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Ronald F. Broadhead

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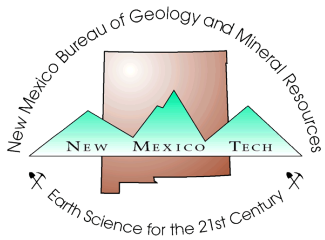

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Oil and gas discovery wells drilled in New Mexico in 1985

by *Ronald F. Broadhead*, Petroleum Geologist, New Mexico Bureau of Mines and Mineral Resources, Socorro, NM 87801

Introduction

The number of wells that were drilled in New Mexico for oil and gas in 1985 was more than the number that were drilled in 1984. Statistics obtained from the New Mexico Oil Conservation Division indicate that 2,047 wells were completed in 1985, up 14% from the 1,794 wells completed in 1984 and down 29% from the record 2,867 wells completed in 1981. In the Permian Basin, southeast New Mexico, 1,237 wells were completed in 1985, up from 1,154 completions in 1984; 792 wells were completed as oil producers, 186 wells were completed as gas producers, and 259 were plugged and abandoned, resulting in a success rate of 79%. In the San Juan Basin, northwest New Mexico, 863 wells were completed in 1985, up from 640 completions in 1984; 270 wells were oil producers, 539 were gas producers, and 54 were plugged and abandoned, resulting in a success rate of 94%. In addition, 41 wells were drilled to develop further the Bravo dome carbon dioxide gas field. A high level of exploration and drilling activity continued in the Tucumcari Basin. Significant oil discoveries were made in the previously nonproductive Española Basin. Significant exploratory wells were drilled in the not-yet-productive Raton, Albuquerque, Acoma, Estancia, Pedregosa, and Mesilla Basins, and on the Pedernal uplift in Lincoln County (Fig. 1).

Total footage of hole drilled in 1985 was 10,955,593 ft, up from 9,776,000 ft drilled in 1984. The average depth of wells drilled in 1985 was 5,352 ft, 97 ft less than the average depth of wells drilled in 1984.

For purposes of this report, a *significant wildcat discovery* is defined as 1) a well in which commercial amounts of oil or gas were discovered in a stratigraphic unit more than 5 mi from the limits of previously discovered pools with commercial production from that stratigraphic unit, or 2) a well that had an unusually high initial potential (more than 1,000 bbls oil per day or 10 million ft³ gas per day) and is 1–5 mi from the limits of previously discovered pools with commercial production from that stratigraphic unit. A *significant wildcat dry hole* is defined as a dry hole drilled in a not-yet-productive basin or a part of a basin where petroleum reservoirs were evaluated. The locations of significant wildcat wells that were drilled in 1985 are shown in Fig. 1. Table 1 summarizes the significant wildcat discoveries, and Table 2 summarizes the significant wildcat dry holes. Table 3 lists other significant wildcat wells that were being drilled, were not completed, or were held "tight" at the end of 1985.

Each well is designated by a number in parentheses that refers to its location in Fig. 1 and its description in Tables 1, 2, or 3.

