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Oil and gas discovery wells drilled in New Mexico in 1983

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Introduction

The number of wells drilled for oil and gas in New Mexico in 1983 was less than the number of wells drilled for oil and gas in New Mexico in 1982. Statistics obtained from the New Mexico Oil Conservation Division indicate that 1,869 wells were completed in New Mexico in 1983, down 19% from the 2,313 wells completed in 1982. In the Permian Basin of southeast New Mexico, 1,178 wells were completed in 1983, down from 1,529 completions in 1982; 598 of the Permian Basin wells were completed as oil producers while 317 were completed as gas producers and 263 were plugged and abandoned resulting in a success rate of 78%. In the San Juan Basin of northwest New Mexico, 691 wells were completed in 1983, down from 784 completions in 1982; 253 of the San Juan Basin wells were oil producers, 338 were gas producers, and 100 were plugged and abandoned for a success rate of 86%. In addition, 34 wells were drilled to develop the Bravo dome carbon dioxide gas field of northeast New Mexico. Several wildcat wells were drilled to follow up on the 1982 discovery of gas in the Tucumcari Basin. Wildcat wells were plugged in the not-yet-productive Raton, Acoma, and Hagan Basins and in Luna and Doña Ana Counties of southwest New Mexico.

Total footage of holes drilled was 9,146,148 ft in New Mexico in 1983, down from approximately 12,000,000 ft drilled in 1982. The average depth of wells drilled in 1983 was 4,894 ft, approximately 300 ft less than the average depth of wells drilled in 1982. The shallower drilling depths indicate increased emphasis on the development of shallow oil reservoirs.

Fig. 1 shows the location of significant wildcat wells drilled in New Mexico in 1983; Table 1 summarizes the significant wildcat discoveries, and Table 2 summarizes the significant dry holes. For purposes of this re- ☞

