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OIL AND GAS POSSIBILITIES OF THE BASINS OF THE SIERRA COUNTY REGION

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Sun Oil Company
Consultant

INTRODUCTION

The geology, petroleum possibilities, and land status of the Jornada del Muerto basin, Rio Grande depression, and the Tularosa basin are treated in order. The recent discussion, by Kelley and Silver (1952, p. 219-230) is extensively quoted and supplemented by more recent developments in the Jornada and Rio Grande basins. The material on the Tularosa basin is new.

"The possible occurrence of oil and gas in the intermontane basins of central southern New Mexico, and especially in the Jornada del Muerto, has long been a subject of economic interest.

"Shows of oil and gas have been reported from a number of wells which have been drilled in these basins, as shown in the accompanying table. Such tests are few in number, and the records of most of them have been lost or forgotten. In the area adjoining the Caballo and Fra Cristobal Mountains fewer than a dozen wells have been drilled, and of these only five have been deeper than 2,000 feet and possibly three have penetrated below the Mesaverde formation. It is a curious fact that the two deepest wells were drilled in the Engle Valley where locations are difficult to make as compared with the Jornada del Muerto. These tests began drilling in the Tertiary, with no clue as to the depths necessary to encounter the more favorable Mesozoic and Paleozoic strata.

"Previous reference to the oil and gas of the area adjoining the Caballo Mountains has been made by Darton (1928, p. 195-197), Winchester (1933, p. 193-201), and Bates (1942 p. 290-294).

"Soon after the start of field work for this report an active leasing and exploration program was initiated by several major oil companies, and various geologic and seismologic field parties have been active in the area. During 1950 and 1951 there were 20 and 115 crew weeks respectively of seismic exploration reported in the Jornada del Muerto (Paul H. Umbach, oral communication). (One crew week signifies one regular seismic party working one week.)

JORNADA DEL MUERTO VALLEY

Stratigraphy and Structure

"The Jornada del Muerto Valley offers the best possibilities for petroleum of any of the depressions surrounding the Caballo Mountains. In general the formations likely to contain oil and gas lie below those most favorable for ground water, and the Tertiary formations will not be considered herein.

"The Mesaverde is the youngest formation from which shows of oil and gas have been reported. Although the formation contains many sandstone reservoir beds, their lenticular nature minimizes the possibilities for large accumulations. Furthermore, the floodplain environment in which the Mesaverde was largely deposited is generally considered not conducive to the formation or preservation of oil and gas. However, similar sediments of the Mesaverde elsewhere in New Mexico (Silver, 1951, p. 114) have produced small quantities of oil and gas. Shows have been reported from wells in the Jornada and perhaps small accumulations are to be anticipated. The accompanying table lists some of the shows." (Table 1)

"The Dakota group is a thick sandstone sequence in which good porosity and permeability can be anticipated. It overlies the marine San Andres formation and is in turn overlain by the dark marine shale of the Mancos. The Dakota outcrops show streaks of asphaltic residue which may indicate that local accumulations of petroleum at a depth are possible in this formation.

"The San Andres and Yeso formations both contain porous and permeable limestone and sandstone. Many of the San Andres limestone beds give off a fetid odor and in part their dark color is due to carbonaceous and bituminous matter. Rocks equivalent to the San Andres are productive in southeastern New Mexico and the formation may be one of the best shallow petroleum objectives in the Jornada.

"The Abo formation has never been productive in central New Mexico. The lack of evidence of car-

bonaceous or petroliferous matter suggests that the Abo in the area could only be productive of oil and gas which have migrated from other formations.

"The Magdalena formation is the thickest marine formation in the area and one of the most promising for oil and gas production. Although some of the limestone beds are very dense, some appear permeable. Alternations of limestone and shale intervals provide numerous confining horizons for possible reservoir beds. Carbonaceous and petroliferous residues are occasionally present in the outcrop. In Sulphur Canyon in the San Andres Mountains well-developed bioherms about 100 feet thick, one-quarter to three-quarters of a mile wide, and of unknown length are present near the top of the lower third of the group. No such bioherms were seen in the Caballo Mountains but they are not uncommon in the Magdalena of central New Mexico. In the San Andres Mountains the base of the Magdalena is marked by a chert breccia and conglomerate up to several tens of feet thick which might be an excellent reservoir of petroleum. Although this bed is not present in the Caballo Mountains it may underlie much of the southern part of the Jornada del Muerto.

"Although the Lake Valley formation offers essentially the same possibilities as the Magdalena, it appears that some of the limestone beds may have a greater secondary porosity owing to more intraformational erosion. Bioherms of the type described by Laudon and Bowsher (1941) and Bowsher (1948) in the Sacramento Mountains were not noted in the Caballo Mountains or the northern part of the San Andres Mountains, but they may be present in the subsurface of the southern part of the Jornada. The irregular distribution of the Lake Valley formation beneath the overlying Magdalena formation and the marked relief of the pre-Magdalena surface may have resulted locally in buried hills of porous Mississippian limestone overlapped by confining Pennsylvanian shales. The edge of Mississippian pinch-out trends north-northeastward beneath the Jornada del Muerto from the southern end of the Caballo Mountains through Upham to the northern end of the San Andres Mountains" (Fig. 1).

"The Percha formation has a sandstone facies or tongue which may extend beneath the Jornada del Muerto and could be an effective reservoir rock. The trend and position of this belt nearly coincide with the Mississippian pinch-out. However, the Percha as a whole is an excellent confining interval and could be important to the accumulation of petroleum in the formations which it overlaps.