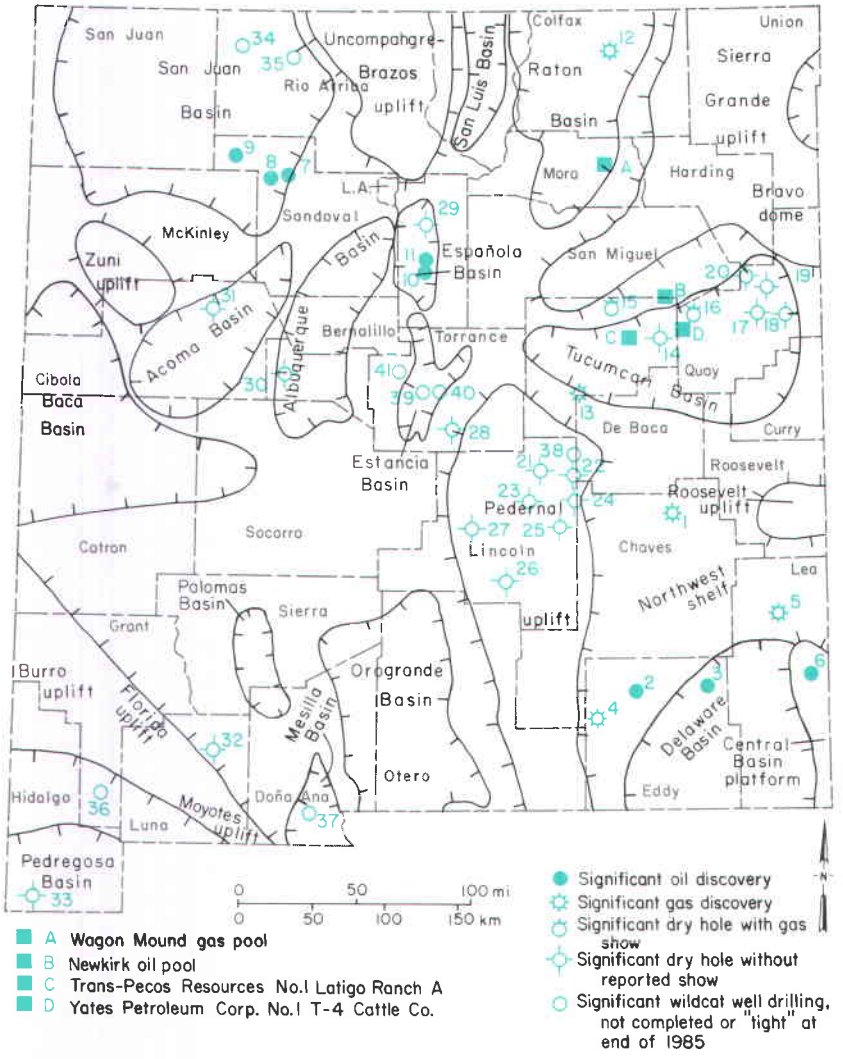

FIGURE 1—Significant oil and gas discoveries and wildcat wells drilled in New Mexico in 1985. Major geologic features are taken from Broadhead and King (1985), Cather and Johnson (1984), Kelley (1978), Kottlowski and Stewart (1970), Meyer (1966), Molenaar (1977), Thompson and Jacka (1981), and Woodward et al. (1978).

Southeast New Mexico

Drilling activity in 1985 was high in the three geologic subdivisions of the Permian Basin: the Delaware Basin, the Central Basin platform, and the Northwest shelf. Drilling activity was moderate on the Roosevelt uplift. The Permian Basin yielded several significant oil and gas discoveries in 1985 (Fig. 1; Table 1). Kinney (1967, pp. 26–27) presented stratigraphic charts of oil- and gas-producing rock units in southeast New Mexico.

The Delaware Basin, the deep-marine part of the Permian Basin, yielded one significant discovery in 1985. That discovery, in the Belnorth Petroleum No. 9 Nelson Federal 3 well (3), was oil in the Bone Spring Formation (Permian). Because of the slack gas market, exploration was concentrated on finding new oil reserves and not on finding new gas reserves. Development drilling in the Delaware Basin was almost exclusively for oil in 1985. Major targets for oil reservoirs in sandstones were the Delaware Mountain Group (Permian) and the Bone Spring Formation (Permian). Major targets for development drilling of oil reservoirs in carbonate rocks were the shallow (less than 6,000 ft) San Andres and Grayburg Formations (Permian) and the moderately deep (8,000–12,000 ft) upper Pennsylvanian and Wolfcampian (Permian) units. Few development gas wells were drilled in 1985. Those wells were drilled mostly for gas reservoirs in the shallow (less than 6,000 ft) Yates and Seven Rivers Formations (Permian) and the deep (10,000–14,000 ft) Morrowan and Atokan (Pennsylvanian) clastic units.

A high level of development drilling took place on the Central Basin platform, but only one significant wildcat discovery was made in this mature, densely drilled area. That discovery was oil in a Wolfcampian (Permian)

reservoir, in the Harvey E. Yates No. 1 Howry 25 well (6). Development drilling was mostly for oil in the San Andres, Grayburg, and Queen Formations (Permian) and in the Drinkard and Blinebry zones of the Yeso Formation (Permian). Most of the drilling in the San Andres and Grayburg Formations was done to develop waterflood operations because these units will produce oil with the aid of waterflood operations. The South Hobbs Grayburg–San Andres waterflood unit was developed extensively by Amoco in 1985 and the North Hobbs Grayburg–San Andres waterflood unit was developed extensively by Shell. When waterflood operations are no longer capable of producing oil economically, carbon dioxide flooding will be used in enhanced oil-recovery operations. Phillips Petroleum initiated pilot flooding at the East Vacuum Grayburg–San Andres unit in September.