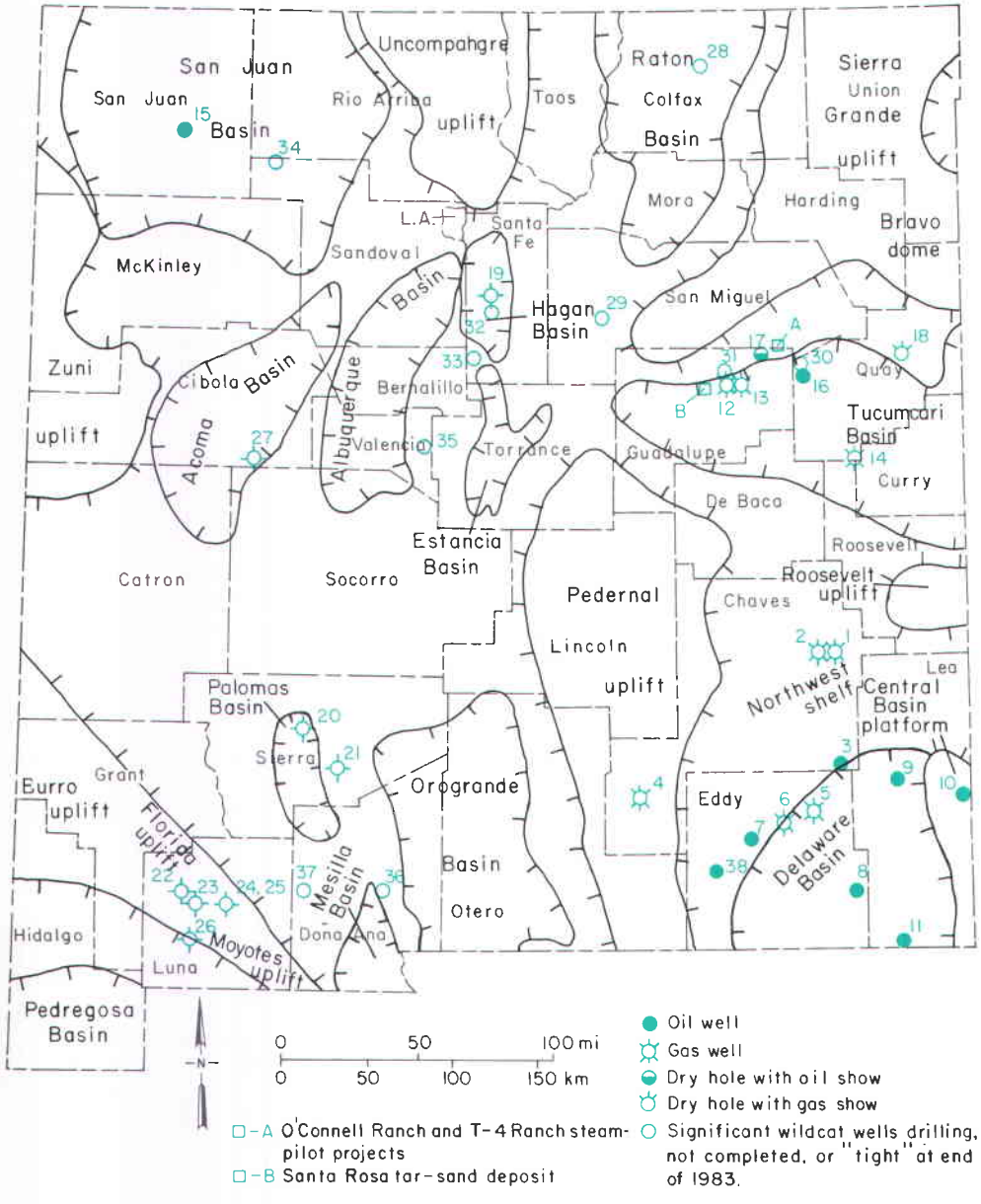

FIGURE 1—Significant oil and gas discoveries and wildcat dry holes drilled in New Mexico during 1983. Major geologic features are taken from Black (1979), Kottlowski and Stewart (1970), Meyer (1966), Molenaar (1977), Roberts et al. (1976), Thompson et al. (1978), and Woodward et al. (1978).

Also in this issue

Coming soon

Jackpile Sandstone Member—a formal definition
Temperature of mineralization in the Mogollon mining district
Early Paleocene vertebrates of Gallegos Canyon

port, a significant wildcat discovery is defined as a well in which commercial amounts of oil or gas have been discovered at a distance of more than five miles from the limits of previously discovered fields with commercial production from that formation. A significant wildcat dry hole is defined as a well drilled in an unproductive basin or part of a basin in which wells were drilled through potential petroleum reservoirs. Table 3 lists wildcats that were being drilled, were not completed, or were held "tight" at the end of 1983 and which were located in unproductive basins or parts of basins.

Southeast New Mexico

Drilling activity has remained fairly high in three of the four geologic subdivisions of the Permian Basin in southeast New Mexico: the Delaware Basin, the Central Basin platform, and the Northwest shelf. The Roosevelt uplift saw little drilling activity in 1983. The Permian Basin yielded several significant oil and gas discoveries in 1983 (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 of Eddy and west Lea Counties yielded several significant wildcat discoveries in 1983. Oil was discovered in two wells in the Strawn Series. The Hilliard Oil and Gas No. 1 McClellan Federal Commission (Fig. 1, no. 3; Table 1, no. 3) had an initial potential of 225 bbls of oil per day (BOPD) from the Strawn through perforations from 10,628 through 10,636 ft. The Tenneco Oil Company No. 1 State Commission 28 LF (Fig. 1, no. 9; Table 1, no. 9) had an initial potential of 37 BOPD and 2 bbls of water per day (BWPD) from the Strawn through perforations from 12,334 to 12,350 ft. Near the northern margin of the Delaware Basin, the Forister & Sweatt No. 2 Hewitt Federal (Fig. 1, no. 5; Table 1, no. 5) found gas in the San Andres Formation (Permian), and the Yates Petroleum Corporation No. 1 Bluffside Federal WF (Fig. 1, no. 6; Table 1, no. 6) found gas in the Chester Series (Mississippian). Farther west, the Amoco Production Company No. 1 Rio Siete (Fig. 1, no. 7; Table 1, no. 7), a workover of a Morrow gas well, yielded oil from rocks correlated with the Glorieta Sandstone (Permian). Farther south toward the center of the Basin, the Yates Petroleum Corporation No. 1 Medano State VA (Fig. 1, no. 8; Table 1, no. 8) made a small oil discovery in Wolfcampian (Permian) rocks. The Pogo Producing Company No. 1 Mosbacher 20 (Fig. 1, no. 11; Table 1, no. 11) discovered gas in Wolfcampian rocks. Major targets of development drilling in the Delaware Basin in 1983 were gas in Pennsylvanian rocks, including the Morrow, Atoka, Strawn, and Cisco Series and oil in sandstones of the Delaware Mountain Group (Permian), the Bone Spring Limestone (Permian), and the San Andres, Grayburg, and Queen Formations (Permian). Improved artificial-fracturing techniques have minimized formation damage to clay-bearing sandstones of the Delaware Mountain Group and have resulted in higher permeabilities and increased production; because of this increased production, drilling for oil in Delaware sand reservoirs has boomed (Mickey, 1983c).