"The Fusselman dolomite extends only over the southern part of the area and is overlapped to the

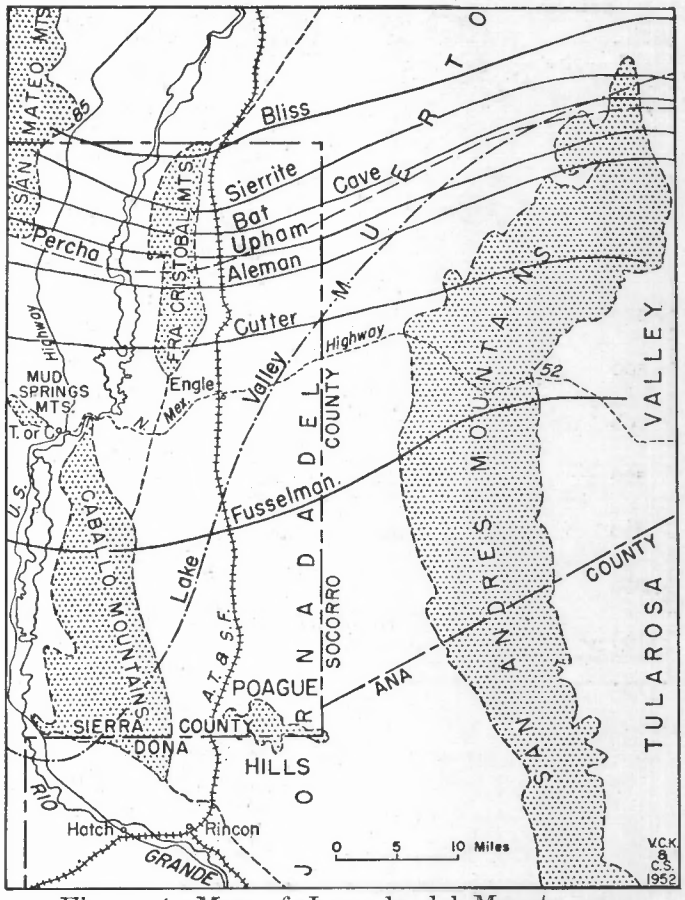


Figure 1. Map of Jornada del Muerto area showing pinch-out of northern edges of pre-Pennsylvanian rocks (Kelley and Silver, 1952, Fig. 24).

north by the Percha formation. It has good solution and intergranular porosity on the outcrop and its wedge-edge beneath the Percha formation is a possible objective. However, the position of the pinch-out of the Fusselman is less clear. It may trend east-north-eastward beneath the Jornada approximately through Cutter. There is sufficient pre-Percha relief on top of the Fusselman to provide opportunities for stratigraphic traps.

"The Cutter formation in general offers the same possibilities for accumulation and porosity as the Fusselman without the extensive intergranular porosity. Many of the beds are dense and sublithographic but secondary-solution porosity is well developed where the formation lies immediately beneath the Percha or Magdalena formaton."

"The Aleman and Upham formations are composed largely of dolomite, and intergranular porosity is well developed locally. Solution porosity occurs in the top of both formations where they lie beneath the Percha or Magdalena formations."

"The Cable Canyon sandstone is irregularly distributed, variable in thickness, and generally

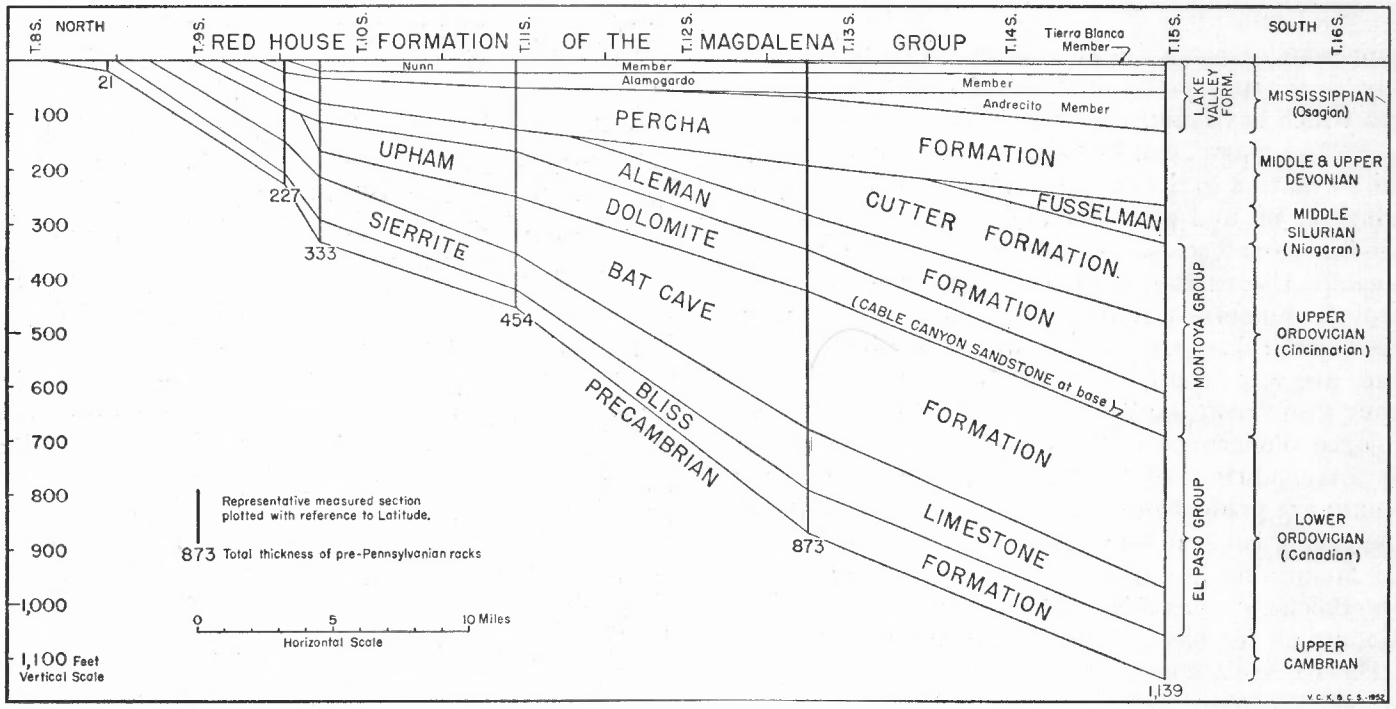


Figure 2. Stratigraphic correlation diagram of pre-Pennsylvanian formations along the east side of the Jornada del Muerto and the Oscura Mountains (Kelley and Silver, 1952, Fig. 25).