The Northwest shelf was drilled actively in 1985, and several significant wildcat discoveries were made (1, 2, 4, 5). The most significant of these discoveries was gas in the Montoya Formation (Ordovician) in the Read & Stevens No. 1 North Haystack Federal well (1), which is located in northern Chaves County. That discovery is important because only minor production had been obtained previously from lower Paleozoic reservoirs in Chaves County. Petroleum was found in Permian reservoirs in two wells, the Yates Petroleum Corp. No. 1–4 Dinkus State GV (2) and the Exxon No. 1 Leggett Federal (4). Gas was found in the MWJ Producing No. 1 Elkins Com. 6 well (5) in the Atokan (Pennsylvanian). Exploration on the Northwest shelf was mostly for Permian and Pennsylvanian targets. San Andres oil was explored for intensely in 1985.

Development drilling on the northwest shelf was mostly for oil. Main targets were the shallow (less than 5,000 ft) Queen, Grayburg, and San Andres Formations (Permian) and shelf-edge dolostones of the Abo Formation (Permian). Most development drilling for gas was in the "tight" sands of the Pecos Slope Abo pool and the south Pecos Slope Abo pool of northern and central Chaves County. Abo gas was developed mostly to prevent drainage by offsetting wells and to hold leases that would expire if the gas was not developed. The south flank of the Roosevelt uplift was drilled actively in 1985, but no significant wildcat discoveries were made. Development drilling was mostly for oil in Pennsylvanian carbonate reservoirs.

Elsewhere in southeast New Mexico, Yates Petroleum Corp. drilled several exploratory wells (21–27, 38) in Lincoln County on the late Paleozoic-age Pedernal uplift. Those exploratory wells were used to test the Abo and Yeso Formations, but no discoveries were made and no hydrocarbon shows were reported. However, the lack of success of those few wells does not condemn the Pedernal uplift. The uplift is a complex tectonic feature and the distribution of traps and reservoirs in that area is poorly understood. Several more years of exploration and study of the uplift area may be needed before the petroleum potential is thoroughly evaluated.

TABLE 1—Significant wildcat discoveries in New Mexico in 1985; the term formation is used in an informal sense. **BOPD,** barrels of oil per day; **BWPD,** barrels of water per day; **MCFGPD,** thousand ft^3 of gas per day; **owwo,** old well worked over; **owdd,** old well drilled deeper; **NR,** not reported.

Number on Fig. 1	Location (section–township–range, County)	Operator well number, and lease	Completion date (mo/yr)	Total depth (ft)	Formation at total depth	Producing formation	Producing interval (ft)	Initial potential	Oil gravity (degrees API)
1	26–5S–26E, Chaves	Read & Stevens No. 1 North Haystack Federal	3/85	6,660	Granite (Precambrian)	Montoya (Ordovician)	6,450–6,462	968 MCFGPD	
2	16–18S–25E, Eddy	Yates Petroleum Corp. No. 1–4 Dinkus State GV (owwo)	3/85	8,810	Morrowan (Pennsylvanian)	Glorieta (Permian)	2,236–2,456	4 BOPD + 3 BWPD	
3	3–18S–30E, Eddy	Belnorth Petroleum No. 9 Nelson Federal 3	2/85	11,675	Morrowan (Pennsylvanian)	Bone Spring (Permian)	6,874–6,936	66 BOPD + 59 BWPD	35.8
4	22–20S–21E, Eddy	Exxon No. 1 Leggett Federal	9/85	8,425	Chester (Mississippian)	Wolfcampian (Permian)	5,994–6,400	378 MCFGPD	
5	6–13S–35E, Lea	MWJ Producing No. 1 Elkins Com. 6	6/85	13,406	Devonian	Atokan (Pennsylvanian)	11,642–11,648	587 MCFGPD	
6	25–17S–37E, Lea	Harvey E. Yates No. 1 Howry 25 (owwo)	8/85	11,565	Atokan (Pennsylvanian)	Wolfcampian (Permian)	10,054–10,094	72 BOPD	
7	6–20N–2W, Sandoval	Gary William Oil Producers No. 16 Johnson 6	1/85	4,996	Semilla (Cretaceous)	Gallup (Cretaceous) Semilla (Cretaceous)	4,156–4,582 4,930–4,967	368 BOPD + 47 MCFGPD	40
8	14–20N–4W, Sandoval	Diamond Shamrock No. 14 Penistaja 22	8/85	4,645	Semilla (Cretaceous)	Gallup (Cretaceous)	3,893–4,360	8 BOPD + 10 MCFGPD	38
9	33–22N–6W, Sandoval	Merrion Oil & Gas No. 1 Navajo	11/85	4,893	Gallup (Cretaceous)	Gallup (Cretaceous)	4,384–4,762	16 BOPD + 385 MCFGPD	41
10	1–13N–8E, Santa Fe	Black Oil Inc. No. 1 Ferrill (owdd)	11/85	3,696	Lower Mancos (Cretaceous)	Niobrara (Cretaceous) Lower Manocs (Cretaceous)	2,740–2,760 2,760–2,762	80 BOPD	48
11	26–14N–8E, Santa Fe	Chace Oil Co. No. 2 Piñon Unit	NR	7,455	NR	Gallup (Cretaceous)	NR	30 BOPD	
12	18–29N–22E, Colfax	Perma Energy No. 1 Rushton	1/85	3,374	Morrison (Jurassic)	Dakota (Cretaceous)	2,984–3,023	100 MCFGPD + 60 BWPD	
13	34–5N–19E, Guadalupe	Cummins & Walker No. 1 Salado Dome Federal Unit	2/85	4,753	Granite (Precambrian)	Yeso (Permian)	1,214–1,234; 1,658–1,666	230 MCFGPD + 10 BWPD	