The Central Basin platform of east Lea County also saw a high level of drilling activity in 1983, but only one significant wildcat discovery was made in this densely drilled area. That discovery well was the Cabana Oil Corporation No. 1 Carter Estate (Fig. 1, no. 10; Table 1, no. 10), which found oil in the Yeso Formation (Permian). Development drilling of shallow oil reservoirs in the San Andres, Grayburg, and Queen Formations (Permian) and the Tubb, Drinkard, and Blinebry zones of the Yeso Formation (Permian) predominates on the Central Basin platform. Several fields produce oil with the aid of waterflood operations. Martin and Taber (1982) received encouraging results in

TABLE 1—SIGNIFICANT WILDCAT DISCOVERIES IN NEW MEXICO IN 1983; the term formation is used in an informal sense. **NR,** not released; **BOPD,** barrels of oil per day; **BWPD,** barrels of water per day; **MCFGPD,** thousand ft³ of gas per day.

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	Gravity (degrees API)
1	21-8S-29E, Chaves	Stevens Operating Corp. No. 1 Red Lake Ridge	10/83	8,530	Montoya (Ordovician)	Atoka (Pennsylvanian)	7,712–7,726	1,600 MCFGPD	--
2	26-8S-29E, Chaves	Amoco Production Co. No. 1 O'Brien Ranch	6/83	9,174	Fusselman (Silurian)	Mississippian	8,398–8,520	1,110 MCFGPD	--
3	27-15S-30E, Chaves	Hilliard Oil & Gas Inc. No. 1 McClellan Federal Com.	2/83	11,420	Mississippian	Strawn (Pennsylvanian)	10,628–10,636	225 BOPD	46
4	20-17S-18E, Chaves	Yates Petroleum Corp. No. 1 Little Cuevo Unit	3/83	5,840	Precambrian	Strawn (Pennsylvanian)	4,423–4,430	340 MCFGPD	--
5	20-18S-29E, Eddy	Forister & Sweatt No. 2 Hewitt Federal	4/83	3,100	San Andres (Permian)	Yates (Permian)	1,080–1,142	357 MCFGPD	--
6	9-19S-27E, Eddy	Yates Petroleum Corp. No. 1 Bluffside Federal WF	2/83	10,250	Mississippian	Chester (Mississippian)	10,170–10,194	490 MCFGPD	--
7	11-20S-25E, Eddy	Amoco Production Co. No. 1 Rio Siete (owwo)	1/83	9,865	Barnett (Mississippian)	Glorieta (Permian)	2,948–2,978	16 BOPD + 15 BWPD	NR
8	16-23S-31E, Eddy	Yates Petroleum Corp. No. 1 Medano State VA (owwo)	4/83	15,000	Morrow (Pennsylvanian)	Wolfcamp (Permian)	11,966–11,990	3 BOPD + 46 BWPD	42
9	28-16S-34E, Lea	Tenneco Oil Co. No. 1 State Com. 28 LF	3/83	13,200	Mississippian	Strawn (Pennsylvanian)	12,334–12,350	37 BOPD + 2 BWPD	43.7
10	32-17S-39E, Lea	Cabana Oil Corp. No. 1 Carter Estate	4/83	8,000	Wolfcamp (Permian)	Yeso (Permian)	6,410–6,436	125 BOPD + 5 BWPD	NR
11	20-26S-34E, Lea	Pogo Producing Co. No. 1 Mosbacher 20	4/83	20,100	Sylvan (Silurian)	Wolfcamp (Permian)	13,382–13,423	2,145 MCFGPD	--
12	4-9N-23E, Guadalupe	Trans-Pecos Resources No. 1 Latigo Ranch Block C	2/83	7,407	NR	Pennsylvanian	6,746–6,819	16.5 MCFGPD	--
13	6-9N-24E, Guadalupe	Trans-Pecos Resources No. 2 Latigo Ranch Block B	4/83	7,241	NR	Pennsylvanian	6,742–6,883	16 MCFGPD	--
14	36-5N-30E, Quay	DeSana Corp. No. 1 Wichita	4/83	7,150	Granite (Precambrian)	San Andres (Permian)	2,070–2,091	519 MCFGPD	--
15	27-24N-12W, San Juan	Dugan Production Co. No. 2 Snuffle Upagus	4/83	5,103	Dakota (Cretaceous)	Gallup (Cretaceous)	3,826–3,859	30 BOPD + 30 MCFGPD	40
16	5-10N-27E, Quay	Yates Petroleum Corp. No. 1 T-4 Cattle Co.	3/83	7,235	NR	Pennsylvanian	7,005–7,120	48 BOPD + 1,100 MCFGPD	40
38	4-22S-22E, Eddy	Phillips Oil Co. No. 1 Rocky	12/83	6,500	Wolfcamp (Permian)	Yeso (Permian)	2,145–2,150	9 BOPD + 3 BWPD	32

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TABLE 2—SIGNIFICANT WILDCAT DRY HOLES IN NEW MEXICO IN 1983; the term formation is used in an informal sense. **D&A,** dry and abandoned.