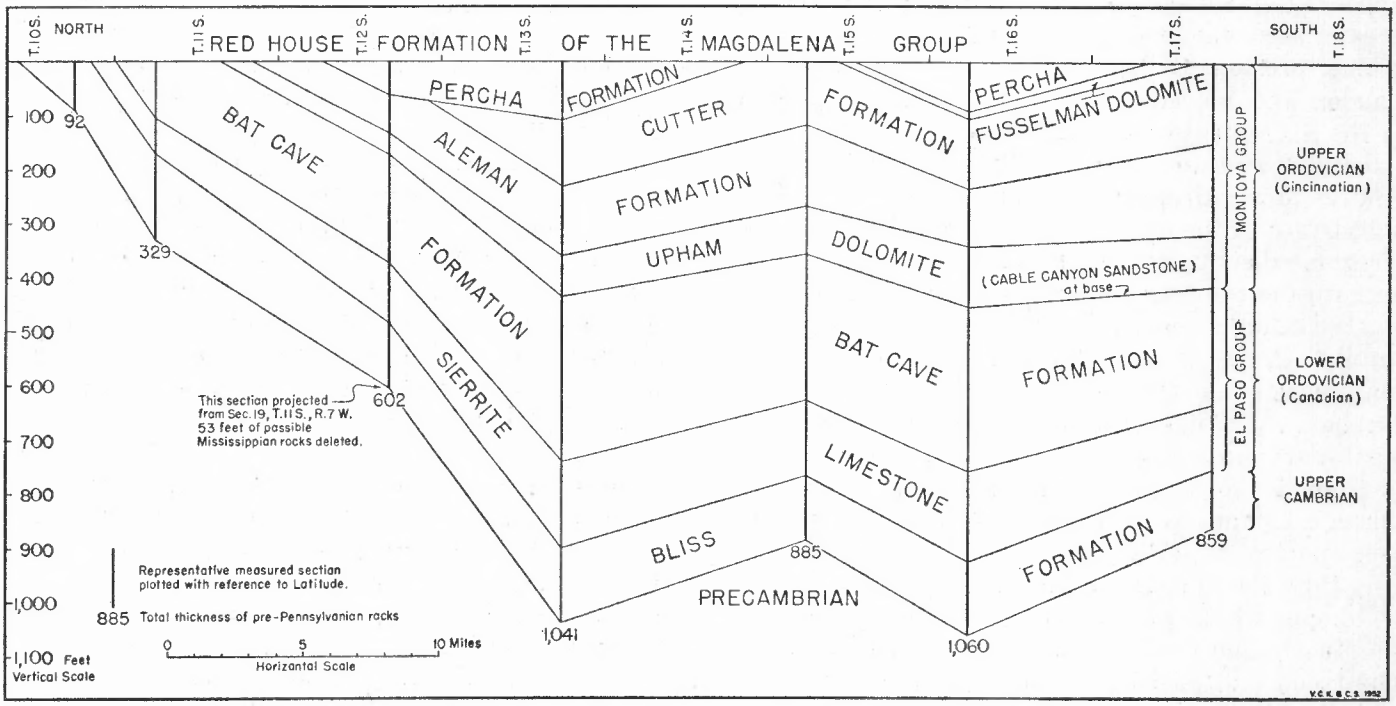


Figure 3. Stratigraphic correlation diagram of pre-Pennsylvanian formations to the west of the Jornada del Muerto in the Caballo, Mud Springs, Cuchillo Negro, and Fra Cristobal Mountains (Kelley and Silver, 1952, Fig. 26).

tightly cemented, but it may locally contain excellent intergranular porosity. Petroleum residues in the outcrops in the Mud Springs Mountains indicate the possibility of oil and gas accumulations at depth.

"The Bat Cave formation is the most promising potential productive horizon of the lower Paleozoic strata and offers reservoir possibilities in the bioherms, solution breccias, and the intergranular porosity of its dolomites, oolites, calcarenites, and reef talus. It is locally fetid and bituminous on the outcrop. The porous conditions present in the reefs and solution breccias appear to be most widely developed beneath the Jornada in the latitude of the Caballo Mountains.

"The Sierrite limestone displays little or no porosity on the outcrop, but the underlying Bliss formation contains several clastic beds that may be locally porous and permeable, especially near the base.

"The central part of the Jornada is concealed beneath alluvial materials and the structure is not well known. It is reported that considerable variation in the bedrock lithology and stratigraphy was encountered in shot holes drilled for seismic work. These shot holes generally showed the bedrock to be either Mesaverde or McRae sediments. In many places along the marginal pediments of the Jornada some folding and faulting of these strata can be observed. It can me anticipated that drilling depths will not be excessive in the Jornada and that the thickness of the sedimentary strata will range from 6,000 feet near the north end of the Fra Cristobal Mountains to as much as 17,500 feet near the south end of the depression. The maximum figure given above for the southern part is predicated upon the presence of the entire known section. In many places in the southern part, however, the full section is not present and Precambrian rock will be encountered at depths no greater than 10,000 to 12,000 feet.

"The sharply overturned Laramide folds in the Caballo Mountains were not likely to have been formed without some folding in the adjoining areas. Although the intensity of folding away from the mountains may have been of lesser degree than in the mountains, such folds buried beneath relatively undeformed Tertiary sediments are to be anticipated. As much of the present elevation of the mountains is late Tertiary, it would appear that oil accumulation both in the mountains and in the adjoining basins is more likely related to the prior Laramide structure.

