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OIL AND GAS EXPLORATION WELLS IN DONA ANA COUNTY, NEW MEXICO

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SUMMARY

Fourteen wells have been drilled in Dona Ana County in search of oil and gas over the period from 1932 to 1973. Several have reported significant shows, but no commercial quantities of petroleum have been produced. Favorable source and reservoir units have been demonstrated in the Cretaceous and Paleozoic sections, and structural traps are evident. Fluid systems no doubt were disrupted locally by igneous and tectonic activity during several episodes from Laramide time onward, but these negative effects do not appear to have been widespread. Although several of the wells were located on good prospects, less than half reached Paleozoic formations and none have reached Precambrian basement. Thus in this county of 70,400 acres, there are many untested areas in the Rio Grande, Jornada del Muerto, and Tularosa Valleys.

For this field conference, we are reviewing briefly the information found in the articles by Kottlowski, Flower, Thompson, and Foster (1956, p. 78-82) and Kottlowski, Foster, and Wengerd (1969, p. 186-196), information in the Bureau files, and some information which was kindly furnished by others for this paper. In the near future, a more comprehensive study of this county is planned as part of the Bureau's regional evaluation of the petroleum potential in southwestern New Mexico.

Figure 1 is a map showing the locations and total depths of the known exploration wells. Table 1 is a summary of the basic information available. In the following sections, key wells are discussed in the geographic order used in the construction of the table.

Cities Service No. 1 Gov.-Corralitos "A" Sec. 6, T. 22 S., R. 2 W.

(Ref.: This information is provided through the courtesy of Mr. Louis J. Bevacqua, Cities Service Oil Co., Midland, Texas)

This well was drilled on a combination gravity, seismic, and shallow subsurface anomaly. At a surface elevation of 4,776 ft it was spudded in Tertiary volcanic rocks (Eocene Palm Park tuffaceous volcanoclastic rocks). At 1,100 ft the volcanic sequence rests on Permian rocks, with reported tops of Yeso at 1,632 ft and Abo at 1,876 ft, but this section may be an Abo-Hueco transition. Tops of older units are: Pennsylvanian at 2,408 ft, Mississippian at 2,986 ft, Devonian-Percha at 3,414 ft, Silurian-Fusselman at 3,580 ft, Ordovician-Montoya at 3,890 ft, El Paso at 4,240 ft, Cambrian (to Ordovician)-Bliss at 5,060 ft. According to Kottlowski (1963, p. 12, fig. 3) the Bliss should not be over 150 ft thick, so at the total depth of 5,129 ft, the well probably was less than 100 ft from the top of Precambrian basement.

No shows of oil or gas were found, but some fair to good reservoirs are indicated by the drill-stem tests. During DST No. 1 from 2,975 to 3,002 ft in the top of the Mississippian, 1,070

ft of mud-cut water (600 ppm Cl) were recovered from fractured and leached, white cherty limestone. During DST No. 2 from 3,550 to 3,680 ft in the top of the Fusselman, 240 ft of mud-cut water (800 ppm Cl) were recovered from fractured and vuggy, slightly sucrosic dolomite. Also in the Fusselman, DST No. 3 from 3,680 to 3,830 ft recovered 1,040 ft of slightly mud-cut water (400 ppm Cl). During DST No. 4 from 4,445 to 4,600 ft in the top of the El Paso, 1,240 ft of mud-cut water plus 520 ft of water (400 ppm Cl) were recovered from white, coarsely crystalline dolomite with intercrystalline porosity. In these tests, the shut-in pressures nearly reached or exceeded the hydrostatic head.

The low chloride contents indicate that these reservoirs have been flushed by meteoric waters, probably after this area was uplifted by Basin and Range block faulting. However, the reservoir quality appears to have been unaffected by any igneous activity.

Sinclair No. 1 Federal-Dona Ana 18 Sec. 27, T. 22 S., R. 1 W.

(Ref.: Kottlowski and others, 1969, p. 192-193; sample log by Foster, and other logs in Bureau files.)

South of the Robledo Mountains, at a surface elevation of

Table 1. Oil and Gas Exploration Wells, Dona Ana Co., N.M.