Northwest New Mexico

In 1985, 863 wells were completed in northwest New Mexico; 640 wells were completed in 1984. Almost all of the wells were drilled in the San Juan Basin. In the record year of 1981, 1,379 wells were completed. The diminished rate of drilling since 1981 has been caused by a decreased market for gas, which is the primary petroleum product of the San Juan Basin.

Three significant oil discoveries, the Gary Williams Oil Producers No. 16 Johnson 6 (7), the Diamond Shamrock No. 14 Penistaja 22 (8), and the Merrion Oil & Gas No. 1 Navajo (9) wells, were made in the Gallup Sandstone (Cretaceous) at depths of 4,000–5,000 ft. The Gallup is the main oil-producing unit in the San Juan Basin. The most prolific Gallup production is from northwest-trending offshore sand bars (Campbell, 1979), which many workers refer to as Tocito sands. Some oil is produced from basinal silty shales northeast of the main Gallup trend. All three discoveries are on the main Gallup trend, but they are southeast of previously discovered oil pools; this indicates that significant oil reserves may remain undiscovered in the Gallup Sandstone.

The Phillips Petroleum No. 112–Y San Juan 30–6 well (34) was spudded in 1985 and drilled to a total depth of 14,000 ft. The Barker Creek Formation (Pennsylvanian) was tested through perforations from 13,195 to 13,214 ft and gas flowed at a rate of 350 MCFGPD (thousand ft^3 gas per day). Although the Phillips well was not completed at the end of 1985, it is a significant wildcat because it tested the Paleozoic section. Only about 30 wildcat wells have tested the Paleozoic section in the New Mexico part of the San Juan Basin; most wells stop in the shallower, prolific Cretaceous and Jurassic pay zones. Production from Paleozoic reservoirs is limited to nine small fields in the northwest part of the basin. Paleozoic reservoirs are Devonian, Mississippian, and Pennsylvanian. The location for another significant Paleozoic test, the Union Oil of California No. 1 Jicarilla H–9 well (35), was staked in 1985. Because the Paleozoic section of the San Juan Basin has been drilled sparsely, it remains a frontier for petroleum exploration.

Development drilling for oil in the San Juan Basin was concentrated in the Gallup Sandstone (Cretaceous). The Bisti Gallup oil pool of San Juan County was developed extensively in 1985. Several development oil wells were completed in two or more of the following stratigraphic units: Gallup Sandstone, Dakota Sandstone, Mancos Shale, Graneros Shale, Greenhorn Limestone, and/or Juana Lopez Member of the lower Mancos Shale (Cretaceous). The producing interval of each completion zone is typically 300–500 ft thick. Stone et al. (1983) summarized the stratigraphy of Cretaceous rocks in the San Juan Basin. ☞

TABLE 2—Significant wildcat dry holes in New Mexico in 1985; the term formation is used in an informal sense. **D&A,** dry and abandoned; **TA,** temporarily abandoned; **NR,** not reported; **DST,** drill-stem test; **owdd,** old well drilled deeper.

