, Winnipeg, Regina, Calgary, Edmonton, Vancouver, and Victoria. These samples were tested for distillation range and specific gravity. The distillation range was determined according to the method recommended by the United States Bureau of Mines. (3) From the results so obtained, a weighted index number was calculated after the method advised by the Bureau of Mines. (4) The difference that the index numbers were calculated from was the distillation range expressed in °F. instead of from temperature expressed in °C. as was done by Gross. The specific gravities were obtained by the pycnometrical method at room temperature and the results calculated

Memorandum Series
No. 31
April, 1928.

This document was produced by scanning the original publication.
Ce document est le produit d'une numérisation par balayage de la publication originale.

MINES BRANCH
DEPARTMENT OF MINES, OTTAWA, CANADA.

Memorandum Series

April, 1928.

No. 31

GASOLINE SURVEY FOR 1927

By

P. V. Rosowarne (1) and R. J. Offord (2)

An annual survey of the gasoline sold in Canada has been conducted by the Fuels and Fuel Testing Division of the Mines Branch during the past four years. (3) This report covers a similar survey for 1927. During the latter part of August, 83 samples were collected (4) from wholesalers or distributors in the following cities: Halifax, St. John, Quebec, Montreal, Ottawa, Toronto, London, Winnipeg, Regina, Calgary, Edmonton, Vancouver, and Victoria. These samples were tested for distillation range and specific gravity. The distillation range was determined according to the method recommended by the United States Bureau of Mines. (5) From the results so obtained, a weighted index number was calculated after the method advocated by Gruse (6), with the difference that the index numbers were calculated from temperatures of the distillation range expressed in $^{\circ}\text{F}$. instead of from temperatures expressed in $^{\circ}\text{C}$. as was done by Gruse. The specific gravities were obtained by the Westphal balance at room temperature and the results calculated (7) to 60°F .

TABLE 1 - RESULTS OF ANALYSES

| Sample No. | Brand | 1st Drop F. | DISTILLATION RANGE | | | | | End Point | Recov-ory | Index No. °F. | Specific Gravity | |
|-----------------------|-------------|-------------|--------------------|---------|---------|---------|---------|-----------|-----------|---------------|------------------|--------|
| | | | 10% °F. | 20% °F. | 50% °F. | 70% °F. | 90% °F. | | | | | |
| <u>HALIFAX, N.S.</u> | | | | | | | | | | | | |
| 1. | Red Seal | (a) | 122 | 188 | 222 | 276 | 324 | 380 | 430 | 97.5 | 1822 | 0.7665 |
| 2. | Premier | (b) | 128 | 189 | 218 | 284 | 328 | 400 | 450 | 97. | 1869 | 0.7575 |
| 3. | White Rose | (a) | 97 | 144 | 170 | 248 | 294 | 370 | 431 | 97. | 1657 | 0.7262 |
| Average | | | 116 | 174 | 203 | 270 | 315 | 383 | 437 | 97.2 | 1783 | 0.7438 |
| <u>ST. JOHN, N.B.</u> | | | | | | | | | | | | |
| 4. | Premier | (b) | 120 | 182 | 212 | 270 | 310 | 368 | 416 | 97. | 1758 | 0.7530 |
| 5. | Fundy | (c) | 94 | 133 | 158 | 233 | 231 | 357 | 408 | 96. | 1570 | 0.7269 |
| 6. | White Rose | (a) | 106 | 160 | 190 | 268 | 316 | 371 | 420 | 97.5 | 1725 | 0.7335 |
| Average | | | 107 | 158 | 187 | 257 | 302 | 365 | 415 | 96.8 | 1684 | 0.7597 |
| <u>QUEBEC</u> | | | | | | | | | | | | |
| 7. | Aviation | (d) | 100 | 140 | 163 | 232 | 279 | 340 | 395 | 97. | 1549 | 0.7240 |
| 8. | Peerless | (e) | 96 | 140 | 170 | 242 | 292 | 364 | 406 | 95.5 | 1614 | 0.7230 |
| 9. | Premier | (b) | 125 | 178 | 207 | 272 | 314 | 363 | 420 | 98. | 1754 | 0.7510 |
| 10. | Super-Power | (e) | 112 | 165 | 198 | 268 | 310 | 371 | 420 | 97. | 1732 | 0.7460 |
| 11. | Ethyl | (b) | 119 | 170 | 197 | 254 | 298 | 354 | 402 | 97.5 | 1675 | 0.7555 |
| 12. | Red Seal | (a) | 110 | 166 | 198 | 270 | 312 | 371 | 426 | 97. | 1743 | 0.7455 |
| Average | | | 110 | 160 | 189 | 256 | 301 | 361 | 412 | 97. | 1678 | 0.7403 |
| <u>MONTREAL</u> | | | | | | | | | | | | |
| 13. | Aviation | (d) | 98 | 142 | 164 | 230 | 275 | 336 | 394 | 98. | 1541 | 0.7255 |
| 14. | Blue Sunoco | (f) | 110 | 174 | 202 | 273 | 318 | 383 | 436 | 98. | 1786 | 0.7625 |
| 15. | Ethyl | (b) | 108 | 160 | 185 | 264 | 302 | 350 | 399 | 98. | 1660 | 0.7430 |
| 16. | Super-Power | (e) | 100 | 154 | 180 | 256 | 294 | 362 | 427 | 97. | 1673 | 0.7385 |
| 17. | Peerless | (e) | 106 | 158 | 180 | 234 | 266 | 320 | 382 | 97.5 | 1540 | 0.7245 |
| 18. | Premier | (b) | 106 | 166 | 196 | 270 | 320 | 371 | 426 | 98. | 1749 | 0.7495 |
| 19. | Tidoute | (c) | 110 | 154 | 176 | 238 | 284 | 354 | 410 | 97.5 | 1616 | 0.7240 |
| 20. | Shell | (d) | 97 | 145 | 184 | 250 | 296 | 353 | 396 | 96. | 1624 | 0.7325 |
| Average | | | 104 | 157 | 183 | 252 | 294 | 354 | 409 | 97.5 | 1649 | 0.7373 |