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
17	15-11N-25E, Guadalupe	Rio Petro Ltd. No. 16 State	12/83	1,186	Glorieta (Permian)	D&A	Oil show in core in Artesia Group (Permian) from 556-734 ft
18	14-11N-33E, Quay	Triton Oil & Gas Corp. No. 1 Purcell	2/83	1,000	Santa Rosa (Triassic)	D&A	Flared gas from Santa Rosa through perforations from 410-420 ft
19	22-15N-18E, Santa Fe	John Gianardi No. 1 CKZ	1/83	7,773		D&A	
20	3-13S-4W, Sierra	Getty Oil Co. No. 2 West Elephant Butte Federal	1/83	7,556	Granite (Precambrian)	D&A	
21	23-15S-2W, Sierra	Overthrust Resources Ltd. No. 1 Federal 23	1/83	2,630	Mancos (Cretaceous)	D&A	
22	15-23S-11W, Luna	Seville-Trident Corp. No. 1 State	1/83	8,240	Granite (Precambrian)	D&A	
23	8-24S-10W, Luna	Seville-Trident Corp. No. 1 Hurt Ranch	3/83	7,723	Granite wash	D&A	
24	6-24S-8W, Luna	Seville-Trident Corp. No. 2 City of Deming	6/83	10,560	Granite wash	D&A	
25	6-24S-8W, Luna	Seville-Trident Corp. No. 1 City of Deming	8/83	4,225	Ordovician	D&A	
26	11-26S-11W, Luna	Marshall Young Oil Co. No. 1 Bisbee Hills	9/83	7,164	Granite wash	D&A	
27	27-5N-7W, Cibola	Cities Service Co. No. 1 Santa Fe A	2/83	5,344	Precambrian	D&A	

their study of the use of chemical surfactants to increase water injectivity in the Hobbs Grayburg–San Andres field.

The Northwest shelf of the Permian Basin is the third area of southeast New Mexico that was actively drilled in 1983. Three significant wildcat discoveries were made on the Northwest shelf. The Yates Petroleum Corporation No. 1 Little Cuevo Unit (Fig. 1, no. 4; Table 1, no. 4) struck gas in the Strawn Series along the west margin of the Northwest shelf. The Yates discovery pushes westward production in the Permian Basin and could open the east flank of the Pedernal uplift to more exploration. The Amoco Production Company No. 1 O'Brien Ranch (Fig. 1, no. 2; Table 1, no. 2) found gas in Mississippian rocks. The Stevens Operating Corporation No. 1 Red Lake Ridge (Fig. 1, no. 1, Table 1, no. 1) struck gas in the Atoka Series. Development drilling was mostly for gas in the Abo "tight" gas sands (Permian) in the first half of 1983. Development drilling for oil in the San Andres Formation (Permian) predominated in the second half of 1983. Broadhead (1983a, 1984a) and Scott and others (1983) reported on the petroleum geology of the "tight" Abo gas sands.

Few wells were drilled on the Roosevelt uplift in 1983 and there were no significant wildcat discoveries. Chief drilling targets on the Roosevelt uplift are Pennsylvanian, Mississippian and Silurian rocks. Pitt (1973) reported on the hydrocarbon potential of pre-Pennsylvanian rocks in Roosevelt County.

Northwest New Mexico

In 1983, the number of wells completed in the San Juan Basin of northwest New Mexico decreased from the previous year. In 1983, 691 wells were completed in northwest New Mexico, and 784 wells were completed in northwest New Mexico in 1982; almost all wells drilled in northwest New Mexico are drilled in the San Juan Basin, which is the only productive basin in the northwest part of the state. The decline in the number of wells drilled in 1983 was caused by a decreased market for gas, which is the primary petroleum product of the San Juan Basin. By mid-1983, however, the percentage of wells drilled for oil in the San Juan Basin was greater than in previous years; this increased percentage of wells drilled for oil resulted in a stabilization of drilling activity (Mickey, 1983a, p. 28). Most of the oil wells were development wells completed in the Gallup Sandstone (Cretaceous). In many wells, oil produced from the Gallup is commingled with oil produced from the Dakota Sandstone, Greenhorn Limestone, and Graneros Shale (Cretaceous). Many recently completed Gallup wells are located in Rio Arriba County and northeast San Juan County and are northeast of the main northwest trend of Gallup production. The main Gallup trend produces oil from northwest-trending bar-shaped sandstones. Many wells northeast of the main trend produce from sandstones that are less permeable and porous than sandstones in the main Gallup trend (Reese, 1977).

