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Analyses of Natural Gases from Anadarko Basin, Southwestern Kansas,
Western Oklahoma, and Texas Panhandle

by Dudley D. Rice, Charles N. Threlkeld, and April K. Vuletich¹

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ANALYSES OF NATURAL GASES FROM ANADARKO BASIN, SOUTHWESTERN KANSAS,
WESTERN OKLAHOMA, AND TEXAS PANHANDLE

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INTRODUCTION

This report contains the chemical and isotopic analyses and related location data for 143 natural gas samples from the Anadarko basin located in southwestern Kansas, western Oklahoma, and the Texas panhandle. The samples are arranged by age of producing interval (youngest to oldest) within the three main producing areas, namely the central basin, Panhandle-Hugoton field, and Sooner Trend.

The gas samples were analyzed by thermal-conductivity gas chromatography. Volume percent of the constituents methane (C_1), ethane (C_2), propane (C_3), butane and pentane (C_{4+}), carbon dioxide (CO_2), and nitrogen and air (N_2 -air) are reported. The methane and carbon dioxide were purified and prepared for isotopic analysis using methods similar to those described by Schoell (1980). Carbon and hydrogen isotope ratios were measured on a Neir-McKinney type mass spectrometer and are reported in δ -notation in parts per thousand (ppt) relative to PDB for carbon and SMOW for hydrogen.

ACKNOWLEDGMENTS

We gratefully acknowledge the cooperation and assistance of the oil and pipeline companies that assisted us in our sampling program. Some of the gas samples in the central basin were analyzed by Global Geochemistry Corporation under Gas Research Corporation contract no. 5081-360-0533.

REFERENCE CITED

Schoell, M., 1980, The hydrogen and carbon isotopic composition of methane from natural gases of various origins: *Geochimica et Cosmochimica Acta*, v. 44, p. 649-661.

Table 1. Chemical and isotopic analyses and location data for natural gas samples from central basin, Anadarko basin, Oklahoma and Texas
[ND, not determined; N, nonassociated gas; A, associated gas]