Number on Fig. 1	Location (section–township–range, County)	Operator well number, and lease	Completion date (mo/yr)	Total depth (ft)	Formation at total depth	Status	Comments
14	34–9N–25E, Guadalupe	Baker & Taylor No. 1 Reilly Minerals	1/85	7,825	Granite (Precambrian)	D&A	No reported shows
15	19–11N–22E, Guadalupe	McClellan Oil No. 3 Burner Fee	7/85	6,100	NR	TA	DST 5,034–5,113 ft (Pennsylvanian), had fair blow and recovered gas; DST 3,996–4,075 ft (Pennsylvanian), recovered gas; Perf 1,010–2,700 ft, swabbed load water with gas show
16	12–10N–27E, Quay	Yates Petroleum Corp. No. 1 T–4 Filly's Tooth	7/85	7,705	Pennsylvanian	D&A	DST 6,760–6,820 ft (Pennsylvanian), weak blow, received 710 ft mud
17	15–10N–32E, Quay	Gulf Oil Corp. No. 1 Whatley	6/85	8,484	Granite (Precambrian)	D&A	No reported shows
18	10–10N–34E, Quay	Murray Hill Oil & Gas No. 1 Stoner Unit	5/85	6,800	Pennsylvanian	D&A	No reported shows
19	20–12N–33E, Quay	Onshore Exploration No. 1 Bahr Megan	4/85	4,065	Pennsylvanian	D&A	No reported shows
20	25–13N–31E, Quay	Canyon Resources No. 1 Harvey/US	6/85	3,398	Sangre de Cristo (Pennsylvanian)	D&A	No reported shows
21	19–2S–17E Lincoln	Yates Petroleum Corp. No. 1–Y Cowboy Mesa Federal AAY	2/85	2,579	Granite (Precambrian)	D&A	No reported shows
22	27–2S–19E, Lincoln	Yates Petroleum Corp. No. 1 Chisum Federal AAW	1/85	4,100	Precambrian	D&A	No reported shows
23	21–4S–16E, Lincoln	Yates Petroleum Corp. No. 1 Asparas Federal ABX	2/85	2,780	Granite (Precambrian)	D&A	No reported shows
24	27–4S–19E, Lincoln	Yates Petroleum Corp. No. 1 Yardstick Federal AAV	1/85	3,750	Precambrian	D&A	No reported shows
25	27–6S–19E, Lincoln	Yates Petroleum Corp. No. 1 Macho Uno Federal ABL	2/85	3,532	Precambrian	D&A	No reported shows
26	10–10S–15E, Lincoln	Yates Petroleum Corp. No. 1 Munoz Canyon Federal AAN	5/65	2,800	Precambrian	D&A	No reported shows
27	20–6S–13E, Lincoln	Dalton Kincheloe No. 1 Arnold Federal	3/85	3,572	Precambrian	D&A	No reported shows
28	13–2N–10E, Torrance	Stevens Oil No. 1 Hobbs	8/85	1,590	Granite (Precambrian)	D&A	No reported shows
29	24–17N–8E, Santa Fe	Yates Petroleum Corp. No. 2 La Mesa Unit	7/85	7,710	Precambrian	D&A	No reported shows
30	19–6N–2W, Valencia	Brana Corp. No. 2 Penteco Trinity	7/85	2,840	Precambrian	D&A	No reported shows
31	36–11N–8W, Cibola	Topaz Southwest No. 1 State (owdd)	5/85	2,900	Entrada (Jurasssic)	D&A	No reported shows
32	27–22S–7W, Luna	May Energy No. 1 May Energy	7/85	5,900	Abo (Permian)	D&A	Spudded in 1982; No reported shows
33	10–33S–20W, Hidalgo	Arco Oil & Gas No. 1 Fitzpatrick	4/85	10,795	Epitaph (Permian)	D&A	No reported shows

Development drilling for gas in the San Juan Basin was concentrated on sandstone reservoirs in the Pictured Cliffs Sandstone, Mesaverde Group, and Dakota Sandstone (Cretaceous). Amoco and El Paso Natural Gas continued their extensive infill drilling of the Dakota Basin gas pool. Other targets of gas drilling were the Fruitland Formation and the Chacra zone (Cretaceous).

The Española Basin is a frontier basin in which two significant discoveries were made. Oil was found in the Black Oil Inc. No. 1 Ferrill well (10) in fractured Niobrara and lower Mancos shale; the oil gravity was 48° API. Oil was found in the Chace Oil Co. No. 2 Piñon Unit well (11) in strata reported to be Gallup Sandstone (Cretaceous). Although production decreased rapidly to subeconomic volumes after completion of the well, the Piñon Unit is nevertheless an important oil discovery. If the Black Oil Inc. No. 1 Ferrill well sustains a commercial amount of oil production for any appreciable amount of time, it would be the most significant frontier basin discovery in New Mexico since the discovery of the Wagon Mound gas pool (Fig. 1, letter A) in Mora County in 1973. Elsewhere in the Española Basin, the Yates Petroleum Corp. No. 2 La Mesa Unit well (29) was abandoned at a total depth of 7,710 ft in Precambrian rocks. The well remains "tight," but no shows were reported; it had been scheduled to be drilled to 8,300 ft to test the Paleozoic section.