Development of fields in the main Gallup trend has also been rapid. It appears that at least one more oil-producing bar-shaped sand has been discovered in the Gallup in 1983 (Mickey, 1983b). A significant oil discovery in the Gallup was made by the Dugan Production Company No. 2 Snuffle Upagus (Fig. 1, no. 15; Table 1, no. 15). The Snuffle Upagus well was drilled in south-central San Juan County, southwest of the main trend of producing Gallup sandstones. Main drilling targets for San Juan Basin natural gas were the same as in previous years: the Dakota Sandstone in the Basin Dakota field and the Pictured Cliffs Sandstone in the Ballard and Blanco fields. Stone and others (1983) discussed the stratigraphy of Cretaceous rocks in the San Juan Basin.

The Gulf Oil No. 1 Gallo Canyon Federal–State Deep Unit (Fig. 1, no. 34; Table 3, no. 34) is an important wildcat that was drilling in the San Juan Basin at the end of the year. The Gallo Canyon well is scheduled to be drilled to 12,500 ft and should penetrate the Paleozoic section. Only approximately 20 wildcat wells have tested the Paleozoic section in the New Mexico portion of the San Juan Basin. Production from Paleozoic rocks is confined to small fields in the west part of the Basin. Therefore, the Paleozoic should be regarded as untested frontier territory that underlies the well-developed Cretaceous section. The stratigraphy of upper Paleozoic rocks in the San Juan Basin has been summarized by Armstrong and Mamet (1977), Jentgen (1977), and Baars and Stevenson (1977). Rice (1983) and Reiter and Clarkson (1983) investigated the thermal maturity of petroleum source rocks in the San Juan Basin. K. F. M. Thompson (1983) studied the origin of natural gas in the San Juan Basin.

In the Acoma Basin of northwest New Mexico, the Cities Service Company No. 1 Santa Fe A (Fig. 1, no. 27; Table 2, no. 27) was abandoned after penetrating the upper Paleozoic section and reaching a total depth of 5,344 ft in Precambrian rocks. Wengerd (1959), Foster (1964), and Broadhead (1983b) discussed the petroleum potential of areas adjacent to the Cities Service well.

In the Hagan Basin of Santa Fe County, the John Gianardi No. 1 CKZ (Fig. 1, no. 19; Table 2, no. 19) was abandoned after reaching a total depth of 7,773 ft; the Gianardi well penetrated Cretaceous, Triassic, and Permian rocks. Also in the Hagan Basin, Pelto Oil Company is attempting to complete its No. 1 Ortiz well (Fig. 1, no. 32; Table 3, no. 32), which was abandoned in 1981 after it recovered 15 bbls of high gravity (40° API) crude oil from Cretaceous rocks. Black (1979) discussed petroleum exploration in the Hagan Basin.

In the Estancia Basin of southern Santa Fe County, the Eastern Sandia Production No. 2 Horton (Fig. 1, no. 33; Table 3, no. 33) was spudded in 1983. It was scheduled to be drilled to 3,500 ft to test the Pennsylvanian section.

Only one shallow well was drilled in the Albuquerque Basin in 1983. The C. R. Robinson No. 1 Baca (Fig. 1, no. 35; Table 3, no. 35) was drilled to a total depth of 1,943 ft on the Hubbell bench in the southeast part of the Basin. It penetrated and tested Pennsylvanian rocks. Completion data were not available at the time this report was written. No wells were drilled in the central deep part of the Albuquerque Basin in 1983. Wells drilled in previous years encountered promising shows of gas and oil (Black, 1982). Kelley (1977) and Black (1982) discussed the geology of the Albuquerque Basin. ☞

TABLE 3—SIGNIFICANT WILDCAT WELLS THAT WERE DRILLED, NOT COMPLETED, OR "TIGHT" AT END OF 1983 IN NEW MEXICO.

Number on Fig. 1	Location (section–township–range, county)	Operator, well number, and lease	Comments
28	13-29N-21E, Colfax	Chalfont Oil & Gas No. 1Y Kaiser Steel	3,500 ft Cretaceous test in Raton Basin.
29	3-13N-15E, San Miguel	Midas Minerals Corp. No. 1 Solano	Drilled to total depth of 1,900 ft. Oil show reported in Pennsylvanian rocks. Production casing set at 1,847 ft.
30	32-11N-27E, Quay	Yates Petroleum Corp. No. 2 T-4 Cattle Co.	Drilled to 7,400 ft to test Pennsylvanian rocks.
31	26-10N-23E, Guadalupe	Trans-Pecos Resources No. 1 Latigo Ranch Block D	Drilled to 7,900 ft to test Pennsylvanian rocks.
32	26-14N-8E, Santa Fe	Pelto Oil Co. No. 1 Ortiz	Drilled to total depth of 7,450 ft in Dakota Sandstone (Cretaceous). Swabbed 15 bbls oil from Dakota. API gravity = 40 degrees. D&A in 1981. Attempted to recomplete in late 1983.
33	32-11N-7E, Santa Fe	Eastern Sandia Production No. 2 Horton	Drilled to total depth of 1,400 ft. Located on west flank of Estancia Basin.
34	26-23N-6W, Sandoval	Gulf Oil Co. No. 1 Gallo Canyon Federal-State Deep Unit	Scheduled to drill to 12,500 ft to test Paleozoic rocks.
35	3-5N-4E, Valencia	C. R. Robinson No. 1 Baca	Drilled to total depth of 1,940 ft. Drilled on Hubbell bench in Albuquerque Basin (Kelley, 1982).
36	11-23S-2E, Doña Ana	Exxon Corp. No. 1 Beard Ole Federal	Scheduled to drill to 5,800 ft.
37	13-23S-4W, Doña Ana	Exxon Corp. No. 1 Mason Draw Federal	Scheduled to drill to 13,500 ft.