Loc. (S, T, R)	Name	Comp.	T. D.	Remarks
25-18S-3W 330'S, 2310'W	Porter No. 1 Rincon-Fed.	6-18-71 P & A	569' Quat.(?)	Conglom. 520'-550', dense; no shows
6-22S-2W 1980' N & W	Cities Service No. 1 Gov. Corralitos "A"	7-25-71 P & A	5129' Camb.	See discussion
27-22S-1W 660' N & W	Sinclair No. 1 Fed. Doña Ana 18	4-7-62 P & A	6510' Camb.	See discussion
35-22S-5E 330'S, 990'E	Parker et al No. 1 Simmons	1939 P & A	2785' Tert.(?)	Prob. only Cenozoic bolson deposits.
35-22S-5E 220'S, 1100'E	Parker No. 1-X Simmons	3-7-44 P & A	3104' Tert.(?)	Sli. shows oil at 3028-34', and gas at 3040'
15-23S-1W 660'N, 1980'E	Picacho O&G Syn. No. 1 Armstrong	5-15-41 P & A	3196' Perm.(?)	See discussion
36-23S-2E 106'N, 41'W	Snowden and Clary No. 1 State	11-1-49 P & A	2585' Penn.	See discussion
15-23S-5E 1980' S & E	Parker No. 1 State	10-7-44 P & A	4260' Tert.(?)	Trace oil 3002'. Prob. only Cenozoic bolson dep.
26-23S-5E 1100'N, 200'W	Viking No. 1 Cox (State)	1932? Abnd.	3224' Tert.(?)	Water 795' & 2565'. Oil 3100' & 3224'. Prob. Cen. dep. (Sev. shallow offsets.)
7-24S-1E 660' S & E	Boles & Assoc. No. 1 Federal	4-12-63 Temp. Abnd.	5180'	No other info.
32-25S-1E 1315' N & W	Grimm et al No. 1 Mobil-32	10-12-73 Temp. Abnd.	21,759' Ord.	See discussion
35-26S-1E 660' S & W	Texaco No. 1 Weaver-Fed.	1-6-66 P & A	6620' Tert.(?)	See discussion
24-26S-5E 2440'N, 250'W	Bertrand No. 1 Casad	1937? Quat.(?)	400'	No other info.
24-28S-2W 1060'N, 2297'E	Pure No. 1 Federal "H"	2-8-62 P & A	7346' Paleoz.(?)	See discussion