Four wildcats were drilled by the Brana Corporation on the west edge of the Albuquerque Basin. All four wells were drilled in a quarter section on a small fault block; only the deepest of the four wells (30) is reported here. All four wells were dry and no shows were reported. In the Acoma Basin, the Topaz Southwest No. 1 State well (31) was drilled to a total depth of 2,900 ft in the Entrada Sandstone (Jurassic), but it was abandoned with no reported shows.

Northeast New Mexico

Several petroleum exploration wells were drilled in northeast New Mexico in 1985. Petroleum has not been produced in this area except for a brief period when marginally commercial amounts of gas were produced from the Morrison Formation (Jurassic) and the Dakota Sandstone (Cretaceous) at the currently inactive Wagon Mound field in Mora County (Fig. 1, letter A). The Newkirk pool (Fig. 1, letter B) produced 362 bbls of heavy oil from the Santa Rosa Sandstone (Triassic) with the aid of a pilot steamflood project.

Some of the wells were drilled as a result of low-volume oil and gas discoveries in Pennsylvanian reservoirs found by Trans-Pecos Resources in 1982 (Fig. 1, letter C) and by Yates Petroleum Corp. in 1983 (Fig. 1, letter D) in the Tucumcari Basin. Currently, those discoveries are shut in. Several exploratory tests were drilled in 1985, and seven of the deepest ones are reported here (14–20). The McClellan Oil Corp. No. 3 Burner Fee well (15) was temporarily abandoned at a total depth of 6,100 ft; gas shows were reported in the Pennsylvanian section. Petroleum was not recovered during a drill-stem test of the Pennsylvanian section in the Yates Petroleum Corp. No. 1 T–4 Filly's Tooth well (16), but it had a weak blow, which may indicate the presence of hydrocarbon-charged reservoirs. The other five Paleozoic exploration wells reached total depth in the Pennsylvanian or Precambrian. Although no shows were reported from those wells, their presence indicates the continued interest of exploration companies in the Tucumcari Basin.

Exploration for Cretaceous petroleum continued in the Raton Basin in 1985. The Perma Energy No. 1 Rushton well (12) was completed as a low-volume discovery well in the Dakota Sandstone through perforations from 2,984 to 3,023 ft. Several similar low-volume gas discoveries have been completed in Cretaceous sands of the Raton Basin in the last 10 years. All of those wells are shut in and no gas has been produced from the New Mexico part of the Raton Basin. Low-volume gas wells in the Raton Basin are shut in because of the poor gas market and the lack of adequate pipeline facilities. The Jurassic and Paleozoic sections remain virtually untested in the Raton Basin. In addition, the Cretaceous section has not been tested adequately.

Four significant wildcat wells were drilled in the Estancia Basin in 1985 (28, 39–41). The Benz, Lyle, & Curtis No. 1 Benz well (40) was drilled to a total depth of 1,500 ft and

was held "tight" at the end of 1985; small volumes of oil and gas were reportedly recovered from the Yeso Formation (Permian). The MAR Oil and Gas No. 1 Estes well (39) was drilled to a total depth of 2,913 ft and had not been completed at the end of 1985; the Pennsylvanian section was tested, and oil, water, and carbon dioxide gas were reportedly recovered. The Stevens Oil No. 1 Hobbs (28) and the John Aday No. 2 D'Spain (41) wells were drilled, and no shows were reported.

The Bravo dome carbon dioxide gas field continued to be developed and 41 wells were completed. The main reservoir is the Tubb sand (Permian). Carbon dioxide produced from the Bravo dome will be used for enhanced oil recovery in the Permian Basin of west Texas and southeast New Mexico. Most of the carbon dioxide will be transported to the Permian Basin by the recently completed Bravo pipeline. The Sheep Mountain pipeline will transport carbon dioxide to the Permian Basin from the Bravo dome field and from the Sheep Mountain field in southeast Colorado.

TABLE 3—Significant wildcat wells that were drilling, not completed, or "tight" at the end of 1985 in New Mexico. **MCFGPD,** thousand ft^3 of gas per day.