| No. | Well name | State | Location | Depth to Gas Pool (ft) | Producing Interval | CH ₄ (%) | C ₂ H ₆ (%) | C ₃ H ₈ (%) | i-C ₄ H ₁₀ (%) | n-C ₄ H ₁₀ (%) | i-C ₅ H ₁₂ (%) | n-C ₅ H ₁₂ (%) | N ₂ and (or) air (%) | CO ₂ (%) | C ₂ H ₄ (%) | $\delta^{13}\text{C}_1$ (‰) | $\delta^{13}\text{C}_2$ (‰) | $\delta^{13}\text{C}_3$ (‰) | Type of gas |
|-----|--------------------------------|----------|--------------------------------|------------------------------------|-----------------------|------------------------|--------------------------------------|--------------------------------------|---|---|---|---|---------------------------------------|------------------------|--------------------------------------|--------------------------------|--------------------------------|--------------------------------|-------------------|
| 1 | Coldwater No. 213 | Oklahoma | sec. 13, T. 5 N., R. 23 E.C.M. | 3,182 | Wolfcampian | 76.93 | 3.41 | 0.71 | 0.08 | 0.00 | 0.00 | 0.00 | 18.90 | 0.00 | 4.56 | -42.6 | ND | ND | N |
| 2 | Angleton No. B-2 | --do-- | sec. 14, T. 5 N., R. 23 E.C.M. | 3,287 | ---do--- | 82.39 | 4.84 | 1.50 | .15 | .16 | 0.00 | 0.00 | 10.96 | 0.00 | 7.47 | -43.4 | ND | ND | N |
| 3 | Barby No. A-1 | --do-- | sec. 26, T. 5 N., R. 26 E.C.M. | 3,516 | ---do--- | 81.32 | 4.59 | 1.62 | .20 | .20 | 0.00 | 0.00 | 12.07 | 0.00 | 7.52 | -44.1 | ND | ND | N |
| 4 | Follett Beard No. A-1 | --do-- | sec. 36, T. 5 N., R. 26 E.C.M. | 3,542 | ---do--- | 81.54 | 5.47 | 2.93 | .39 | .30 | 0.00 | 0.00 | 9.37 | 0.00 | 10.03 | -41.9 | -29.6 | ND | N |
| 5 | O'Neill Barby No. 1 | --do-- | sec. 18, T. 4 N., R. 27 E.C.M. | 5,360 | Virgilian | 81.52 | 5.33 | 3.15 | .41 | .47 | .08 | 0.00 | 8.76 | .28 | 10.38 | -42.4 | ND | ND | N |
| 6 | O'Neill Barby Estate No. 1 | --do-- | sec. 26, T. 4 N., R. 26 E.C.M. | 5,244 | ---do--- | 74.74 | 4.98 | 1.92 | .19 | .16 | 0.00 | 0.00 | 17.87 | .14 | 8.84 | -45.4 | ND | ND | N |
| 7 | Barby No. 1-35 | --do-- | sec. 35, T. 4 N., R. 26 E.C.M. | 5,286 | ---do--- | 62.80 | 12.52 | 8.33 | .72 | .62 | 0.00 | 0.00 | 15.00 | 0.00 | 26.12 | -48.6 | -36.4 | ND | N |
| 8 | Muehlebach No. 1 | --do-- | sec. 2, T. 3 N., R. 26 E.C.M. | 5,312 | ---do--- | 82.90 | 5.62 | 1.79 | .17 | .20 | 0.00 | 0.00 | 9.06 | .19 | 8.65 | -44.3 | ND | ND | N |
| 9 | Verna Roberts | --do-- | sec. 17, T. 17 N., R. 26 W. | 8,068 | ---do--- | 80.01 | 7.30 | 2.62 | .31 | .22 | 0.00 | 0.00 | 9.21 | .31 | 11.57 | -47.3 | -28.6 | ND | N |
| 10 | Ira E. Northrup | --do-- | sec. 21, T. 17 N., R. 26 W. | 8,070 | ---do--- | 79.84 | 7.88 | 2.66 | .30 | .20 | 0.00 | 0.00 | 8.73 | .36 | 12.14 | -47.3 | -30.0 | ND | N |
| 11 | Berryman No. 1 | --do-- | sec. 27, T. 17 N., R. 23 W. | 8,235 | ---do--- | 81.41 | 5.60 | 1.82 | .20 | .20 | 0.00 | 0.00 | 10.74 | .11 | 8.68 | -46.8 | ND | ND | N |
| 12 | Nuttall No. 1-32 | --do-- | sec. 32, T. 17 N., R. 22 W. | 8,185 | ---do--- | 80.42 | 5.63 | 1.99 | .34 | .29 | 0.00 | 0.00 | 11.16 | .18 | 9.29 | -47.0 | ND | ND | N |
| 13 | Dunaway No. 2-4 | --do-- | sec. 4, T. 26 N., R. 25 W. | 4,124 | ---do--- | 86.19 | 5.51 | 2.28 | .31 | .47 | .13 | .09 | 4.83 | .19 | 9.26 | -44.2 | ND | ND | N |
| 14 | Shaller No. 1 | Texas | sec. 152, Blk. 41, H&TC Survey | 7,192 | ---do--- | 79.37 | 7.59 | 4.27 | .62 | 1.17 | .35 | .31 | 5.80 | .52 | 15.28 | -49.8 | ND | ND | N |
| 15 | Texas Wildlife and Parks No. 2 | --do-- | sec. 181, Blk. 41, H&TC Survey | 6,884 | ---do--- | 78.05 | 7.36 | 4.46 | .64 | 1.21 | .38 | .33 | 7.27 | .30 | 15.56 | -49.6 | ND | ND | N |
| 16 | Baker No. 1-20 | Oklahoma | sec. 20, T. 12 N., R. 21 W. | 16,970 | Desmoinesian | 92.49 | 4.01 | .67 | .14 | .09 | ND | ND | 1.30 | 1.20 | 15.14 | -42.3 | -32.9 | -133 | N |
| 17 | Watkins No. 2-21 | --do-- | sec. 21, T. 12 N., R. 21 W. | 13,989 | ---do--- | 92.30 | 4.26 | .82 | .16 | .10 | ND | ND | 1.20 | 1.10 | 5.53 | -44.1 | -32.3 | -145 | N |
| 18 | Wilks No. 1-17 | --do-- | sec. 17, T. 12 N., R. 21 W. | 13,611 | ---do--- | 93.36 | 3.40 | .66 | .16 | .08 | ND | ND | 1.20 | 1.12 | 4.42 | -43.2 | -32.5 | -136 | N |
| 19 | Thurmond No. 1-32 | --do-- | sec. 32, T. 13 N., R. 20 W. | 13,190 | ---do--- | 89.58 | 5.57 | 1.56 | .26 | .22 | ND | ND | 1.90 | .90 | 7.84 | -44.5 | -34.1 | -145 | N |