"Several small anticlinal folds occur in the pediment areas and the foothill belts. A few of these are doubly plunging and provide structural closure entirely as a result of folding. Elsewhere noses are crossed by faults that may provide closure. In the Caballo Mountains several fold axes are shown in the pediment areas and others can be seen plunging beneath the pediment gravels. The few wells drilled do not appear to be located on the structural apexes. Additional folds occur to the east of the mapped area.

"The Putnam anticline appears to be closed independently of faulting and if the fold broadens at depth, as do most of the folds in the Caballo Mountains, then it may have some possibilities. . . . . Some possibility exists for an anticline beneath the pediment east of the Taylor Ridge overturned belt."

"The pre-Pennsylvanian rocks wedge out northward due to erosional truncation in the latitude of the north end of the Fra Cristobal Mountains. Successive overlaps by both the Magdalena and Percha formations occur in this wedge-belt." (Fig. 1) "The combined pre-Pennsylvanian formations thicken to several wedge-belt drilling objectives." (Figs. 2 and 3)

"As yet no adequate tests have been drilled in the Jornada in the area underlain by a full section of pre-Pennsylvanian formations. The Sun Oil Company No. 1 and No. 2 Victorio Land and Cattle Company wells appear to have been located too far north to find a favorable pre-Pennsylvanian section. The structure, stratigraphy, and geologic history of the Jornada compare favorably with the pre-Permian rocks of the Central Basin Platform of southeastern New Mexico. Whether petroleum accumulations exist has yet to be determined." (Kelley and Silver, 1952)

EXPLORATORY DRILLING

Subsequent to publication of the paper by Kelley and Silver, there has been only one oil and gas test, the William F. Carr No. 1 Gentry, drilled in the vicinity of the Jornada del Muerto, and this venture was located on the Putnam anticline in the eastern foothills of the Caballo Mountains. The No. 1 Gentry, located 640 feet from the north line and 1620 feet from the east line of sec. 32, T. 15 S., R. 3 W., was abandoned at a total depth of 5,418 feet in sand. The operator drilled this test as a "tight hole," consequently little information is available. There are some reports indicating that one test was conducted at a depth of about 1,700 feet, three cores taken at unknown depths, but no shows of oil or gas were encountered.

At the time of compilation of this guidebook a current test for oil and gas, the Sun Oil Company No. 1 Bingham-State located 660 feet from the south line and 660 feet from the west line of sec. 23, T. 5

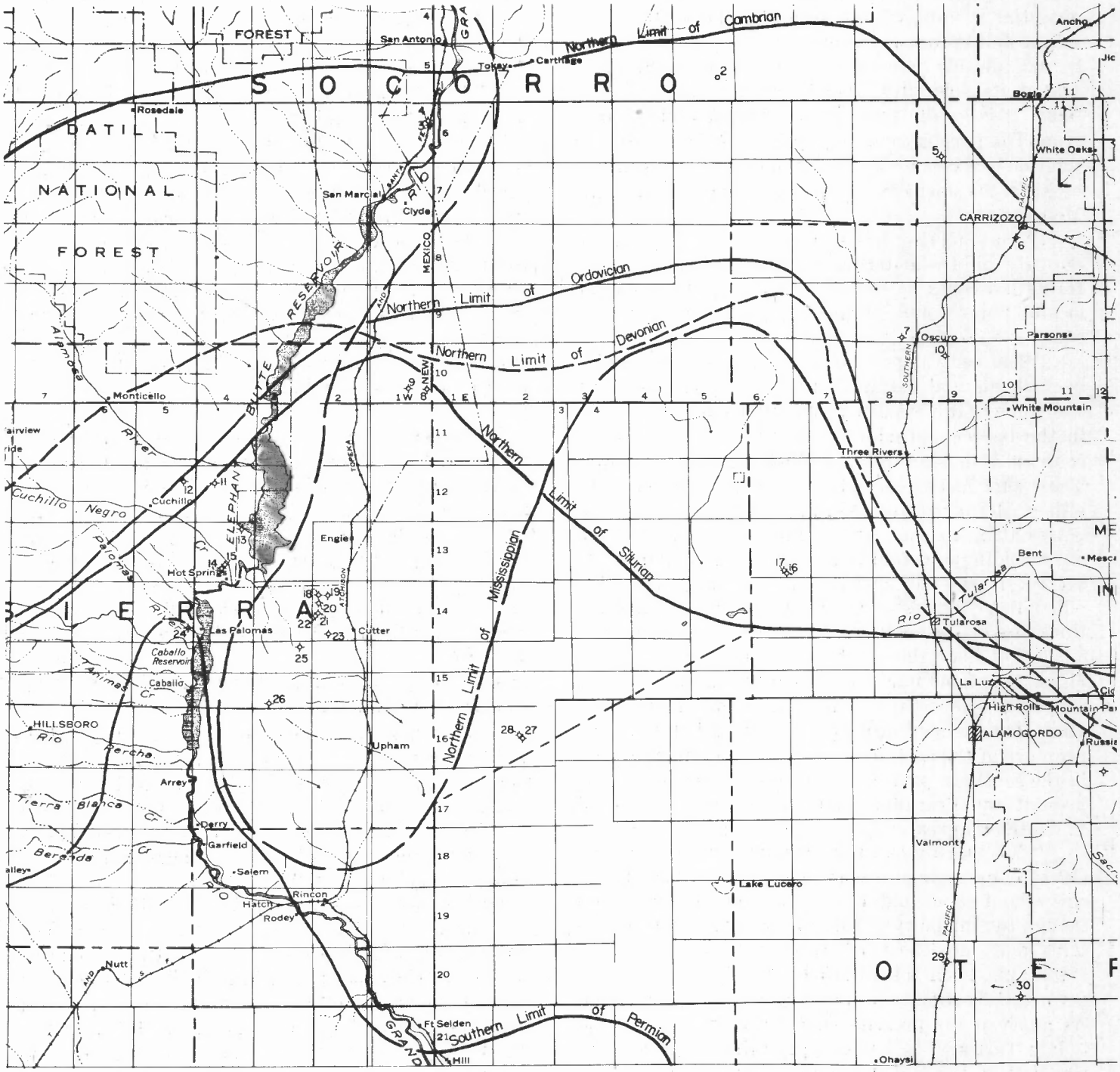


Figure 4. Map showing well locations and possible northern limits of several systems in Sierra County region.