(a) Canadian Oil Companies, Limited; (b) Imperial Oil, Limited; (c) Canadian Independent Oil, Limited; (d) Shell Oil Company, Limited; (e) British American Oil Company, Limited; (f) Sun Oil Company, Limited; (g) Tidoute Refining Company, Limited; (h) McColl Bros., Limited; (j) Frontenac Oil Company; (k) Supertest Petroleum Corporation; (l) Beach Motors; (m) Hull Iron and Steel; (n) Cities Service Oil Company, Limited; (o) Union Oil of Pennsylvania (Canadian Division); (p) Perfection Petroleum Company, Limited; (q) North Star Oil and Refining Company, Limited; (r) Western Oil Company; (s) Prairie City Oil Company; (t) Puritan Oil Company; (u) Union Oil Company, Limited; (v) Maple Leaf Oil and Refining Company, Limited; (x) Alberta Refining Company, Limited; (y) Vancouver Oil Company, Limited; (z) General Oil Company, Limited.

TABLE 1 - RESULT OF ANALYSES (CONT'D).

| Sample No. | Brand | DISTILLATION RANGE | | | | | | | | Recov-ery. | Index No. °F. | Specific Gravity |
|----------------------|-----------------|--------------------|---------|---------|---------|---------|---------|-----------|-----|------------|---------------|------------------|
| | | 1st Drop °F. | 10% °F. | 20% °F. | 50% °F. | 70% °F. | 90% °F. | End Point | | | | |
| <u>OTTAWA, ONT.</u> | | | | | | | | | | | | |
| 21. | Premier | (b) | 116 | 174 | 204 | 264 | 306 | 363 | 412 | 97.5 | 1723 | 0.7480 |
| 22. | Ethyl | (b) | 110 | 155 | 184 | 260 | 302 | 355 | 398 | 96.5 | 1654 | 0.7405 |
| 23. | Poorless | (o) | 111 | 157 | 180 | 233 | 269 | 325 | 381 | 97. | 1545 | 0.7245 |
| 24. | British Motor | (e) | 122 | 182 | 207 | 268 | 307 | 367 | 420 | 97. | 1751 | 0.7495 |
| 25. | Aviation | (d) | 100 | 148 | 179 | 258 | 310 | 378 | 427 | 96.5 | 1700 | 0.7420 |
| 26. | Shell | (d) | 102 | 152 | 181 | 264 | 320 | 382 | 427 | 96. | 1726 | 0.7400 |
| 27. | White Rose | (a) | 97 | 143 | 176 | 263 | 314 | 391 | 427 | 95. | 1714 | 0.7315 |
| 28. | Red Seal | (a) | 120 | 177 | 206 | 268 | 310 | 367 | 425 | 97.5 | 1753 | 0.7460 |
| 29. | Marathon | (h) | 101 | 148 | 176 | 244 | 295 | 370 | 413 | 96. | 1646 | 0.7265 |
| 30. | Cycle | (j) | 101 | 140 | 168 | 263 | 344 | 399 | 423 | 96. | 1737 | 0.7610 |
| 31. | Frontenac | (j) | 116 | 172 | 200 | 266 | 306 | 364 | 420 | 97. | 1728 | 0.7470 |
| 32. | Supertest (HC) | (k) | 110 | 152 | 172 | 224 | 260 | 328 | 406 | 97. | 1542 | 0.7275 |