| 20 | Marik No. 1-11 | --do-- | sec. 11, T. 13 N., R. 20 W. | 13,688 | ---do--- | 83.09 | 7.20 | 2.36 | .38 | .43 | ND | ND | 5.60 | 1.00 | 11.04 | -46.4 | -43.8 | -150 | A |
| 21 | Parcain No. 1-6 | --do-- | sec. 6, T. 11 N., R. 21 W. | 14,326 | ---do--- | 90.57 | 5.52 | 1.04 | .22 | .14 | ND | ND | 1.20 | 1.30 | 7.11 | -45.0 | -31.0 | -152 | N |
| 22 | Palmer No. 1-20 | --do-- | sec. 20, T. 11 N., R. 14 W. | 12,355 | ---do--- | 94.28 | 1.80 | 1.06 | .14 | .20 | ND | ND | 1.09 | 1.43 | 3.28 | -40.7 | -36.5 | -149 | N |
| 23 | Palmer No. 1-17 | --do-- | sec. 17, T. 12 N., R. 15 W. | 11,865 | ---do--- | 85.79 | 6.95 | 3.76 | .55 | .70 | ND | ND | 1.43 | .82 | 12.24 | -45.9 | -35.1 | -153 | A |
| 24 | Canyon Camp Unit No. 1 | --do-- | sec. 19, T. 11 N., R. 10 W. | 11,992 | ---do--- | 86.51 | 7.36 | 2.94 | .41 | .50 | ND | ND | 1.37 | .92 | 11.46 | -46.7 | -33.3 | -152 | N |
| 25 | Rickenberg | --do-- | sec. 20, T. 11 N., R. 10 W. | 11,932 | ---do--- | 86.57 | 6.26 | 2.67 | .40 | .48 | ND | ND | 1.51 | 2.10 | 10.19 | -46.7 | -32.8 | -159 | N |
| 26 | McKay No. 1 | --do-- | sec. 21, T. 11 N., R. 10 W. | 11,826 | ---do--- | 80.19 | 11.51 | 4.47 | .64 | .75 | ND | ND | 1.65 | .77 | 17.82 | -46.9 | -32.8 | -158 | N |
| 27 | Hazlett No. 1 | --do-- | sec. 2, T. 19 N., R. 11 W. | 7,212 | ---do--- | 83.74 | 4.19 | 1.61 | .20 | .36 | .09 | .05 | 9.10 | .47 | 7.40 | -42.6 | ND | ND | N |
| 28 | Worley Unit No. 1 | --do-- | sec. 19, T. 20 N., R. 11 W. | 7,215 | ---do--- | 75.11 | 2.65 | .66 | .06 | .09 | .02 | .01 | 21.07 | .33 | 4.44 | -41.6 | ND | ND | N |
| 29 | Brown No. 1 | --do-- | sec. 25, T. 19 N., R. 11 W. | 7,366 | ---do--- | 78.08 | 2.96 | .96 | .11 | .10 | .02 | .02 | 17.55 | .20 | 5.07 | -40.7 | ND | ND | N |
| 30 | Outhier No. 1 | --do-- | sec. 35, T. 13 N., R. 12 W. | 11,215 | ---do--- | 73.82 | 6.64 | 1.99 | .24 | .15 | .02 | 0.00 | 16.73 | .41 | 10.91 | -43.7 | ND | ND | N |
| 31 | Carr No. 1-35 | --do-- | sec. 27, T. 12 N., R. 22 W. | 14,527 | Atokan | 94.65 | 2.04 | .36 | .15 | .07 | ND | ND | 1.50 | 1.20 | 2.72 | -43.1 | -32.0 | -137 | N |
| 32 | Thurmond No. 1-27 | --do-- | sec. 34, T. 12 N., R. 20 W. | 14,984 | ---do--- | 95.72 | 1.87 | .29 | .04 | .04 | ND | ND | 1.00 | 1.00 | 2.23 | -42.3 | -34.3 | -149 | N |
| 33 | K.C. Cattle No. 1-34 | --do-- | sec. 34, T. 12 N., R. 22 W. | 15,070 | ---do--- | 95.20 | 1.48 | .35 | .17 | .08 | ND | ND | 1.40 | 1.30 | 2.16 | -42.9 | -32.2 | -139 | N |
| 34 | Gregory No. 1-12 | --do-- | sec. 12, T. 11 N., R. 22 W. | 15,267 | ---do--- | 95.20 | 1.74 | .38 | .13 | .09 | ND | ND | 1.20 | 1.20 | 2.46 | -43.9 | -31.2 | -145 | N |
| 35 | Ashby No. 1-36 | --do-- | sec. 36, T. 14 N., R. 15 W. | 11,884 | ---do--- | 82.00 | 9.64 | 4.20 | .61 | .73 | ND | ND | 2.10 | .07 | 16.18 | -48.1 | -34.3 | -162 | A |
| 36 | Coulson No. 5-1 | --do-- | sec. 5, T. 12 N., R. 17 W. | 14,212 | ---do--- | 95.06 | 1.91 | .48 | .09 | .04 | ND | ND | 1.40 | 1.10 | 2.50 | -43.0 | -31.3 | -151 | N |
| 37 | Webb No. 2-1 | --do-- | sec. 2, T. 12 N., R. 17 W. | 14,116 | ---do--- | 95.23 | 2.08 | .44 | .04 | .03 | ND | ND | 1.10 | 1.10 | 2.63 | -43.7 | -30.7 | -150 | N |
| 38 | Allison No. 103 | --do-- | sec. 3, T. 11 N., R. 20 W. | 14,955 | ---do--- | 95.72 | 1.77 | .28 | .04 | .03 | ND | ND | 1.01 | 1.01 | 2.12 | -42.8 | -34.3 | -147 | N |
| 39 | Risley No. 4 | Texas | sec. 6, Blk. 1, I&GN Survey | 10,576 | Granite wash | 81.84 | 8.67 | 3.65 | .47 | .90 | .28 | .25 | 3.16 | .77 | 14.81 | -45.6 | ND | ND | N |
| 40 | Risley No. 3 | --do-- | sec. 6, Blk. 1, I&GN Survey | 10,592 | ---do--- | 79.00 | 8.56 | 3.70 | .50 | .97 | .30 | .30 | 5.99 | .68 | 15.35 | -45.7 | ND | ND | N |
| 41 | Ross No. 2-71 | --do-- | sec. 71, Blk. A-2, H&GN Survey | 10,670 | ---do--- | 70.75 | 8.06 | 3.59 | .47 | .87 | .24 | .22 | 15.47 | .32 | 15.98 | -46.2 | ND | ND | A |
| 42 | Hobart No. 8-70 | --do-- | sec. 70, Blk. A-2, H&GN Survey | 10,800 | ---do--- | 78.02 | 10.45 | 4.83 | .69 | 1.28 | .34 | .30 | 3.42 | .69 | 18.64 | -48.3 | ND | ND | N |
| 43 | Long "A" No. 2 | Oklahoma | sec. 23, T. 5 N., R. 22 E.C.M. | 6,344 | Norwegian | 79.61 | 5.39 | 2.87 | .27 | .26 | 0.00 | 0.00 | 11.34 | .25 | 9.95 | -43.1 | ND | ND | N |