S., R. 5 E., is drilling at a depth of 500 feet in beds of probable Yeso age. Pediment gravel approximately 175 feet in thickness covers the surface at this location. The operator anticipates that Pennsylvanian sediments offer the best, if not the only, possibilities of a reservoir for oil and gas. Surface investigation revealed the presence of a faulted anticline upon which the test is located.

The Sun Oil Company's No. 1 and No. 2 Victorio Land and Cattle Company wells (Table 1; Kelley and Silver, 1952) are the deepest tests drilled in the Jornada del Muerto. These were located within the boundaries of the vast Pedro Armendariz grant in the northwestern portion of the valley. No shows of oil or gas were encountered by either well and both penetrated a very similar sedimentary section. The following formation tops were reported for the No. 1 Victorio Land and Cattle Company: Mancos 710 feet (?), Dakota 880 feet (?), Triassic 1070 feet, San Andres 1240 feet, Yeso 1894 feet, Abo 3168 feet, Pennsylvanian 3890 feet, El Paso 5712 feet, Bliss 5890 feet(?), Precambrian 6000 feet; total depth 6053 feet. It was believed necessary to drill a second test before the faulted structure, interpreted from seismograph records, could be considered as adequately tested.

Geophysical Exploration

An extensive program of seismograph exploration was conducted by a contract crew to evaluate the area of Sun Oil Company's tests of the Pedro Armendariz grant. The records obtained were classified as generally poor but usable in local areas. Contours based on reflections from an unidentified horizon suggested the presence of an area of complex faulting. Indicated regional dip to the southwest over most of the prospect is frequently interrupted by faulting. It appears that further experimentation will prove the seismograph a successful tool for exploration in the less disturbed areas of the Jornada del Muerto.

Gravity and possibly some magnetic surveys have been conducted by at least two other major oil companies in portions of the valley. Lack of sufficient well control and the presence of pediment gravels over most of the region point to geophysical exploration as the only method to locate structural anomalies favorable for the accumulation of oil and gas in the Jornada del Muerto.

Land Situation

Arbitrarily limiting the Jornada del Muerto to that area extending from the northern boundary of T. 1 S. to the southern boundary of T. 22 S., and from the Caballo and Fra Cristobal Mountains on the west to the San Andres and Oscura Mountains on the east, the valley consists of some 3,000 square miles or about 2,000,000 acres. Approximately 230,000 acres lie within the Pedro Armendariz grant; an estimated area of 180,000 acres is designated as special federal land (range reserve, special grants, etc.); and an area of about 320,000 acres is restricted for purposes of the military. This military reservation is located in the northeastern portion of the valley and includes that area from T. 6 S. to T. 10 S. and from R. 2 E. eastward into the Tularosa valley. Of the remaining 1,270,000 acres, an estimated 75 per cent is public domain; 20 per cent is owned by the state, and 5 per cent or less is private land. It should be understood that this land status is generalized and the acreage figures represent rough estimates.

Cities Service, Sinclair, and Sun Oil Companies are the principal holders among major operators of oil and gas leases in the Jornada del Muerto. Considerable federal and state acreage has been leased by individuals, but a very large amount remains available for oil and gas leasing.

RIO GRANDE DEPRESSION

Geology

"Several deep wells have been drilled in the valleys to the west and north of the Caballo Mountains in search of petroleum, as shown in the accompanying table." (Table 1) "These valleys are structurally distinct and separated from the Jornada del Muerto. They appear to be complex grabens rather than downwarped belts and they are filled with greater thicknesses of middle and late Tertiary sediments than is the Jornada. The outcropping Paleozoic rocks in the Mud Springs Mountains separate the Engle and Las Palomas Valleys.

"Most of the formations found in the Caballo Mountains may be present beneath these valleys. However, the bedrock structure cannot be determined from structure in the unconsolidated surface deposits. The contact between Tertiary sediments and pre-Tertiary sediments ranges from disconformity to considerable angular unconformity and the rocks which may be encountered at the base of the Tertiary formations may range from Precambrian to Cretaceous. In the Engle Valley two deep tests reveal a relief upon the buried pre-Tertiary surface of at least 4,500 feet in a distance of 4 miles between the Drew-Mathews No. 1 Federal well and the Gartland No. 1 Garner Federal well. Inasmuch as the latter well was reported still in Tertiary sediments at a depth of 6,524 feet, a much greater structural relief may be present. The Drew-Mathews No. 1 Federal

TABLE 1.