Northeast New Mexico

Several petroleum exploration wells were drilled in northeast New Mexico in 1983. Most of the wells were drilled as a result of the 1982 Pennsylvanian gas and gas condensate discovery made by Trans–Pecos Resources No. 1 Latigo Ranch Block A, located in the Tucumcari Basin of Guadalupe County. Northeast New Mexico has never produced petroleum except for the brief period when gas was produced from the Morrison Formation (Jurassic) and the Dakota Sandstone (Cretaceous) at the presently abandoned Wagon Mound field in Mora County (Brooks and Clark, 1978).

Trans–Pecos Resources drilled several wells to confirm their 1982 gas discovery. The Trans–Pecos Resources No. 1 Latigo Ranch Block C (Fig. 1, no. 12; Table 1, no. 12) and the Trans–Pecos Resources No. 2 Latigo Ranch Block B (Fig. 1, no. 13; Table 1, no. 13) both found small amounts of gas in Pennsylvanian granite wash. The Trans–Pecos Resources No. 1 Latigo Ranch Block D (Fig. 1, no. 31; Table 3, no. 31) was drilled to a total depth of about 7,900 ft and was held "tight" at the end of 1983. A few miles to the east, in westernmost Quay County, Yates Petroleum Corporation drilled two wells that tested Pennsylvanian rocks. The Yates Petroleum Corporation No. 1 T–4 Cattle Company (Fig. 1, no. 16; Table 1, no. 16), in an extremely important discovery, reached a total depth of 7,235 ft and was completed in Pennsylvanian rocks for an initial potential of 48 BOPD and 1,100 MCFGPD. The Yates Petroleum Corporation No. 2 T–4 Cattle Company (Fig. 1, no. 30; Table 3, no. 30) was held "tight" at the end of 1983, but reached a total depth of approximately 7,400 ft and presumably tested the Pennsylvanian section. To the southeast, in southwest Quay County, the Desana Corporation No. 1 Wichita (Fig. 1, no. 14; Table 1, no. 14) made a small gas discovery in the San Andres Formation (Permian) after it was drilled to a total depth of 7,150 ft in Precambrian rocks. Pitt and Scott (1981) discussed porosity zonation in the San Andres Formation of east-central New Mexico. To the north in San Miguel County, the Midas Minerals Corporation No. 1 Solano (Fig. 1, no. 29; Table 3, no. 29) reached a total depth of 1,900 ft and reported an oil show in Pennsylvanian rocks; production casing was set to 1,847 ft.

Heavy oil accumulations in the Santa Rosa Sandstone (Triassic) continued to be the object of exploratory and development activity in 1983. The Triton Oil and Gas Corporation No. 1 Purcell (Fig. 1, no. 18; Table 2, no. 18) reportedly flared gas from the Santa Rosa Sandstone through perforations from 410 to 420 ft before being abandoned. In northeast Guadalupe County, Rio Petro Limited continued its efforts to recover heavy oil from the Santa Rosa Sandstone north of the town of Newkirk (Fig. 1, letter A). Rio Petro is operating two pilot steamflood tests, the O'Connell Ranch pilot and the T–4 Ranch pilot, in an attempt to recover the oil. Steam injection was begun in the O'Connell Ranch pilot in 1981 and in the T–4 Ranch pilot in 1982. Repeated mechanical failure of the steam generators appears to be the major reason why neither pilot project has yet produced oil in economic quantities; those mechanical problems have recently been corrected and the response to steam injection appears to be improving. Martin (1983) recently reported on the O'Connell Ranch pilot. In late 1983, Solv-Ex Corporation abandoned its attempt to mine and extract heavy oil from outcrops of the Santa Rosa tar sands in central Guadalupe County (Fig. 1, letter B). It was decided that it was not economically feasible to extract oil from the tar sands at that time. Encroachment of water from Santa Rosa Lake onto outcrops of the tar sands has also hindered development. Budding (1979, 1980) and Gorman and Robeck (1946) reported on the geology of the Santa Rosa tar sands. The subsurface areal extent of the oil-impregnated sandstone has not been well defined. Sanchez (1983) discussed the possible uses of micro-organisms to increase the extraction efficiency of oil from the Santa Rosa tar sands. Broadhead (1984b) studied the regional subsurface stratigraphy and petroleum geology of the Santa Rosa Sandstone in northeast New Mexico.