Table 1. Chemical and isotopic analyses and location data for natural gas samples from central basin, Anadarko basin, Oklahoma and Texas--continued

| No. | Well name | State | Location | Pool (ft) | Depth to Gas | Producing Interval | CH ₄ (%) | C ₂ H ₆ (%) | C ₃ H ₈ (%) | 1-C ₄ H ₁₀ (%) | n-C ₄ H ₁₀ (%) | 1-C ₅ H ₁₂ (%) | n-C ₅ H ₁₂ (%) | N ₂ and (or) air (%) | CO ₂ (%) | C ₂ + (%) | δ ¹³ C ₁ (‰) | δ ¹³ C ₂ (‰) | Type of gas | |
|-----|---------------------------|--------|--------------------------------|--------------|--------------------|-----------------------|------------------------|--------------------------------------|--------------------------------------|---|---|---|---|---------------------------------------|------------------------|-------------------------|---------------------------------------|---------------------------------------|-------------------|---|
| 44 | Barby No. 1-36 | --do-- | sec. 36, T. 4 N., R. 26 E.C.N. | 6,882 | | ----- | 79.39 | 5.53 | 3.45 | .23 | .30 | 0.00 | 0.00 | 10.76 | .32 | 10.72 | -44.4 | -33.8 | ND | N |
| 45 | Barby No. 1-29 | --do-- | sec. 29, T. 4 N., R. 26 E.C.N. | 6,836 | | ----- | 83.48 | 3.81 | 1.64 | .16 | .15 | 0.00 | 0.00 | 10.49 | .20 | 6.46 | -42.1 | ND | ND | N |
| 46 | Boutman No. 1-23 | --do-- | sec. 23, T. 23 N., R. 24 W. | 8,180 | | ----- | 83.30 | 4.12 | 1.18 | .11 | .08 | 0.00 | 0.00 | 10.73 | .46 | 6.20 | -40.2 | ND | ND | N |
| 47 | Elliot No. 1-24 | --do-- | sec. 24, T. 24 N., R. 24 W. | 7,811 | | ----- | 77.98 | 3.58 | 1.13 | .13 | .08 | 0.00 | 0.00 | 17.00 | .10 | 5.93 | -40.4 | ND | ND | N |
| 48 | Frisky No. 1-29 | --do-- | sec. 29, T. 24 N., R. 23 W. | 7,911 | | ----- | 82.55 | 4.47 | 1.53 | 8.18 | .10 | 0.00 | 0.00 | 10.91 | .26 | 7.09 | -37.7 | ND | ND | N |
| 49 | Harrison No. 1-19 | --do-- | sec. 19, T. 24 N., R. 23 W. | 7,800 | | ----- | 86.34 | 2.13 | .40 | 0.00 | 0.00 | 0.00 | 0.00 | 10.78 | .32 | 2.85 | -38.0 | ND | ND | N |
| 50 | Hudson No. 1-35 | --do-- | sec. 35, T. 25 N., R. 23 W. | 7,519 | | ----- | 86.94 | 5.12 | 2.30 | .33 | .50 | .14 | .08 | 4.20 | .29 | 8.97 | -41.9 | ND | ND | N |
| 51 | Conley No. 1 | --do-- | sec. 27, T. 16 N., R. 11 W. | 9,458 | | ----- | 80.62 | 2.61 | .67 | .07 | .06 | .02 | .01 | 15.66 | .28 | 4.09 | -39.6 | ND | ND | N |
| 52 | Bradford No. 1-18 | --do-- | sec. 18, T. 15 N., R. 11 W. | 10,234 | | ----- | 78.25 | 6.24 | 3.02 | .36 | .38 | .08 | .01 | 11.21 | .45 | 11.42 | -42.4 | ND | ND | N |
| 53 | Tompkinson No. 17-1 | --do-- | sec. 17, T. 13 N., R. 10 W. | 11,239 | | ----- | 78.41 | 3.52 | .01 | .19 | .08 | .02 | 0.00 | 17.30 | .52 | 4.58 | -39.9 | ND | ND | A |
| 54 | Youngheim No. 1 | --do-- | sec. 6, T. 12 N., R. 9 W. | 10,886 | | ----- | 84.12 | 1.09 | .38 | .01 | .01 | 0.00 | 0.00 | 14.17 | .22 | 1.13 | -37.8 | ND | ND | N |
| 55 | Barnum No. 1-32 | --do-- | sec. 32, T. 11 N., R. 21 W. | 18,113 | | ----- | 96.59 | .95 | .04 | 0.00 | 0.00 | ND | ND | .90 | 1.40 | 1.01 | -38.5 | ND | -135 | N |
| 56 | Clark No. 1-33 | --do-- | sec. 27, T. 12 N., R. 21 W. | 17,264 | | ----- | 95.81 | 1.06 | .04 | 0.00 | 0.00 | ND | ND | 1.50 | 1.50 | 1.10 | -38.2 | -36.1 | -147 | N |
| 57 | Gregory No. 2-27 | --do-- | sec. 27, T. 12 N., R. 21 W. | 17,052 | | ----- | 96.41 | 1.08 | .04 | 0.00 | 0.00 | ND | ND | .80 | 1.60 | 1.22 | -38.2 | -36.6 | -133 | N |
| 58 | Farrar No. 1-22 | --do-- | sec. 22, T. 12 N., R. 21 W. | 17,002 | | ----- | 96.18 | .26 | .04 | 0.00 | 0.00 | ND | ND | 1.90 | 1.40 | .54 | -38.2 | ND | -133 | N |
| 59 | Watkins No. 1-21 | --do-- | sec. 21, T. 12 N., R. 21 W. | 16,997 | | ----- | 96.8 | .41 | .03 | 0.00 | 0.00 | ND | ND | 1.20 | 1.50 | .51 | -38.2 | ND | -135 | N |
| 60 | Thornton No. 2-30 | --do-- | sec. 30, T. 12 N., R. 21 W. | 17,214 | | ----- | 96.75 | .46 | .03 | 0.00 | 0.00 | ND | ND | 1.00 | 1.70 | .57 | -37.8 | ND | -131 | N |
| 61 | Berry No. 1-8 | --do-- | sec. 8, T. 13 N., R. 24 W. | 14,977 | | ----- | 96.48 | .52 | 0.00 | 0.00 | 0.00 | ND | ND | 1.30 | 1.70 | .54 | -38.3 | ND | -139 | N |
| 62 | Dugger No. 1-18 | --do-- | sec. 18, T. 13 N., R. 20 W. | 17,485 | | ----- | 95.45 | .30 | .01 | 0.00 | 0.00 | ND | ND | 1.60 | 2.80 | .16 | -38.1 | ND | -140 | N |
| 63 | Rymer No. 1 | --do-- | sec. 35, T. 14 N., R. 15 W. | 13,013 | | ----- | 92.28 | 3.65 | 1.40 | .31 | .25 | ND | ND | 1.30 | .90 | 5.64 | -43.0 | -32.7 | -149 | N |
| 64 | West No. 1-7 | --do-- | sec. 7, T. 12 N., R. 11 W. | 12,228 | | ----- | 94.61 | 2.36 | .69 | .08 | .08 | ND | ND | 1.19 | .98 | 3.29 | -41.4 | -34.0 | -150 | N |