DATA OF PERTINENT WELLS IN SOUTH-CENTRAL NEW MEXICO

No.	Name of Well	Location	Total Depth	Surface Formation	Deepest Formation Penetrated	Remarks
1	New Mexico Dev. Co. #1	660'FSL & 1980'FEL Sec. 30-5S-1E Socorro Co.	3245'	Tertiary		Good show black oil @ 1387'
2	Sun Oil Co. #1 Bingham State	660'FSL & FWL Sec. 23-5S-5E Socorro Co.		Recent		Presently drilling
3	Arnold #1	1980'FNL & 660'FEL Sec. 13-6S-1W Socorro Co.	2445'	Recent	Permian	Show oil 1690'
4	Arnold #2	330'FSL & 230'FEL Sec. 13-6S-1W Socorro Co.	1975'	Recent	Permian	
5	Standard Oil Co. of Texas #1 J. F. Heard	1980'FNL & FWL Sec. 33-6S-9E Lincoln Co.	8050'	Permian	Precambrian	
6	El Paso & Southwestern RR #1	Sec. 11-8S-10E Lincoln Co.	1125'	Recent	Cretaceous	
7	El Paso & Southwestern RR #1	Sec. 35-9S-8E Lincoln Co.	965'	Recent		
8	Sun Oil Co. #1 Victorio L. & C. Co.	660'FSL & 1980'FWL Sec. 25-10S-1W Sierra Co.	6053'	Mesaverde	Precambrian	Water in Dakota and San Andres 1,000 and 1,318'
9	Sun Oil Co. #2 Victorio L. & C. Co.	1980'FNL & 660'FEL Sec. 27-10S-1W Sierra Co.	6352'	Mesaverde	Precambrian	No shows, water as in #1
10	Rafferty #1	Sec. 9-10S-9E Lincoln Co.	864'	Recent		
11	Thomas J. Gartland #1 Maggie Brister	2010'FSL & 1988'FEL Sec. 8-12S-4W Sierra Co.	8585'	Pediment gravel Santa Fe	Precambrian	Reported shows of gas 25° 60° dips. OWDD, formerly Drew &Matthews

DATA OF PERTINENT WELLS IN SOUTH-CENTRAL NEW MEXICO

No.	Name of Well	Location	Total Depth	Surface Formation	Deepest Formation Penetrated	Remarks
12	Gartland #1 Garner	660'FSL & 1980'FEL Sec. 11-12S-5W Sierra Co.	6524'	Pediment gravel Santa Fe	Tertiary	Reported shows of gas
13	Summit Expl. Co. #1 Mimms	1980'FSL & 660'FWL Sec. 2-13S-4W Sierra Co.	6195'	Recent	Pennsylvanian	Formerly J. H. Blackstone, et al
14	Brown-Lester Drlg. Co. #1 Bailey	1980'FSL & 660'FEL Sec. 28-13S-4W Sierra Co.	725'	Pediment gravel	Bar B	No shows
15	Brown-Lester Drlg. Co. #1 Scott A	1960'FSL & 660'FEL Sec. 28-13S-4W Sierra Co.	520'	Pediment gravel	Abo	No shows
16	Belmont-Tularosa Basin Oil Co. #1	Sec. 34-13S-7E Otero Co.	1400'	Recent		
17	Belmont-Tularosa Basin Oil Co. #2	Sec. 34-13S-7E Otero Co.	3542'	Recent	Permian	
18	Clyde R. Wofford #1 Wofford	990'FSL & 1650'FEL Sec. 7-14S-2W Sierra Co.	533'	Mesaverde	Mesaverde	No shows
19	Clyde R. Wofford #1 Graham State	660'FSL & FWL Sec. 8-14S-2W Sierra Co.	507'	Mesaverde	Mesaverde	Water: 90' Show gas: 300' Show oil: 458' Coal: 389', 397'
20	Clyde R. Wofford #1 J. H. Winslow	990'FSL & 330'FWL Sec. 18-14S-2W Sierra Co.	587'	Mesaverde	Mesaverde	Water: 104-109' Water: 230-257'
21	McCall Drlg. Co. #1 Park-Bowers	NE¼ Sec. 19-14S-2W Sierra Co.	2900'	Mesaverde	Permian	Show oil: 513-531, 1,115-1,720' Water: 160-180, 470-500, 750-944, 1024, 1,290-1,365

DATA OF PERTINENT WELLS IN SOUTH-CENTRAL NEW MEXICO

No.	Name of Well	Location	Total Depth	Surface Formation	Deepest Formation Penetrated	Remarks
22	Winslow & Wright #1 State	1650'FNL & 330'FEL Sec. 19-14S-2W Sierra Co.	700'	Mesaverde	Mesaverde	No oil, gas, salt or sulphur water was encountered
23	McCal' Drlg. Co. #2 Park-Bowers	Sec. 32-14S-2W Sierra Co.	2205'	Mesaverde	Permian	
24	Barney Iorio #1 Fee	N NW¼ SE¼ Sec. 25-14S-5W Sierra Co.	2100'	Pediment gravel Santa Fe	Thurman	Top Thurman 1165' plugged back to 1550' Flowed 30 gal./min. hot mineral water Temp. 90° F.
25	Wright & Winslow #1 State	330'FSL & 2310'FWL Sec. 2-15S-3W Sierra Co.	900'	Cretaceous	Cretaceous	
26	F. William Carr #1 Gentry-State	640'FNL & 1620'FEL Sec. 32-15S-3W Sierra Co.	5408'	Pennsylvanian	Mississippian ?	
27	Burton Dev. Co. #1 Guame	1987'FSL & 660'FEL Sec. 21-16S-2E Socorro Co.	2172'	Recent	Permian	
28	Burton Dev. Co. #2 Guame	1855'FSL & 2385'FEL Sec. 21-16S-2E Socorro Co.	3506'	Recent	Permian	
29	Plymouth Oil #1 Evans	660'FNL & FWL Sec. 15-20S-9E Otero Co.	7585'	Recent	El Paso	
30	Sun Oil Co. #1 Pearson	800'FSL & FEL Sec. 35-20S-10E Otero Co.	4468'	Recent	Montoya	

well found the Santa Fe formation resting on the Mesaverde formation at a depth of 1,495 feet and below that drilled a sedimentary section similar in thickness and lithology to the section found at the surface in the Caballo Mountains. The well was reported to be bottomed at 7,122 feet in beds of the Magdalena.