| 33. | Supertest | (k) | 120 | 175 | 202 | 262 | 306 | 364 | 424 | 97.5 | 1733 | 0.7460 |
| 34. | Sumoco (HT) | (f) | 100 | 154 | 176 | 238 | 279 | 352 | 430 | 98. | 1629 | 0.7165 |
| 35. | Sumoco (LT) | (f) | 106 | 155 | 184 | 242 | 288 | 364 | 434 | 96.5 | 1667 | 0.7240 |
| 36. | Beach (SQ) | (l) | 108 | 156 | 174 | 226 | 262 | 328 | 409 | 97. | 1555 | 0.7265 |
| 37. | Super-Service | (m) | 110 | 154 | 174 | 224 | 262 | 327 | 398 | 97. | 1539 | 0.7255 |
| 38. | Cities-Sor (HT) | (n) | 101 | 142 | 166 | 220 | 257 | 315 | 376 | 97.5 | 1476 | 0.7155 |
| 39. | Cities-Sor (LT) | (n) | 110 | 160 | 186 | 244 | 284 | 348 | 408 | 97. | 1630 | 0.7355 |
| Average | | | 108 | 150 | 184 | 249 | 294 | 357 | 414 | 96.8 | 1655 | 0.7362 |
| <u>TORONTO, ONT.</u> | | | | | | | | | | | | |
| 40. | Premier | (b) | 109 | 160 | 195 | 272 | 320 | 380 | 428 | 97.5 | 1755 | 0.7475 |
| 41. | Light | (j) | 100 | 156 | 188 | 258 | 294 | 356 | 420 | 97. | 1672 | 0.7265 |
| 42. | Perfection | (p) | 100 | 148 | 170 | 236 | 277 | 340 | 402 | 97. | 1573 | 0.7245 |
| 43. | Blue Sumoco | (f) | 100 | 140 | 166 | 238 | 292 | 376 | 421 | 96.5 | 1633 | 0.7635 |
| 44. | City Service | (n) | 96 | 150 | 178 | 260 | 310 | 368 | 414 | 97. | 1680 | 0.7330 |
| 45. | Marathon | (h) | 97 | 146 | 182 | 276 | 336 | 394 | 421 | 96.5 | 1755 | 0.7385 |
| 46. | White Rose | (a) | 88 | 129 | 159 | 257 | 312 | 389 | 430 | 95. | 1676 | 0.7245 |
| 47. | Aviation | (d) | 105 | 156 | 183 | 246 | 289 | 339 | 370 | 97. | 1583 | 0.7285 |
| Average | | | 99 | 148 | 178 | 255 | 304 | 368 | 413 | 96.7 | 1666 | 0.7356 |
| <u>LONDON, ONT.</u> | | | | | | | | | | | | |
| 48. | Red Seal | (a) | 110 | 182 | 215 | 282 | 322 | 374 | 419 | 97.5 | 1794 | 0.7485 |
| 49. | Marathon | (h) | 96 | 148 | 170 | 230 | 272 | 336 | 394 | 97. | 1550 | 0.7225 |
| 50. | Aviation | (d) | 94 | 144 | 170 | 240 | 282 | 334 | 371 | 96.5 | 1541 | 0.7235 |
| 51. | High Test | | 106 | 158 | 194 | 280 | 332 | 392 | 434 | 96.5 | 1790 | 0.7400 |
| 52. | Super-Power | (e) | 114 | 173 | 200 | 269 | 312 | 365 | 412 | 97.2 | 1731 | 0.7415 |
| 53. | Shell | (d) | 96 | 154 | 184 | 252 | 298 | 354 | 386 | 97. | 1628 | 0.7320 |
| 54. | Premier | (b) | 110 | 171 | 199 | 270 | 312 | 365 | 411 | 97. | 1728 | 0.7400 |
| 55. | Supertest | (k) | 124 | 190 | 217 | 285 | 322 | 373 | 418 | 97. | 1806 | 0.7435 |
| Average | | | 107 | 165 | 194 | 264 | 307 | 362 | 406 | 97. | 1696 | 0.7372 |