The Rio Petro No. 16 State (Fig. 1, no. 17; Table 2, no. 17), drilled in the T–4 Ranch pilot, was a wildcat Glorieta Sandstone (Permian) test that was drilled to a total depth of 1,186 ft. The Glorieta was wet in the well but an oil-stained core of the Artesia Group (Permian) was recovered (George L. Scott, Jr., personal communication 1983). An igneous dike cut out part of the Glorieta from approximately 1,090 to 1,160 ft.

The not-yet-productive Raton Basin of northeast New Mexico has been the object of continued search for petroleum. The Chalfont Oil & Gas No. 1Y Kaiser Steel (Fig. 1, no. 28; Table 3, no. 28) was scheduled to be drilled to 3,500 ft to test Cretaceous rocks. Several wells drilled in previous years have encountered promising shows of gas in Cretaceous rocks in the Raton Basin (Speer, 1976; Broadhead, 1982), but commercial production has not been established. Woodward (1983) discussed the occurrence of potential fractured reservoirs in the Raton Basin. Paleozoic rocks remain virtually untested in the Basin.

Amoco Production Company initiated a second phase of development drilling in the Bravo dome carbon dioxide gas unit of Union, Harding, and Quay Counties, and 34 wells were drilled in 1983. The Bravo dome carbon dioxide field has been unitized under Amoco's operation. Carbon dioxide from the Bravo dome will be used for enhanced oil recovery in the Permian Basin of west Texas (Wash, 1983) and New Mexico. Most carbon dioxide produced at the Bravo dome will be transported to the Permian Basin by the Amoco-operated Bravo dome pipeline, which has

not yet been constructed. The ARCO-operated Sheep Mountain pipeline will transport carbon dioxide from Bravo dome and from Sheep Mountain in southern Colorado to the Permian Basin.

Southwest New Mexico

Several petroleum exploration wells were drilled in southwest New Mexico in 1983, but none produced discoveries. In the Palomas Basin of Sierra County, the Getty Oil Company No. 2 West Elephant Butte Federal (Fig. 1, no. 20; Table 2, no. 20) was abandoned after reaching a total depth of 7,556 ft in Precambrian granite. In the Jornada del Muerto of Sierra County, the Overthrust Resources No. 1 Federal 23 (Fig. 1, no. 21; Table 2, no. 21) was abandoned after reaching a total depth of 2,630 ft in Cretaceous rocks.

Five wells were completed in Luna County in 1983. All five wells were abandoned, and none had reports of oil or gas shows. The first well completed, the Seville–Trident Corporation No. 1 State (Fig. 1, no. 22; Table 2, no. 22) was abandoned after it was drilled to a total depth of 8,240 ft in Precambrian granite. The Seville–Trident Corporation No. 1 Hurt Ranch (Fig. 1, no. 23; Table 2, no. 23) was abandoned after it was drilled to a total depth of 7,723 ft in reported granite wash. In 1982, the Seville–Trident Corporation No. 1 City of Deming (Fig. 1, no. 25; Table 2, no. 25) was drilled to a total depth of 4,225 ft in rocks that are probably Tertiary valley fill or volcanics, and it was plugged in 1983. The Seville–Trident Corporation No. 2 City of Deming (Fig. 1, no. 24; Table 2, no. 24) was abandoned after it was drilled to a total depth of 10,560 ft in Precambrian granite. The fifth well completed in Luna County in 1983 is the Marshall Young Oil Company No. 1 Bisbee Hills (Fig. 1, no. 26; Table 2, no. 26), which was abandoned in probable Precambrian basement at a total depth of 7,164 ft.

Two wells were spudded by Exxon in Doña Ana County late in 1983. The Exxon Corporation No. 1 Beard Ole Federal (Fig. 1, no. 36; Table 3, no. 36) was scheduled to be drilled to 5,800 ft, and the Exxon Corporation No. 1 Mason Draw Federal (Fig. 1, no. 37; Table 3, no. 37) was scheduled to be drilled to 13,500 ft.