"The Drew-Mathews No. 1 Federal cut a quartz-monzonite intrusive from 4,350 to 5,110 feet that appears to be intruded into the lower part of the Yeso formation. Dips of 25 degrees were noted in cores from above this interval.

"If this igneous body was a sill with similar dip, its thickness would be approximately 500 feet. The two wells draw attention to the uncertainties of drilling in the Rio Grande Depression, and yet shows were reported from both wells. Occurrences of marsh gas (methane) are not uncommon in the continental basin sediments of the Basin and Range Province, the Rio Grande depression, the Great Basin area and the Snake River Plains. Such gas is generally conceded to have had a separate genesis from oil and may never have been associated with petroleum.

"The shows reported from wells in the Engle and Las Palomas Valleys cannot be evaluated on the basis of present information. Evidence does point to the probable existence of representative stratigraphic sections at depth in both of these grabens under a variable thickness of Tertiary rocks. Shows of gas are reported frequently from wells penetrating the Santa Fe formation in the Albuquerque-Belen basin. A show of gas was reported in the Iorio well in Las Palomas Valley at a depth of 2,004-2,010 feet, probably in the Thurman formation."

"If a full thickness of sediments lies under the Gartland No. 1 Garner Federal, it is possible that the Engle Valley in places contains as much as 20,000 feet of sedimentary rocks. On the other hand, it is unlikely that a total of more than 9,000 feet can be drilled in the Drew-Mathews No. 1 Federal before encountering the Precambrian. The thickness of sediments in Las Palomas Valley may be as much as 16,000 feet, as the Iorio No. 1 Fee bottomed in the Thurman formation at 2,100 feet." (Kelley and Silver, 1952)

EXPLORATION

The wells drilled as oil and gas tests in the Rio Grande depression and adjacent areas are listed in Table 1 and are shown on Figure 4. Of these the most significant are the Gartland No. 1 Brister (formerly the Drew-Mathews No. 1 Federal) in the NW¼SE¼ sec. 8, T. 12 S., R. 4 W.; the Summit No. 1 Mimms (formerly the Blackstone and Spaugh No. 1 Mimms) in the NW¼SW¼ sec. 2, T. 13 S., R. 4 W.; and the Gartland No. 1 Garner in the SW¼SE¼ sec. 11, T. 12 S., R. 5 W.

The Brister well is reported to have encountered 1,400 feet of Pennsylvanian and 567 feet of Mississippian and lower Paleozoic sediments before entering Precambrian granite at 8,567 feet. A slight show of oil and gas was found in a drill-stem test of the Silurian (?) between 8,499 and 8,527 feet. The well has been plugged back to 8,527 feet and at this writing was "shut down awaiting orders."

The Summit well was bottomed at 6,200 feet in Pennsylvanian rocks. A "good show" of gas was encountered between 5,775 and 5,800 feet in a formation of unknown age, probably in the top of the Pennsylvanian.

The No. 1 Garner well was still in the Tertiary at total depth of 6,524 feet. All other wells drilled in the Rio Grande depression have been relatively shallow holes that did not go below the Permian.

LAND SITUATION

North of Socorro the land is about equally divided between fee (Spanish grants) and Indian reservations. Southward from Socorro the land along the Rio Grande for a mile or so on either side is about equally divided between fee (both patent and Spanish grants) and special federal acreage (river control, game preserves, etc.). Away from the river, the land is predominantly public domain. Less than 10 per cent of the land area is under lease. No major oil companies have any holdings in the area. The largest blocks under lease are just west of the Elephant Butte reservoir and are held by individuals. No recent geophysical activity has been carried on in the area.

LAND STATUS IN THE TULAROSA BASIN AREA, SOUTH-CENTRAL NEW MEXICO

The most recent published data relative to the geology of the Tularosa basin area of south-central New Mexico may be found in the guidebook for the Fifth Field Conference of the New Mexico Geological Society, in articles contributed by William M. Sandeen, Henry L. Jicha, Jr., and Lloyd C. Pray. Portions of these papers are excellent and bibliographies of material relative to the general area are included.

Subsequent to the issuance of the guidebook cited very little new data have become available as related to the geology of the basin area. It would therefore appear somewhat superfluous to attempt another summation of local geologic conditions.