TABLE 1 - RESULT OF ANALYSES (CONT'D)

| Sample No. | Brand | 1st Drop °F. | DISTILLATION RANGE | | | | | End Point | Recovery | Index No. °F. | Specific Gravity |
|-------------------------|----------------|--------------|--------------------|---------|--------|---------|---------|-----------|----------|---------------|------------------|
| | | | 10% °F. | 20% °F. | 50% °R | 70% °F. | 90% °F. | | | | |
| <u>WINNIPEG, MAN.</u> | | | | | | | | | | | |
| 56. | White Rose | (a) 96 | 140 | 168 | 252 | 304 | 378 | 436 | 96.5 | 1678 | 0.7375 |
| 57. | British Motor | (e) 110 | 172 | 200 | 270 | 312 | 366 | 414 | 97. | 1734 | 0.7405 |
| 58. | North Star | (q) 99 | 146 | 172 | 236 | 276 | 330 | 379 | 97. | 1539 | 0.7210 |
| 59. | Fyro Drop | (r) 108 | 169 | 198 | 265 | 306 | 360 | 410 | 97.2 | 1708 | 0.7385 |
| 60. | Ethyl | (b) 110 | 167 | 194 | 258 | 295 | 347 | 400 | 97.2 | 1661 | 0.7390 |
| 61. | Buffalo | (s) 92 | 136 | 162 | 242 | 302 | 382 | 423 | 96. | 1652 | 0.7230 |
| Average | | 102 | 155 | 182 | 254 | 299 | 361 | 411 | 96.8 | 1662 | 0.7333 |
| <u>REGINA, SASK.</u> | | | | | | | | | | | |
| 62. | British Motor | (e) 100 | 170 | 199 | 273 | 317 | 382 | 432 | 97.2 | 1773 | 0.7470 |
| 63. | Maple Leaf | (t) 118 | 178 | 205 | 290 | 340 | 400 | 436 | 97. | 1849 | 0.7505 |
| 64. | White Rose | (a) 96 | 130 | 158 | 244 | 296 | 372 | 438 | 96. | 1638 | 0.7230 |
| 65. | Imperial | (b) 116 | 177 | 204 | 274 | 318 | 386 | 442 | 97. | 1801 | 0.7455 |
| Average | | 108 | 164 | 192 | 270 | 318 | 385 | 437 | 96.8 | 1765 | 0.7418 |
| <u>CALGARY, ALTA.</u> | | | | | | | | | | | |
| 66. | Union | (u) 106 | 166 | 195 | 266 | 311 | 379 | 428 | 97. | 1745 | 0.7545 |
| 67. | Maple Leaf | (w) 116 | 176 | 204 | 286 | 338 | 398 | 432 | 97.5 | 1836 | 0.7490 |
| 68. | Sun Shine | (x) 130 | 182 | 204 | 268 | 313 | 378 | 432 | 97.7 | 1777 | 0.7410 |
| 69. | Premier | (b) 102 | 160 | 192 | 278 | 322 | 384 | 426 | 97. | 1762 | 0.7465 |
| Average | | 114 | 172 | 199 | 275 | 321 | 385 | 430 | 97.3 | 1780 | 0.7478 |
| <u>EDMONTON, ALTA.</u> | | | | | | | | | | | |
| 70. | North Star | (q) 100 | 160 | 191 | 280 | 328 | 385 | 422 | 97.2 | 1766 | 0.7465 |
| 71. | British Motor | (e) 108 | 164 | 196 | 282 | 332 | 388 | 430 | 97. | 1792 | 0.7470 |
| 72. | White Rose | (a) 116 | 169 | 188 | 244 | 280 | 345 | 409 | 98. | 1635 | 0.7205 |
| 73. | Premier | (b) 106 | 166 | 200 | 279 | 326 | 380 | 420 | 97. | 1771 | 0.7475 |
| Average | | 108 | 165 | 194 | 271 | 317 | 375 | 420 | 97.3 | 1741 | 0.7424 |
| <u>VANCOUVER, B. C.</u> | | | | | | | | | | | |
| 74. | Premier | (b) 116 | 175 | 200 | 250 | 296 | 366 | 420 | 97.5 | 1707 | 0.7575 |
| 75. | Union | (u) 104 | 164 | 202 | 272 | 317 | 385 | 432 | 97. | 1772 | 0.7573 |
| 76. | Shell | (d) 112 | 172 | 203 | 260 | 304 | 360 | 402 | 97. | 1701 | 0.7535 |
| 77. | Northern Light | (y) 110 | 168 | 190 | 256 | 306 | 373 | 415 | 97. | 1708 | 0.7485 |
| 78. | General | (z) 99 | 162 | 201 | 271 | 321 | 387 | 425 | 96.5 | 1767 | 0.7500 |
| Average | | 108 | 168 | 199 | 262 | 309 | 374 | 419 | 97. | 1731 | 0.7550 |
| <u>VICTORIA, B. C.</u> | | | | | | | | | | | |
| 79. | Union | (u) 96 | 154 | 187 | 265 | 313 | 379 | 424 | 96.5 | 1722 | 0.7520 |
| 80. | Premier | (b) 106 | 164 | 191 | 258 | 302 | 371 | 423 | 97.5 | 1709 | 0.7535 |
| 81. | Shell | (d) 114 | 181 | 206 | 265 | 307 | 360 | 399 | 97. | 1718 | 0.7500 |
| 82. | Victory Gas | | 114 | 183 | 206 | 283 | 327 | 379 | 97.5 | 1793 | 0.7630 |
| 83. | Associated Gas | | 120 | 188 | 214 | 284 | 324 | 380 | 98. | 1810 | 0.7645 |
| Average | | | 110 | 174 | 201 | 271 | 315 | 374 | 97.3 | 1750 | 0.7582 |