| 65 | Ranch No. 1-15 | --do-- | sec. 15, T. 5 N., R. 6 W. | 13,725 | | ----- | 97.08 | 6.69 | 2.90 | .37 | .59 | .07 | 11.40 | 1.65 | .07 | 11.40 | -49.2 | -38.3 | -154 | N |
| 66 | Kardokus No. 10-1 | --do-- | sec. 10, T. 10 N., R. 13 W. | 15,410 | | ----- | 96.24 | 1.07 | .14 | .02 | .03 | ND | ND | .93 | 1.56 | 1.30 | -38.8 | -34.9 | -170 | N |
| 67 | Leasperance No. 1-35 | --do-- | sec. 35, T. 13 N., R. 12 W. | 12,444 | | Springer Fm. | 85.05 | .82 | .02 | .01 | .003 | .01 | 0.00 | 13.16 | .75 | 1.21 | -36.6 | ND | ND | N |
| 68 | Rice No. 1-35 | --do-- | sec. 35, T. 11 N., R. 21 W. | 21,614 | | ----- | 94.01 | .66 | 0.00 | 0.00 | 0.00 | ND | ND | 2.10 | 3.10 | .69 | -33.2 | ND | -154 | N |
| 69 | Cornstalk Unit No. 1-8 | --do-- | sec. 8, T. 13 N., R. 14 W. | 13,554 | | ----- | 94.37 | 2.29 | .81 | .13 | .11 | ND | ND | 1.20 | 1.10 | 3.41 | -41.9 | -34.6 | -142 | N |
| 70 | Rayner No. 2 | --do-- | sec. 30, T. 14 N., R. 16 W. | 13,726 | | ----- | 95.6 | 1.20 | .50 | .08 | .09 | ND | ND | 1.30 | 1.10 | 2.05 | -39.9 | -34.9 | -144 | N |
| 71 | Hamburger No. 1-9 | --do-- | sec. 9, T. 11 N., R. 15 W. | 16,698 | | ----- | 96.46 | 0.00 | .13 | 0.00 | 0.00 | ND | ND | 1.86 | 1.54 | .14 | -39.0 | -35.5 | -142 | N |
| 72 | Brown Foundation No. 1-16 | --do-- | sec. 14, T. 11 N., R. 15 W. | 15,996 | | ----- | 97.23 | .16 | .07 | 0.00 | 0.00 | ND | ND | 1.00 | 1.45 | .33 | -39.4 | ND | -139 | N |
| 73 | Flaming No. 1-20 | --do-- | sec. 20, T. 11 N., R. 14 W. | 16,002 | | ----- | 96.30 | .98 | .08 | .01 | .01 | ND | ND | .94 | 1.67 | 1.12 | -38.9 | -35.7 | -148 | N |
| 74 | Hintchel Unit No. 1 | --do-- | sec. 8, T. 11 N., R. 10 W. | 12,747 | | ----- | 94.99 | 2.17 | .62 | .07 | .07 | ND | ND | 1.09 | .98 | 3.00 | -40.3 | -34.5 | -146 | N |
| 75 | Jones No. 1-17 | --do-- | sec. 17, T. 11 N., R. 10 W. | 13,028 | | ----- | 93.92 | 2.19 | 1.03 | .16 | .18 | ND | ND | .48 | 1.03 | 3.66 | -39.5 | -34.3 | -143 | A |
| 76 | Bull Elk No. 1 | --do-- | sec. 8, T. 4 N., R. 9 W. | 20,467 | | ----- | 97.02 | .55 | .14 | 0.00 | 0.00 | ND | ND | 1.32 | .96 | .72 | -41.4 | -35.9 | -145 | N |
| 77 | Ten Bears No. 1 | --do-- | sec. 5, T. 14 N., R. 9 W. | 19,929 | | ----- | 96.36 | 1.50 | .12 | 0.00 | 0.00 | ND | ND | .82 | 1.18 | 1.67 | -40.0 | -34.4 | -144 | N |
| 78 | Little Washita No. 1 | --do-- | sec. 6, T. 4 N., R. 9 W. | 20,198 | | ----- | 96.21 | 1.24 | .10 | 0.00 | 0.00 | ND | ND | 1.22 | 1.22 | 1.38 | -38.9 | -34.0 | -140 | A |
| 79 | Quannah Parker No. 1 | --do-- | sec. 1, T. 4 N., R. 10 W. | 18,070 | | ----- | 95.62 | 1.47 | .16 | .01 | .01 | ND | ND | 1.71 | 1.01 | 1.71 | -43.0 | -36.3 | -136 | N |
| 80 | Kardokus No. 10-1 | --do-- | sec. 10, T. 10 N., R. 13 W. | 15,885 | | ----- | 96.02 | 1.14 | .15 | .01 | .02 | ND | ND | .85 | 1.80 | 1.37 | -38.7 | -35.1 | -148 | N |
| 81 | APC Long No. A-1 | --do-- | sec. 23, T. 4 N., R. 22 E.C.N. | 6,585 | | Chesterian | 86.67 | 2.91 | .97 | .12 | .13 | 0.00 | 0.00 | 9.00 | .19 | 4.56 | -40.2 | ND | ND | N |
| 82 | McFarland No. 1-32 | --do-- | sec. 32, T. 5 N., R. 23 E.C.N. | 6,630 | | ----- | 87.54 | 1.99 | .45 | 0.00 | 0.00 | 0.00 | 0.00 | 9.69 | .32 | 2.72 | -39.2 | ND | ND | N |
| 83 | Barby No. 1-10 | --do-- | sec. 10, T. 3 N., R. 26 E.C.N. | 7,398 | | ----- | 86.61 | 3.04 | .74 | .09 | 0.00 | 0.00 | 0.00 | 8.99 | .53 | 4.28 | -40.2 | ND | ND | N |
| 84 | Barby No. 1-25 | --do-- | sec. 25, T. 4 N., R. 25 E.C.N. | 7,232 | | ----- | 86.46 | 3.45 | .96 | .12 | .08 | 0.00 | 0.00 | 8.75 | .80 | 5.06 | -40.5 | ND | ND | N |
| 85 | Barby No. 1-24 | --do-- | sec. 24, T. 4 N., R. 25 E.C.N. | 7,064 | | ----- | 86.14 | 3.75 | 1.16 | .17 | .13 | 0.00 | 0.00 | 8.19 | .47 | 5.69 | -40.7 | -30.7 | -158 | N |
| 86 | Brown No. 1 II | --do-- | sec. 19, T. 20 N., R. 11 W. | 7,344 | | ----- | 78.45 | 3.30 | 1.00 | .11 | .10 | .02 | 0.00 | 16.68 | .35 | 5.45 | -40.5 | ND | ND | N |
| 87 | Holden No. 1A | --do-- | sec. 31, T. 5 N., R. 5 W. | 15,883 | | Simpson Group | 80.52 | 9.40 | 5.90 | 1.02 | 1.81 | ND | ND | .93 | .41 | 18.39 | -47.0 | -34.8 | -158 | A |
| 88 | Harris No. 2 | --do-- | sec. 36, T. 5 N., R. 6 W. | 15,940 | | ----- | 85.17 | 7.97 | 3.93 | .58 | .90 | ND | ND | .93 | .52 | 13.58 | -46.9 | -34.7 | -161 | A |
| 89 | Holden No. 1A | --do-- | sec. 31, T. 5 N., R. 5 W. | 16,995 | | Arbuckle | 89.51 | 5.31 | 2.41 | .46 | .88 | ND | ND | 1.09 | .33 | 9.20 | -45.4 | -34.9 | -156 | A |