Number on Fig. 1	Location (section–township–range, County)	Operator well number, and lease	Comments
34	26–30N–6W, Rio Arriba	Phillips Petroleum No. 112–Y San Juan 30–6	Drilled to total depth of 14,000 ft; perforated and acidized Barker Creek Formation (Pennsylvanian) from 13,195–13,214 ft; flowed 350 MCFGPD
35	9–29N–2W, Rio Arriba	Union Oil of California No. 1 Jicarilla H–9	Scheduled to be drilled to 12,900 ft to test Pennsylvanian section
36	33–25S–15W, Grant	Marshall Young Oil Co. No. 1 Salty's Unit	Drilled "tight" to total depth of 9,775 ft
37	4–27S–1E, Doña Ana	Phillips Petroleum No. 1 Sunland Park Unit	Scheduled to be drilled to 22,000 ft to test Paleozoic section; "tight" hole
38	10–1S–19E, Lincoln	Yates Petroleum Corp. No. 1 Ramon ABA	Drilled "tight" to total depth of 4,300 ft
39	35–5N–8E, Torrance	MAR Oil & Gas No. 1 Estes	Drilled "tight" to total depth of 2,913 ft; perforated Pennsylvanian; recovered oil, CO_2, and water
40	18–5N–9E, Torrance	Benz, Lyle, & Curtis No. 1 Benz	Drilled to total depth of 1,500 ft; perforated Yeso (Permian); swabbed oil- and gas-cut water
41	12–6N–6E, Torrance	John Aday No. 2 D'Spain	Drilled to total depth of 1,900 ft

Southwest New Mexico

Exploratory drilling for oil and gas continued in southwest New Mexico in 1985. In the Pedregosa Basin, the Arco No. 1 Fitzpatrick well (33) was drilled to a total depth of 10,795 ft before it was abandoned in reported Permian rocks. In Grant County, the Marshall Young No. 1 Salty's Unit well (36) was drilled "tight" to a total depth of 9,775 ft. The Phillips Petroleum No. 1 Sunland Park Unit (37) is a "tight" hole that was scheduled to be drilled to 22,000 ft to test the Paleozoic section.

Although there is no current petroleum production in southwest New Mexico, there is potential for future production. The Paleozoic and Lower Cretaceous sections in the Pedregosa Basin area are particularly promising (Thompson, 1980, 1981).

The sparsely drilled Baca Basin of Catron County and western Socorro County has also drawn interest. In the last two years approximately 3 million acres of land have been leased by several firms including Shell, Elf Aquitane, Sohio, Hunt Oil Co., High Plains Petroleum Corp., Monarch Petroleum Corp., Leed Petroleum Corp., Zimmerman Resources, Love Oil Co., the New Mexico and Arizona Land and Cattle Co., and Sam, Gary, and Greg Merrion. Although no wells have been drilled in the Baca Basin since 1979, the area has been explored extensively with reflection seismology. Possible reservoir objectives in the Baca Basin are Upper Cretaceous sandstones, the San Andres, Yeso, and Abo Formations (Permian), and Pennsylvanian sandstones and limestones.

Effect of discoveries on oil and gas production

In 1984, New Mexico was the seventh largest producer of crude oil and the fourth largest producer of natural gas in the United States (Energy Information Administration, 1985). Production of crude oil and natural gas liquids in 1984 was 79.3 million bbls, an increase of 5.5% from the 75.2 million bbls produced in 1983. Oil production decreased by approximately 2% in 1985 (New Mexico Oil Conservation Division data). Production of natural gas in 1984 was 947 billion ft^3, an increase of 6.9% from the 886 billion ft^3 produced in 1983. Gas production decreased by approximately 6% in 1985 (New Mexico Oil Conservation Division data). In 1984, 93% of the state's oil and 52% of the state's gas were produced from the Permian Basin; 7% of the state's oil and 48% of the state's gas were produced from the San Juan Basin. As of December 31, 1984, New Mexico had oil reserves of 941 million bbls, an increase of 84 million barrels from December 31, 1983. As of December 31, 1984, New Mexico had gas reserves of 15.3 trillion ft^3, a decrease of 0.4 trillion ft^3 from December 31, 1983. The oil reserves include oil that can be recovered by enhanced-recovery techniques.

The decrease in oil production in 1985 can be attributed to two factors. First, oil reserves found and developed during the "boom" drilling years of 1980–1982 reached peak development and production in 1983 and 1984. Because of the drilling slump of 1983–1985, reserves in larger pools were not developed quickly enough to supplant previously developed reserves that were depleted by production. Approximately 70% of the oil produced in southeast New Mexico is from 10 pools; production from those pools is declining at an average of 4–12% annually (Stamets et al., 1985). Second, the declining price of oil lowered oil production. The price of west Texas intermediate crude oil with a gravity of 40° API fell 2.7% from $28.00/bbl in January 1985 (Oil and Gas Journal, 1985) to $27.25/bbl in January 1986 (Oil and Gas Journal, 1986a). Because of the decrease in price, economically marginal wells are less attractive to operate and produce.