It may be of more interest to any prospective

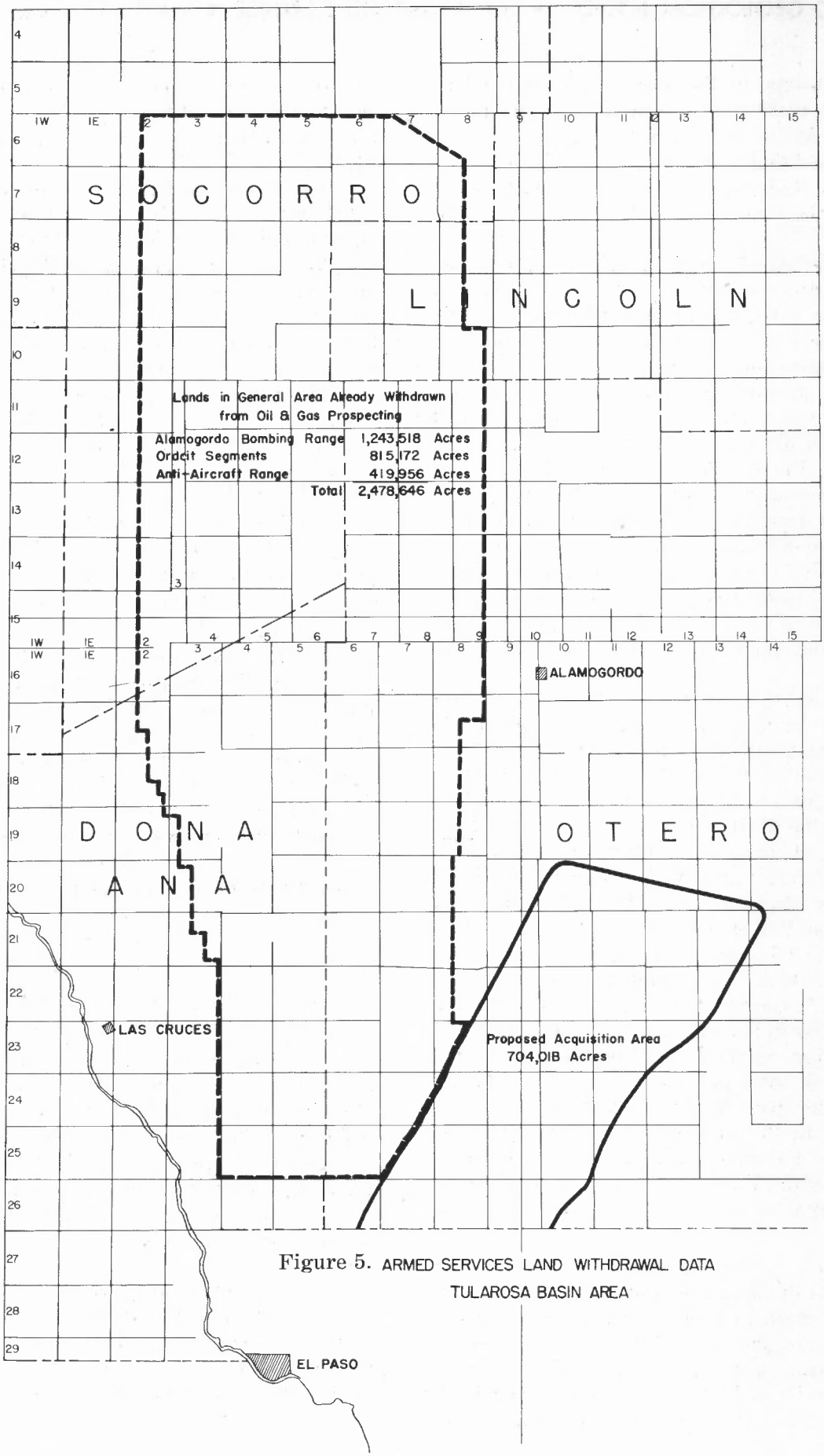


Figure 5. ARMED SERVICES LAND WITHDRAWAL DATA
TULAROSA BASIN AREA

operators who are not familiar with the Tularosa basin area to be furnished with some more or less generalized data relative to land situations. Preceeding such a presentation it may be in point to give a few data that may answer the often asked question, "Why have the oil companies been so lax or slow in showing more interest in an area that has the productive potentialities of the Tularosa basin?"

The earlier history of oil and gas production in southeastern New Mexico was the story of Upper Permian beds. Yields were prolific and hence most of the operators became busy and subsequently complacent. They played "follow the leader" then as now. Moreover, cursory examination of available data indicated that Upper Permian beds offered little in the way of production possibilities in the Tularosa basin.

It was not until 1944 that any production was obtained from beds of pre-Permian age in southeastern New Mexico. In that year beds of Pennsylvanian and Lower Ordovician (El Paso) age first yielded oil. In 1947 the first Silurian production was obtained. Then followed the Cross Roads field Silurian production and thereafter the rush was on for pre-Permian oil and gas.

Meantime the land situation in the Tularosa basin had been steadily deteriorating, as related to leasing possibilities. Hence, by the time the operators in general were ready to consider seriously pre-Permian production possibilities in the basin, the doors had been virtually closed for lease acquisition.

World War II saw an immense expansion at Fort Bliss, Texas, at the city of El Paso. This necessitated marked expansion in the lands needed for military purposes. The Air Force activities and the White Sands project called for still more land. Naturally it was simpler for the Armed Services to take New Mexico lands than Texas lands because federally owned lands in the former state are plentiful, whereas no federal lands exist in Texas. This land acquisition by the Armed Services began in the latter part of 1942 and for practical purposes may well be considered as still continuing. Thus by the time the oil and gas operators were ready to consider seriously leasing programs in the basin, the Armed Services had already put together the Fort Bliss Anti-Aircraft Range, the Alamogordo Bombing Range and the Orocit Segments. Thus was closed to oil and gas activities an area 18 to 40 miles in width east and west and 120 miles long north and south. (These lands have a combined total of 2,478,646 acres.) Some of these lands are under oil and gas leases, but no exploration is permitted.

The lands thus taken over by the Armed Services still do not seem to satisfy their supposed needs. The result has been that the Services now propose the acquisition, *in fee*, of another 704,000 acres of land, contiguous on the southeast with that already held. Very naturally this proposed new acquisition would be from New Mexico lands.

A formal hearing relative to the proposed new acquisition was held before a Congressional Committee from the House of Representatives in the city of Alamogordo, New Mexico, on June 23, 1955. The Armed Services were represented by Major General Rutledge of Fort Bliss. Various agencies, including the New Mexico Tax Payers Association, the New Mexico Cattlemen's Association, the New Mexico Wool Growers Association, and the New Mexico Oil and Gas Association, entered formal protests against the acquisition request. H. S. Cave prepared the formal protest for the New Mexico Oil and Gas Association. This protest was in the form of a summary report supported by six maps and one chart. Numerous companies contributed data and other help in the preparation of the report.

No decision regarding the proposed new land acquisition by the Armed Services has been announced by the Congressional Committee as of the date of the writing of this article.

The accompanying map (Fig. 5) shows the outlines of the lands within the general Tularosa basin area that have already been withdrawn from oil and gas prospecting. Likewise shown is the additional area that the Armed Services currently want. From this map it can very clearly be seen that the preponderance of the lands in the Tularosa basin have already been removed from oil and gas prospecting. If the additionally requested lands are taken over by the Armed Services, Tularosa basin will be virtually closed to oil and gas exploration activities.

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