Table 2. Chemical and isotopic analyses and location data for natural gas samples from Panhandle-Nugoton field, Anadarko basin, Kansas, Oklahoma, and Texas

[ND, not determined; N, nonassociated gas; A, associated gas]

| No. | Well name | State | Location | Gas Pool (ft) | Producing Interval | CH ₄ (%) | C ₂ H ₆ (%) | C ₃ H ₈ (%) | i-C ₄ H ₁₀ (%) | n-C ₄ H ₁₀ (%) | i-C ₅ H ₁₂ (%) | n-C ₅ H ₁₂ (%) | N ₂ and (or) air (%) | CO ₂ (%) | C ₂ + (%) | δ ¹³ C ₁ (‰) | δ ¹³ C ₂ (‰) | δ ¹³ C ₃ (‰) | Type of gas |
|-----|----------------------|----------|--------------------------------|---------------|--------------------|---------------------|-----------------------------------|-----------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|---------------------------------|---------------------|-------------------------|---------------------------------------|---------------------------------------|---------------------------------------|-------------|
| | | | | | | | | | | | | | | | | | | | |
| 1 | G.W. Deahl No. 2R | Texas | sec. 25, Blk. Y-2, AB&M Survey | 1,752 | Leonardian | 75.78 | 7.15 | 4.12 | 0.48 | 1.17 | 0.30 | 0.30 | 10.38 | 0.32 | 15.14 | -44.0 | -32.2 | -164 | N |
| 2 | Burnett No. 3R | --do-- | sec. 25, Blk. Y-2, AB&M Survey | 1,736 | --do-- | 74.17 | 6.97 | 3.88 | 0.45 | 1.14 | .28 | .28 | 12.72 | .09 | 14.93 | -43.9 | ND | ND | N |
| 3 | Interstate No. C-6 | Kansas | sec. 20, T. 32 S., R. 43 W. | 1,265 | --do-- | 50.46 | 1.61 | 0.91 | 0.19 | 0.30 | .10 | 0.00 | 46.43 | 0.00 | 5.81 | -46.4 | ND | ND | N |
| 4 | G.W. Deahl No. 2 | Texas | sec. 25, Blk. Y-2, AB&M Survey | 2,385 | Wolfcampian | 63.00 | 10.63 | 10.12 | 1.69 | 3.69 | .88 | .92 | 8.44 | .60 | 30.74 | -42.0 | ND | ND | N |
| 5 | Burnett No. 5C | --do-- | sec. 79, Blk. 5, I&GN Survey | 2,415 | --do-- | 72.72 | 6.48 | 5.20 | .92 | 2.19 | .67 | .77 | 10.32 | .69 | 18.28 | -42.4 | ND | ND | N |
| 6 | Burnett No. 1-12 | --do-- | sec. 95, Blk. 5, I&GN Survey | 2,302 | --do-- | 75.62 | 6.25 | 4.88 | .87 | 1.93 | .61 | .70 | 8.73 | .37 | 16.81 | -41.8 | -34.3 | -154 | N |
| 7 | Burnett No. 7 | --do-- | sec. 49, Blk. 5, I&GN Survey | 2,315 | --do-- | 73.52 | 6.36 | 4.77 | .86 | 1.85 | .55 | .64 | 11.10 | .31 | 17.01 | -42.0 | ND | ND | N |
| 8 | Burnett No. 24 | --do-- | sec. 42, Blk. 5, I&GN Survey | 2,277 | --do-- | 76.99 | 6.30 | 4.33 | .73 | 1.71 | .02 | .01 | 9.75 | .14 | 14.56 | -42.1 | -34.00 | -157 | N |
| 9 | State No. 1 | Oklahoma | sec. 2, T. 1 N., R. 11 E.C.M. | 2,682 | --do-- | 54.97 | 4.90 | 4.00 | .58 | 1.23 | .28 | .28 | 33.57 | .18 | 17.03 | -42.8 | ND | ND | N |
| 10 | L.C. Christian No. 1 | --do-- | sec. 11, T. 1 N., R. 11 E.C.M. | 2,666 | --do-- | 76.76 | 7.80 | 4.77 | .44 | 1.36 | .24 | .37 | 7.96 | .30 | 16.33 | -46.1 | ND | ND | N |
| 11 | Sharpe No. 1 | --do-- | sec. 30, T. 1 N., R. 11 E.C.M. | 2,688 | --do-- | 59.20 | 5.38 | 3.90 | .53 | 1.19 | .98 | .30 | 29.07 | .15 | 16.36 | -42.5 | ND | ND | N |
| 12 | Myers No. 1 | --do-- | sec. 8, T. 2 N., R. 14 E.C.M. | 2,695 | --do-- | 69.85 | 6.07 | 3.66 | .43 | .97 | .19 | .21 | 18.49 | .13 | 14.17 | -42.8 | ND | ND | N |
| 13 | Macay No. 2 | --do-- | sec. 6, T. 5 N., R. 16 E.C.M. | 2,695 | --do-- | 72.39 | 6.08 | 3.51 | .42 | .84 | .16 | .15 | 16.27 | .16 | 13.38 | -42.5 | -33.4 | -163 | N |
| 14 | Hackay No. 1 | --do-- | sec. 6, T. 5 N., R. 16 E.C.M. | 2,695 | --do-- | 72.76 | 6.25 | 3.64 | .40 | .83 | .17 | .17 | 15.66 | .12 | 13.61 | -42.8 | ND | ND | N |
| 15 | Cargill No. 11 | Kansas | sec. 20, T. 32 S., R. 40 W. | 2,248 | --do-- | 67.97 | 5.88 | 3.66 | .39 | 1.02 | .26 | .27 | 20.41 | .15 | 14.44 | -43.5 | ND | ND | N |