Continued oil discoveries in the Permian and San Juan Basins will encourage exploratory drilling and development and should help prevent production declines in the future. In the last five years, oil discoveries in the Delaware Mountain Group (Permian Basin), the Bone Spring Formation (Permian Basin), and the Gallup Sandstone (San Juan Basin) provide major new exploration targets and add new oil reserves and production that will supplant declining production from older oil pools. Production declines will be slowed in the more distant future by implementation of carbon dioxide flooding of existing fields. Foster (1980, p. 3) estimated that 4.6–11 million bbls of oil per day could be produced with carbon dioxide flooding techniques. Such additional production would replace waning production from older fields, but would not constitute an increase in reserves. Significant increases in oil reserves may be made by the discovery of new oil pools in the already productive Permian and San Juan Basins or by the discovery of oil pools in the not-yet-productive frontier areas, such as the Tucumcari, Española, Albuquerque, Acoma, Baca, and Pedregosa Basins, or in the Paleozoic section of the San Juan Basin.

The decrease in gas production in 1985 was caused by a decreased demand for gas, rather than a decreased capability to produce gas. The large decline in gas production was caused primarily by a poor market for gas in California, the chief consumer of New Mexico gas. The future of gas production in New Mexico is uncertain because of the unknown demand for and price of gas in the future. The American Gas Association has predicted no large increase in gas demand for 1986 (Oil and Gas Journal, 1986b), but the long-term demand for gas is predicted to increase (American Gas Association, 1984).

Decreased demand for gas has caused a marked decrease in exploration. Some of the produced gas reserves were not replaced by new discoveries, and reserves declined ac- ☞

cordingly. Generally, only the very best gas prospects, or those gas prospects required to hold leases, were drilled in 1985. However, existing gas pools in the San Juan Basin continued to be developed.

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Association for Women Geoscientists field trip

Kate Johnson of the USGS, a noted expert on the Salmon River area of west-central Idaho, will lead a three-day trip on the Salmon River on July 4–6, 1986. The lower canyons of the Salmon River cut through some of the most spectacular country anywhere in the U.S. Johnson will discuss the local outcrops of Tertiary and Cretaceous rocks exposed in the canyon and the regional geology and tectonic setting of the area. In addition, we will have ample time to study the modern point-bar deposits of the Salmon River, which are exposed as white sand beaches that make some of the best campsites in the west. The cost of $300 for members and $350 for nonmembers includes all expenses on the river and round-trip transportation between Grangeville, Idaho, and the river. The trip is limited to 24 people. For information call Marcia Knadle at (206) 593–6510 or Jeanne Harris at (303) 694–6076, or write to: Association for Women Geoscientists, National Field Trip, Box 1005, Menlo Park, California 94024.

Society of Economic Paleontologists and Mineralogists courses

May 30, 1986 SEPM short course "Glacial sedimentary environments," in Champaign, Illinois.

June 14–15, 1986 SEPM short course "Structures and sequences in clastic rocks," in Atlanta, Georgia.

June 14–15, 1986 SEPM short course "Modern and ancient deep sea fan sedimentation," in Atlanta, Georgia.

June 15, 1986 SPEM short course "Paleoclimatology and economic geology," in Atlanta, Georgia.

June 15, 1986 SEPM core workshop "Modern and ancient shelf clastics," in Atlanta, Georgia.

August 1–2, 1986 SEPM field seminar, "Paleozoic and Mesozoic rocks of the Golden–Boulder area and Denver Basin, Colorado," in Golden, Colorado.

For more information or to register for any of the above courses, contact: Joni C. Merkel, Society of Economic Paleontologists and Mineralogists, P.O. Box 4756, Tulsa, Oklahoma 74159–0756, (918) 743–2498.

Editor's note: Because several articles in this issue include both conventional (American and British) and metric units, I have reprinted below the current policy on use of measurements in *New Mexico Geology*. Comments are invited.

The general policy is that measurements should be given in the units *originally* used and conversions will not be given in parentheses unless specifically requested by the author. This means:

1) Geographic distances or elevations in the U.S. should be given in conventional units (miles, yards, feet) regardless of the kind of measurements used elsewhere in the paper.
2) Field, section, fossil, or other measurements made *originally* in metric units should be reported that way even if this means that some measurements in the paper are reported in standard units (. . . the study area is 10 miles north of Socorro . . .) and some are reported in metric units (. . . the 6-m-thick section . . .; . . . we used a 2-mm mesh screen to . . .).
3) Any quoted material must, of course, be identical to the original published text. Conversion of meters to feet within a quote (. . . "the 6-m-[19.7-ft-] thick section . . .") is unnecessary even if in the rest of the paper only standard units are used.
4) An exception is made on figures where we require one scale bar that has *both* metric and conventional units delineated.