TABLE 11 - AVERAGE RESULT OF ANALYSES BY CITIES.

| District | 1st drop OF. | DISTILLATION RANGE | | | | | End Point | Recovery | Index No. OF. | Specific Gravity |
|----------------------|--------------|--------------------|---------|---------|---------|---------|-----------|----------|---------------|------------------|
| | | 10% OF. | 20% OF. | 50% CF. | 70% OF. | 90% OF. | | | | |
| Halifax, N.S. | 116 | 174 | 203 | 270 | 315 | 363 | 437 | 97.2 | 1703 | 0.7460 |
| St. John, N.B. | 107 | 158 | 187 | 257 | 302 | 365 | 415 | 96.8 | 1604 | 0.7397 |
| Quebec, Quo. | 110 | 160 | 189 | 256 | 301 | 361 | 412 | 97.0 | 1678 | 0.7400 |
| Montreal, Quo. | 104 | 157 | 183 | 252 | 294 | 354 | 409 | 97.5 | 1649 | 0.7375 |
| Ottawa, Ont. | 108 | 158 | 184 | 249 | 294 | 357 | 414 | 96.8 | 1655 | 0.7362 |
| Toronto, Ont. | 99 | 146 | 176 | 255 | 304 | 360 | 413 | 96.7 | 1666 | 0.7357 |
| London, Ont. | 107 | 165 | 194 | 264 | 307 | 362 | 406 | 97.0 | 1696 | 0.7372 |
| Winnipeg, Man. | 102 | 155 | 182 | 254 | 299 | 361 | 411 | 96.8 | 1662 | 0.7353 |
| Regina, Sask. | 100 | 164 | 192 | 270 | 318 | 365 | 437 | 96.8 | 1765 | 0.7410 |
| Calgary, Alta. | 114 | 172 | 199 | 275 | 321 | 365 | 430 | 97.3 | 1700 | 0.7470 |
| Edmonton, Alta. | 100 | 165 | 194 | 271 | 317 | 375 | 420 | 97.3 | 1741 | 0.7424 |
| Vancouver, B.C. | 100 | 168 | 190 | 262 | 309 | 374 | 419 | 97.0 | 1731 | 0.7550 |
| Victoria, B.C. | 110 | 174 | 201 | 271 | 315 | 374 | 416 | 97.3 | 1750 | 0.7502 |
| Average ^x | 107 | 161 | 189 | 259 | 304 | 366 | 416 | 97.0 | 1693 | 0.7406 |

^x This is the average value for all the samples tested.

Comparison of Results.