| 16 | Cargill No. 2 | --do-- | sec. 20, T. 32 S., R. 40 W. | 2,201 | --do-- | 67.42 | 5.88 | 3.57 | .38 | .98 | .21 | .24 | 21.10 | .22 | 14.31 | -43.3 | -32.2 | -164 | N |
| 17 | Kinsler No. 1 | --do-- | sec. 8, T. 32 S., R. 40 W. | 2,183 | --do-- | 68.53 | 5.91 | 3.70 | .43 | .98 | .21 | .24 | 19.85 | .14 | 14.35 | -43.2 | ND | ND | N |
| 18 | Conan No. A-1 | --do-- | sec. 34, T. 31 S., R. 40 W. | 2,306 | --do-- | 70.24 | 6.43 | 3.95 | .41 | 1.11 | .24 | .28 | 17.18 | .15 | 15.04 | -43.5 | ND | ND | N |
| 19 | Conan No. A-2 | --do-- | sec. 34, T. 31 S., R. 40 W. | 2,302 | --do-- | 68.93 | 6.33 | 3.78 | .41 | 1.06 | .22 | .26 | 18.88 | .20 | 14.90 | -43.5 | ND | ND | N |
| 20 | Bond No. 1 | --do-- | sec. 13, T. 31 S., R. 40 W. | 2,405 | --do-- | 67.67 | 6.31 | 4.05 | .45 | 1.12 | .25 | .30 | 19.70 | .16 | 15.56 | -43.8 | ND | ND | N |
| 21 | Bond No. 2 | --do-- | sec. 13, T. 31 S., R. 40 W. | 2,637 | --do-- | 68.26 | 6.44 | 4.07 | .45 | 1.10 | .24 | .29 | 18.94 | .15 | 15.57 | -43.8 | ND | ND | N |
| 22 | Collingwood No. 6-1 | --do-- | sec. 25, T. 29 S., R. 40 W. | 2,265 | --do-- | 67.45 | 6.30 | 3.79 | .42 | 1.09 | .23 | .27 | 20.50 | .12 | 15.03 | -44.0 | ND | ND | N |
| 23 | Julian No. 3 | --do-- | sec. 1, T. 29 S., R. 40 W. | 2,290 | --do-- | 69.80 | 6.44 | 3.81 | .41 | 1.02 | .21 | .25 | 17.95 | .11 | 14.82 | -43.7 | -33.7 | -165 | N |
| 24 | Claypool | --do-- | sec. 33, T. 21 S., R. 35 W. | 2,630 | --do-- | 62.28 | 5.46 | 3.54 | 0.39 | 1.04 | .22 | .28 | 26.69 | .11 | 14.92 | -43.1 | -33.7 | -169 | N |
| 25 | Bentley | --do-- | sec. 32, T. 22 S., R. 35 W. | 2,564 | --do-- | 68.19 | 6.27 | 3.83 | .41 | 1.06 | .22 | .28 | 19.62 | .13 | 15.03 | -43.4 | ND | ND | N |
| 26 | Kenny | --do-- | sec. 25, T. 22 S., R. 38 W. | 2,570 | --do-- | 65.65 | 5.60 | 3.40 | .36 | .90 | .19 | .21 | 23.52 | .15 | 13.99 | -43.3 | ND | ND | N |
| 27 | Rohman No. A-1 | --do-- | sec. 35, T. 23 S., R. 38 W. | 2,660 | --do-- | 64.64 | 5.79 | 3.60 | .29 | .37 | .21 | .25 | 24.75 | .11 | 13.97 | -43.3 | -33.6 | -161 | N |
| 28 | Rohman No. A-2 | --do-- | sec. 35, T. 23 S., R. 38 W. | 2,836 | --do-- | 65.19 | 5.80 | 3.57 | .39 | .91 | .18 | .20 | 23.65 | .10 | 14.50 | -43.3 | ND | ND | N |
| 29 | Webster No. B-1 | --do-- | sec. 21, T. 33 S., R. 41 W. | 2,852 | Virgilian | 64.38 | 4.79 | 2.37 | .25 | .44 | .08 | .06 | 27.65 | 0.00 | 11.04 | -42.8 | -33.6 | ND | N |
| 30 | Webster No. C-4 | --do-- | sec. 25, T. 35 S., R. 43 W. | 2,589 | --do-- | 61.11 | 5.28 | 3.10 | .33 | .49 | .10 | 0.00 | 29.48 | .11 | 13.21 | -42.6 | -34.9 | ND | N |
| 31 | Roseberry No. 2 | Oklahoma | sec. 22, T. 3 N., R. 15 E.C.M. | 5,680 | Desmoinesian | 74.89 | 5.03 | 3.35 | .57 | 1.05 | .22 | .08 | 14.58 | .32 | 12.10 | -45.2 | ND | ND | A |
| 32 | L.C. Christian No. 2 | --do-- | sec. 14, T. 1 N., R. 11 E.C.M. | 6,237 | Horrowan | 65.45 | 5.85 | 3.76 | .47 | 1.03 | .22 | .24 | 22.76 | .21 | 15.03 | -42.7 | -35.9 | -172 | N |
| 33 | Gardner No. 1 | --do-- | sec. 14, T. 5 S., R. 14 E.C.M. | 6,752 | --do-- | 71.79 | 5.22 | 3.11 | .39 | .87 | .20 | .22 | 17.75 | .43 | 12.26 | -43.1 | ND | ND | N |
| 34 | Miggins No. 1 | --do-- | sec. 10, T. 2 S., R. 15 E.C.M. | 6,324 | --do-- | 75.83 | 6.00 | 3.75 | .47 | 1.19 | .30 | .38 | 11.82 | .25 | 13.76 | -43.8 | ND | ND | A |
| 35 | Wiggins No. 1 | --do-- | sec. 10, T. 2 S., R. 15 E.C.M. | 6,688 | --do-- | 77.33 | 5.99 | 3.67 | .46 | 1.18 | .30 | .40 | 10.27 | .41 | 13.42 | -43.7 | ND | ND | A |
| 36 | Carpenter No. 6-8 | --do-- | sec. 8, T. 5 S., R. 16 E.C.M. | 6,494 | --do-- | 90.36 | 2.48 | 1.06 | .14 | .28 | .09 | .10 | 5.08 | .40 | 4.40 | -39.9 | ND | ND | N |