Although there was no petroleum production in southwest New Mexico in 1983, there is potential for future production (Foster and Grant, 1974; Greenwood and others, 1977; Thompson, 1980; Thompson, 1981; Thompson and Jacka, 1981). Several wells drilled in past years encountered promising shows of both oil and gas (Thompson and Bieberman, 1975; Thompson and others, 1978; Thompson, 1982a, b; Broadhead, 1983b). Many wells drilled in recent years in southwest New Mexico were located on the assumption that southwest New Mexico is part of the Laramide-age Cordilleran overthrust belt, as proposed by Corbitt and Woodward (1973), Drewes (1978, 1982), and Woodward and DuChene (1981). More recent studies have indicated that thrust faulting in southwest New Mexico is of local extent only; major Laramide-age structural features are high-angle reverse faults that form basement-cored block uplifts (Brown and Clemons, 1983; Seager, 1983). The well-documented shelf-edge reefs of the Pedregosa Basin of southern Hidalgo County (Thompson and Jacka, 1981) may contain excellent petroleum reservoirs that have not been discovered.

Effect of discoveries on oil and gas production

New Mexico's oil and gas production and reserves have been declining in recent years, but the state continues to be a major producer of both crude oil and natural gas. In 1981, New Mexico was the seventh largest producer of crude oil and the fourth largest producer of natural gas in the United States (New Mexico Energy and Minerals Department, 1982, p. 13). Production of crude oil and natural-gas liquids in New Mexico in 1982 was 71.0 million bbls, a decrease of 1.6% from the 72.2 million bbls produced in 1981. Data obtained from the New Mexico Oil Conservation Division indicate that oil production increased by approximately 4.5% in 1983. Gas production in New Mexico in 1982 was 990 billion ft^3, down 11.5% from the 1,119 billion ft^3 produced in 1981. Data obtained from the New Mexico Oil Conservation Division indicate that gas production declined approximately 13% in 1983; the annual decline in gas production occurred during the first eight months of 1983. Gas production was fairly stable in the last four months of 1983. In 1982, the Permian Basin of southeast New Mexico produced 91% of the state's oil and 53% of the state's gas; the San Juan Basin of northwest New Mexico produced 9% of the state's oil and 47% of the state's gas. As of December 31, 1982, New Mexico had oil reserves of 947 million bbls, an increase of 2% from the January 1981 reserves of 929 million bbls; those reserves include oil that can be recovered by enhanced-recovery techniques. As of December 31, 1982, New Mexico had gas reserves of 16.5 trillion ft^3, a decrease of 8% from the December 21, 1981, reserves of 17.9 trillion ft^3.

The increase in oil production in 1983 may be attributed to two factors. First, new oil reserves were discovered and existing fields were developed in the record number of wells drilled in 1980, 1981, and 1982 so that the amount of oil available to be produced was increased. Second, the market for produced oil was good so that any oil produced could be sold. Oil production in 1984 should remain stable or increase slightly because of a steadily rising demand for oil (Oil and Gas Journal, 1983, p. 58) and continued stability of oil prices at around $29/bbl. Continued oil discoveries in the Delaware Mountain Group, the Bone Spring Limestone, and the Gallup Sandstone will encourage drilling and development and should help prevent production declines. 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 an additional 4.6 to 11 million bbls of oil per day could be produced by carbon dioxide flood techniques by 1990. Such additional production would replace waning production from older fields, but would not reflect an increase in the reserves. One way to significantly increase oil reserves in New Mexico is by the discovery of new fields in frontier areas such as the Pedregosa and Tucumcari Basins or in the Paleozoic system in the San Juan Basin.

The decline in gas production in 1983 has been caused primarily by a decrease in sales of New Mexico gas to California, the chief consumer of gas produced in New Mexico. California consumed less New Mexico gas in 1983 than in previous years because of conservation, some consumers switching to alternate energy resources and importation of cheaper gas from other sources. An exceptionally cold winter is partially responsible for stopping the decline in gas production in the last four months of 1983. The future of gas production in New Mexico is uncertain because of the uncertain future demand for gas and the uncertain future price of gas.

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settlers in the 1790's, it is situated on a high bluff overlooking the meandering Pecos River. The community is part of the vast San Miguel del Bado grant that was chartered by the Spanish Crown in 1794. Established at a time when Indian attacks were routine, Villanueva is one of the last New Mexican villages that still has part of the high wall that once surrounded it completely. These types of outposts or placitas (little plaza or little city) were built with the houses facing inward on a central plaza, so that the solid back wall formed a stout barricade. Long bypassed by railroad and highway, Villanueva has retained much of its original Spanish-colonial charm. The beautifully maintained mission church in the village dates back to 1818.

Above the river, on both sides, are vertical cliffs, containing many caves that show signs of prehistoric Indian occupancy. Old stone walls and crumbling adobe huts are reminders of the sheep-raising days of the past.

The name villanueva, meaning "new village," dates back to the establishment of the post office in Villanueva in 1890. Prior to that time, the village was called Cuesta or La Cuesta. In 1890, when the inhabitants of Cuesta petitioned the United States government to establish a post office, two large families lived in the area: the Aragons and the Villanuevas. The petition contained more signatures from the Villanueva family, hence the name of the village.

—Roy Foster

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