It is quite interesting to compare the above figures with others obtained in somewhat the same way. Table 111 gives the average results of 66 samples collected in Canada, presumably in 1913, and reported by the laboratories of the Department of Inland Revenue (C); the average of 48 samples collected in Canada during 1923 (3); the average of 59 samples collected during 1924 (10); the average of 73 samples collected during 1925 (11); the average of 76 samples collected in 1926 (12); the average of 83 samples collected during 1927; the average of 131 samples collected in United States during July 1927, and reported by the U.S. Bureau of Mines (13); and the essential features of the specification for motor gasoline adopted by the Specification Board of the United States (14) for the use of the various departments and independent establishments of the United States Government. It will be observed that the gasoline sold in Canada during the present year shows an average of good quality when judged by the distillation range which is the ordinarily accepted standard.

TABLE 111 - AVERAGE RESULTS FOR COMPARISON

| | DISTILLATION RANGE | | | | | | | Index | | | |
|----------------------------|--------------------|---------|---------|---------|---------|---------|-----------|----------|---------|--------|--------------|
| | 1st drop °F. | 10% °F. | 20% °F. | 50% °F. | 70% °F. | 90% °F. | End Point | Recovery | No. °F. | Sp.Gr. | Iodine Value |
| Canada, 1916 | 125 | 170 | 192 | 237 | 270 | 330 | 380 | ---- | 1579 | 0.732 | 17 |
| Canada, 1923 | 120 | 170 | 193 | 255 | 296 | 358 | 423 | 97.1 | 1695 | 0.737 | 19 |
| Canada, 1924 | 113 | 173 | 195 | 249 | 288 | 347 | 410 | 97.4 | 1662 | 0.736 | 18 |
| Canada, 1925 | 116 | 174 | 199 | 258 | 299 | 359 | 412 | 97.0 | 1701 | 0.739 | 18 |
| Canada, 1926 | 110 | 164 | 191 | 255 | 300 | 360 | 410 | 97.4 | 1681 | 0.739 | 21 |
| Canada, 1927 | 107 | 161 | 189 | 259 | 304 | 366 | 416 | 97.0 | 1693 | 0.741 | -- |
| United States, July, 1927 | 102 | --- | 193 | 267 | --- | 381 | 417 | 96.4 | ---- | 0.748 | -- |
| U.S. Federal Specification | 131 | --- | 221 | 284 | --- | 293 | 437 | --- | ---- | ---- | -- |

TABLE 1V - 10 PER CENT OF SAMPLES HAVING MAXIMUM END POINT.

| Sample No. | Brand | DISTILLATION RANGE | | | | | | | Index | | |
|------------|-------------|--------------------|---------|---------|---------|---------|---------|-----------|----------|---------|------------------|
| | | 1st drop °F. | 10% °F. | 20% °F. | 50% °F. | 70% °F. | 90% °F. | End Point | Recovery | No. °F. | Specific Gravity |
| 2. | Premier | 128 | 189 | 218 | 284 | 328 | 400 | 450 | 97.0 | 1869 | 0.7575 |
| 65. | Imperial | 116 | 177 | 204 | 274 | 318 | 386 | 442 | 97.0 | 1801 | 0.7465 |
| 64. | White Rose | 98 | 130 | 158 | 244 | 296 | 372 | 438 | 96.0 | 1638 | 0.7230 |
| 14. | Blue Sunoco | 110 | 174 | 202 | 273 | 318 | 383 | 436 | 98.0 | 1786 | 0.7635 |
| 56. | White Rose | 96 | 140 | 168 | 252 | 304 | 378 | 436 | 96.5 | 1678 | 0.7375 |
| 63. | Maple Leaf | 118 | 178 | 205 | 290 | 340 | 400 | 436 | 97.0 | 1849 | 0.7505 |
| 35. | Sunoco LT. | 106 | 155 | 184 | 242 | 288 | 364 | 434 | 96.5 | 1667 | 0.7240 |
| 51. | High Test | 106 | 158 | 194 | 280 | 332 | 392 | 434 | 96.5 | 1790 | 0.7400 |
| Average | | 110 | 163 | 192 | 267 | 316 | 384 | 438 | 96.8 | 1710 | 0.7428 |