Table 3. Chemical and isotopic analyses and location data for natural gas samples from Sooner Trend, Anadarko basin, Oklahoma
[ND, not determined; N, nonassociated gas; A, associated]

| No. | Well name | State | Location | Depth to Gas Pool (ft) | Producing Interval | CH ₄ (%) | C ₂ H ₆ (%) | C ₃ H ₈ (%) | i-C ₄ H ₁₀ (%) | n-C ₄ H ₁₀ (%) | i-C ₅ H ₁₂ (%) | n-C ₅ H ₁₂ (%) | N ₂ and (or) air (%) | CO ₂ (%) | C ₂ + (%) | δ ¹³ C ₁ (‰) | δ ¹³ C ₂ (‰) | δD ₁ (‰) | Type of gas |
|-----|----------------------|----------|-----------------------------|------------------------------------|---|------------------------|--------------------------------------|--------------------------------------|---|---|---|---|---------------------------------------|------------------------|-------------------------|---------------------------------------|---------------------------------------|------------------------|-------------------|
| 1 | Little Charlie No. 1 | Oklahoma | sec. 27, T. 9 N., R. 1 E. | 5,585 | Desmoinesian | 64.75 | 9.22 | 3.69 | 0.30 | 0.60 | 0.09 | 0.04 | 21.11 | 0.21 | 17.70 | -46.1 | -35.6 | -149 | A |
| 2 | Jarvis No. 1 | --do---- | sec. 23, T. 8 N., R. 1 W. | 6,362 | --do----- | 51.00 | 13.09 | 9.42 | 1.26 | 1.51 | .21 | .04 | 23.22 | .26 | 33.35 | -47.3 | ND | ND | A |
| 3 | Walker No. 1-35U | --do---- | sec. 35, T. 23 N., R. 12 W. | 6,168 | Mississippian | 82.84 | 4.27 | 1.72 | .26 | .28 | .07 | .02 | 10.42 | .12 | 7.40 | -42.3 | -31.2 | -146 | N |
| 4 | Dietz No. 1 | --do---- | sec. 32, T. 23 N., R. 12 W. | 6,616 | --do----- | 74.39 | 5.48 | 2.52 | .31 | .51 | .11 | .06 | 16.54 | .07 | 10.79 | -42.1 | ND | ND | A |
| 5 | Gilger No. 1 | --do---- | sec. 17, T. 22 N., R. 8 W. | 6,704 | --do----- | 64.88 | 4.43 | 1.45 | .20 | .32 | .07 | .03 | 28.31 | .32 | 9.09 | -43.1 | ND | ND | N |
| 6 | Schneider No. 1 | --do---- | sec. 14, T. 22 N., R. 8 W. | 6,635 | --do----- | 66.40 | 5.26 | 1.84 | .20 | .30 | .05 | .02 | 25.67 | .27 | 10.34 | -41.8 | ND | ND | N |
| 7 | Meadowlake No. 1 | --do---- | sec. 24, T. 22 N., R. 7 W. | 6,487 | --do----- | 70.81 | 5.63 | 1.92 | .24 | .21 | .02 | 0.00 | 20.95 | .21 | 10.19 | -43.8 | -31.7 | -142 | A |
| 8 | Quintle No. 1 | --do---- | sec. 34, T. 16 N., R. 9 W. | 8,587 | --do----- | 85.86 | 0.57 | 0.23 | .12 | .12 | .04 | .01 | 13.03 | .02 | 1.25 | -42.8 | ND | ND | N |
| 9 | Hill No. 1 | --do---- | sec. 1, T. 9 N., R. 6 W. | 9,678 | --do----- | 67.93 | 10.69 | 4.64 | .35 | .70 | .07 | .02 | 15.19 | .41 | 19.51 | -46.0 | -38.1 | -157 | A |
| 10 | Simmons No. 1 | --do---- | sec. 13, T. 16 N., R. 9 W. | 9,590 | Hunton Group | 66.08 | 8.92 | 3.71 | .42 | .49 | .07 | .01 | 20.09 | .21 | 17.09 | -46.7 | -31.0 | -150 | A |
| 11 | Killough No. 1-21 | --do---- | sec. 21, T. 13 N., R. 4 E. | 5,076 | --do----- | 67.61 | 5.80 | 2.46 | .16 | .32 | .04 | .02 | 23.51 | .08 | 11.52 | -45.3 | ND | ND | A |
| 12 | Rigdon Unit No. 2 | --do---- | sec. 28, T. 18 N., R. 4 W. | 5,978 | Simpson Group | 67.43 | 8.70 | 3.45 | .45 | .60 | .08 | .02 | 19.08 | .19 | 16.10 | -42.9 | ND | ND | N |
| 13 | Blaney Nos. 2, 3, 5 | --do---- | sec. 21, T. 18 N., R. 4 W. | 4,658 | Missourian and Simpson Group | 66.91 | 7.90 | 3.74 | .46 | .57 | .08 | .02 | 20.12 | .20 | 16.03 | -43.2 | ND | ND | A |
| 14 | Waswo No. 1 | --do---- | sec. 4, T. 15 N., R. 4 W. | 6,240 | Desmoinesian, Mississippian, and Hunton Group | 71.16 | 7.46 | 2.30 | .25 | .27 | .02 | .02 | 18.33 | .19 | 12.67 | -43.5 | ND | ND | A |
| 15 | Nach No. 1 | --do---- | sec. 11, T. 12 N., R. 6 W. | 7,945 | --do----- | 72.41 | 8.81 | 3.36 | .27 | .48 | .07 | .03 | 14.12 | .45 | 15.24 | -44.5 | -34.9 | -164 | A |
| 16 | Schein Nos. 1, 2, 3 | --do---- | sec. 9, T. 12 N., R. 6 W. | 7,410 | --do----- | 71.79 | 8.75 | 3.34 | .56 | .09 | .09 | .04 | 14.73 | .41 | 15.40 | -45.2 | ND | ND | A |
| 17 | FIFI No. 1 | --do---- | sec. 10, T. 15 N., R. 4 W. | 6,014 | --do----- | 71.5 | 8.17 | 2.89 | .28 | .47 | .07 | .03 | 16.33 | .25 | 14.30 | -43.6 | ND | ND | A |
| 18 | Omega No. 19-1 | --do---- | sec. 19, T. 16 N., R. 9 W. | 8,665 | Mississippian and Hunton Group | 76.31 | 6.37 | 2.07 | .28 | .38 | .08 | .09 | 14.28 | .14 | 10.84 | -43.1 | ND | ND | A |