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

| Sample No. | Brand | DISTILLATION RANGE | | | | | | | Index | | |
|------------|-------------------|--------------------|---------|---------|---------|---------|---------|-----------|----------|---------|------------------|
| | | 1st drop °F. | 10% °F. | 20% °F. | 50% °F. | 70% °F. | 90% °F. | End Point | Recovery | No. °F. | Specific Gravity |
| 47. | Aviation | 105 | 156 | 183 | 246 | 289 | 339 | 370 | 97.0 | 1583 | 0.7285 |
| 50. | Aviation | 94 | 144 | 170 | 240 | 282 | 334 | 371 | 96.5 | 1541 | 0.7235 |
| 38. | Cities Service HT | 101 | 142 | 166 | 220 | 257 | 315 | 376 | 97.5 | 1476 | 0.7155 |
| 58. | North Star | 99 | 146 | 172 | 236 | 276 | 330 | 379 | 97.0 | 1539 | 0.7210 |
| 23. | Peerless | 111 | 157 | 180 | 233 | 269 | 325 | 381 | 97.0 | 1545 | 0.7245 |
| 17. | Peerless | 106 | 158 | 180 | 234 | 266 | 320 | 382 | 97.5 | 1540 | 0.7245 |
| 53. | Shell | 96 | 154 | 184 | 252 | 298 | 354 | 386 | 97.0 | 1628 | 0.7320 |
| 13. | Aviation | 98 | 142 | 164 | 230 | 275 | 336 | 394 | 98.0 | 1541 | 0.7255 |
| Average | | 101 | 150 | 175 | 236 | 277 | 332 | 380 | 97.2 | 1549 | 0.7244 |

In order to estimate the variations in quality of the gasoline being sold, the average of the 8 samples (approximately 10% of the total 83 samples) having the highest end point, and the average of the 8 samples having the lowest end point was obtained as in preceding years. The results are as shown in Table 1V and Table V.

TABLE VI - DIFFERENCE BETWEEN MAXIMUM AND MINIMUM END POINTS.

| | 1916 | August 1923 | August 1924 | August 1925 | August 1926 | August 1927 |
|-------------|------|----------------|----------------|----------------|----------------|----------------|
| | °F. | °F. | °F. | °F. | °F. | °F. |
| Maximum 10% | 432 | 446 | 459 | 458 | 437 | 438 |
| Minimum 10% | 322 | 381 | 353 | 366 | 379 | 380 |
| Difference | 110 | 65 | 101 | 92 | 58 | 58 |

Table VI shows the difference between the average end points of the maximum 10% and minimum 10% of samples collected in Canada in 1916 (15), 1923, 1924, 1925, 1926 and in 1927. The difference between the two averages has been used previously for the purpose of comparison, as a measure of the variation in quality. It will be observed that in 1927 the variation in quality when determined by the above method was the same as that obtained in the survey of 1926.

Accordingly, an attempt was made to obtain a figure which would indicate more exactly the variations in quality. For that purpose the index number was chosen because it represents an aggregate of several points in the distillation range rather than the arbitrarily chosen end point. The procedure adopted was the same as that used above, namely, the average of ten per cent of the samples having the highest index numbers and the average of ten per cent of the samples having the lowest index numbers was calculated as shown in Tables VII and VIII.

TABLE VII - 10 PER CENT OF SAMPLES HAVING MAXIMUM INDEX NUMBERS.

| Sample No. | Brand | Index No. °F. | Specific Gravity | DISTILLATION RANGE | | | | | End Point |
|---------------|----------------|---------------------|---------------------|--------------------|------------|------------|------------|------------|--------------|
| | | | | 10% °F. | 20% °F. | 50% °F. | 70% °F. | 90% °F. | |
| 2. | Premier | 1869 | 0.7575 | 189 | 218 | 284 | 328 | 400 | 450 |
| 63. | Maple Leaf | 1849 | 0.7505 | 178 | 205 | 290 | 340 | 400 | 436 |
| 67. | Maple Leaf | 1636 | 0.7490 | 178 | 204 | 286 | 338 | 398 | 432 |
| 1. | Red Seal | 1822 | 0.7565 | 188 | 222 | 278 | 324 | 380 | 430 |
| 83. | Associated Gas | 1810 | 0.7645 | 188 | 214 | 284 | 324 | 380 | 420 |
| 55. | Supertest | 1806 | 0.7495 | 190 | 217 | 285 | 322 | 373 | 418 |
| 65. | Imperial | 1801 | 0.7465 | 177 | 204 | 274 | 318 | 386 | 442 |
| 48. | Red Seal | 1794 | 0.7485 | 182 | 215 | 282 | 322 | 374 | 419 |
| Average | | 1823 | 0.7528 | 184 | 212 | 283 | 327 | 377 | 431 |

TABLE VIII - 10 PER CENT OF SAMPLES HAVING MINIMUM INDEX NUMBERS

| Sample No. | Brand | Index No. F. | Specific Gravity | DISTILLATION RANGE | | | | | End Point |
|------------|---------------------|--------------|------------------|--------------------|---------|---------|---------|---------|-----------|
| | | | | 10% °F. | 20% °F. | 50% °F. | 70% °F. | 90% °F. | |
| 38. | Citios Service (HT) | 1476 | 0.7155 | 142 | 166 | 220 | 257 | 315 | 376 |
| 37. | Supor-Service | 1539 | 0.7255 | 154 | 174 | 224 | 262 | 327 | 398 |
| 58. | North Star | 1539 | 0.7210 | 146 | 172 | 236 | 276 | 330 | 379 |
| 17. | Peerless | 1540 | 0.7245 | 158 | 180 | 234 | 266 | 320 | 382 |
| 13. | Aviation | 1541 | 0.7255 | 142 | 164 | 230 | 275 | 336 | 394 |
| 50. | Aviation | 1541 | 0.7235 | 144 | 170 | 240 | 282 | 334 | 371 |
| 32. | Supertest (HC) | 1542 | 0.7275 | 152 | 172 | 224 | 260 | 328 | 406 |
| 23. | Peerless | 1545 | 0.7245 | 157 | 180 | 233 | 269 | 325 | 381 |
| Average | | 1518 | 0.7234 | 149 | 172 | 230 | 268 | 327 | 386 |

Similar calculations were made for samples collected and analyzed in preceding years and these results are shown in Table IX.

TABLE IX - DIFFERENCE BETWEEN MAXIMUM AND MINIMUM INDEX NUMBERS.

| Year | 1923 | 1924 | 1925 | 1926 | 1927 |
|-------------|------|------|------|------|------|
| Maximum 10% | 1791 | 1806 | 1821 | 1815 | 1823 |
| Minimum 10% | 1500 | 1428 | 1479 | 1524 | 1518 |
| Difference | 291 | 378 | 324 | 291 | 305 |

It will be seen that the variation in quality by this method of calculation shows a reasonably good agreement with that determined by the previous method, but that the variation in quality was slightly greater during 1927 than that during 1926.

It will be further observed that the average index number of ten per cent of the samples having the highest index numbers of all those examined in 1927 was slightly higher than an average index number calculated in like manner from the samples examined in 1926. This indicates that the average volatility of that group of samples was less in 1927 than in 1926. Conversely, it is also to be noted that the average index number of ten per cent of the samples having the lowest index numbers of those examined in 1927 was slightly lower than an average index number calculated in like manner from the samples examined in 1926. For the same reason, this indicates that the average volatility of this group of samples was greater in 1927 than in 1926.

LIST OF REFERENCES

1. Chemist, Division of Fuels and Fuel Testing, Mines Branch.
2. Junior Chemist, Division of Fuels and Fuel Testing, Mines Branch.
3. Investigations of Fuels and Fuel Testing, Mines Branch, 1923 to 1926 inclusive.
4. The hearty support and co-operation of the Department of Health in taking samples is gratefully acknowledged.
5. U.S. Bureau of Mines, Technical Paper, 323A.
6. Chemical and Metallurgical Engineering, Vol. 29, No. 22, Page 970.
7. Investigations of Fuels and Fuel Testing, Mines Branch, 1923, p. 53.
7. U.S. Bureau of Standards, Circular 57.
8. Department of Inland Revenue, Canada, Bulletin 362 ("Gasoline").
9. Investigations of Fuels and Fuel Testing, Mines Branch, 1923.
10. Investigations of Fuels and Fuel Testing, Mines Branch, 1924.
11. Investigations of Fuels and Fuel Testing, Mines Branch, 1925.
12. Investigations of Fuels and Fuel Testing, Mines Branch, 1926.
13. U.S. Bureau of Mines, Report of Investigations, Serial No. 2827.
14. U.S. Bureau of Mines, Technical Paper, 323A.
15. Investigations of Fuels and Fuel Testing, Mines Branch, 1923.

- SUMMARY -

Eight-three samples of gasoline were collected in August, 1927, from thirteen widely separated Canadian cities, and may be accepted, therefore, as representative of the gasoline sold in Canada at that time.

The analyses and detailed examination of these samples show that the average gasoline sold during 1927 was of good quality, but was not quite as good as that sold during 1926.

The average distillation curves show that the gasoline sold in Canada during August, 1927, was superior to that sold in the United States during July, 1927, and to the United States Federal Specifications for the United States Government motor gasoline.

The variation in quality was slightly greater during 1927 than during 1926; the greater variation was due to the lower grades being less volatile and the higher grades more volatile in 1927 than in 1926.