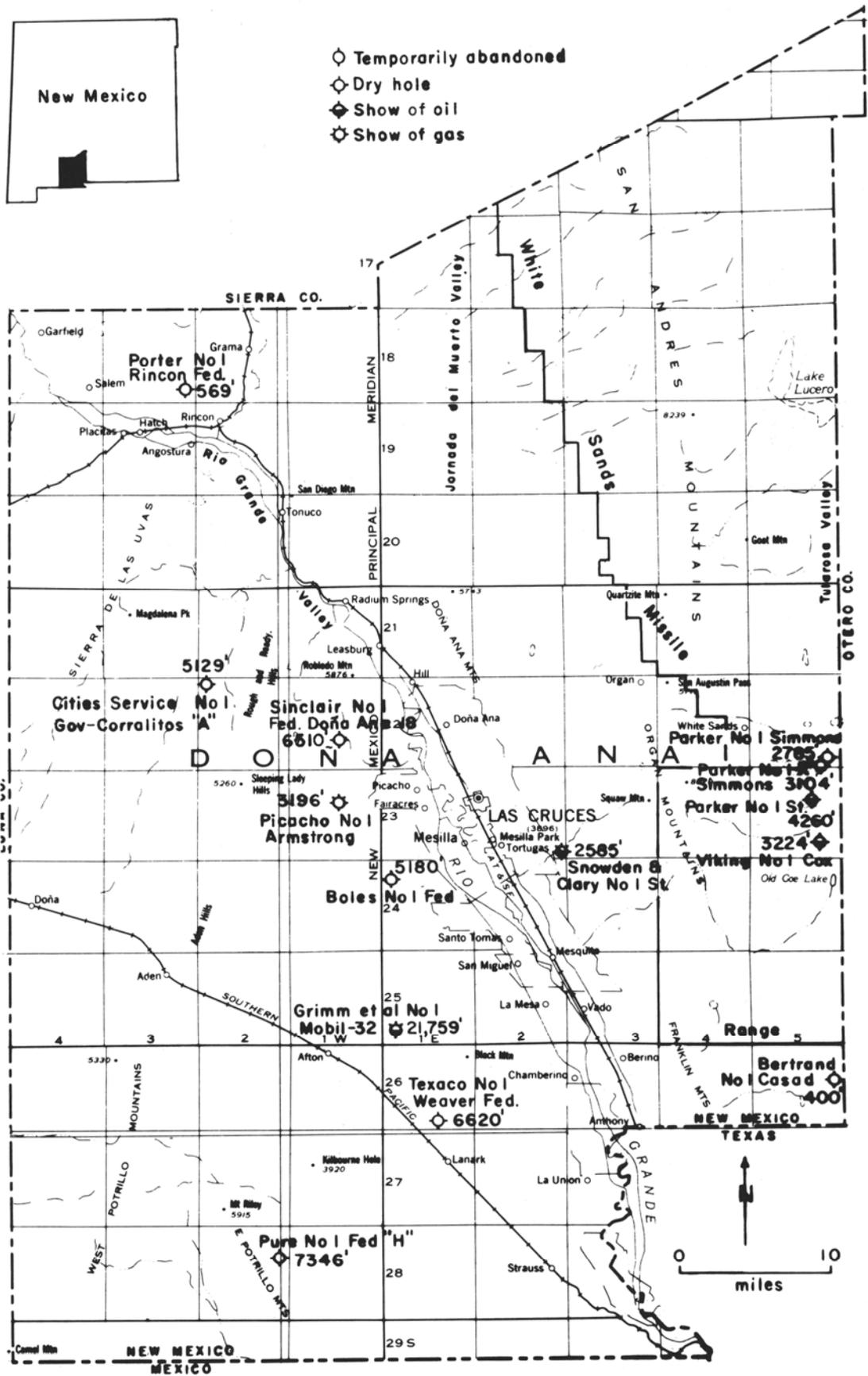


Figure 1. Oil and Gas Exploration Wells, Dona Ana Co., New Mexico.

4,684 ft, this well spudded in Quaternary conglomerate composed mainly of volcanic fragments. The volcanic sequence was topped at 280 ft and consists of rhyolite, quartz latite, tuffs, and black vitrophyre at the base. A fault contact with the underlying Pennsylvanian-Missourian limestones was encountered at 2,850 ft. Desmoinesian fusulinids were identified at 3,330 ft, and two thick rhyolite sills were found similar to those intruding the Pennsylvanian outcrops in the Robledo Mountains. Additional work is needed to establish the top of the Mississippian cherty limestone at 3,655 ft or below, and the top of the Devonian Percha shale at 4,130 ft or above. In the older Paleozoic section the following tops are given: Silurian Fusselman Dolomite at 4,300 ft, Ordovician Montoya dolomite and sandstone at 4,580 ft, El Paso carbonate at 4,970 ft, a (Tertiary ?) rhyolite sill at 5,710 ft, Cambrian-Ordovician Bliss sandstone at 6,330 ft, and another rhyolite sill at 6,440 ft. The total depth at 6,510 ft is still in the sill.

No shows are indicated on the hydrocarbon log, but some intercrystalline porosity is shown in the Fusselman Dolomite. The microlog indicates permeable units in the Pennsylvanian, Mississippian, Fusselman, Montoya, and El Paso. On the induction log, significant SP deflections in the Mississippian and older units suggest that the formation waters are salty and have not been flushed by fresh water. No drill-stem tests were taken.

Picacho Oil and Gas Synd. No. 1 Armstrong
Sec. 15, T. 23 S., R. 1 W.

(Ref.: Kottlowski and others, 1956, p. 82; sample log by Geological Services)

From the surface elevation of about 4,480 ft down to a depth of 265 ft, this well drilled Quaternary deposits and the Santa Fe Formation. Below, the following tentative tops are given: Tertiary volcanics (andesites, etc.) at 265 ft, lower Tertiary (to Cretaceous ?) Love Ranch Formation (redbeds, etc.) at 1,670 ft, Permian Hueco Formation (limestone, etc.) at 2,340 ft, and a "novaculite" at 3,100 ft down to the total depth of 3,196 ft, which was reported originally to be "igneous rock" (and could be a fine-grained sill, silicified Hueco, or up-faulted Mississippian).

Two slight shows of gas were reported at 2,435 ft and 2,620 ft in Hueco limestone.

Snowden and Clary (Clary and Ruther) No. 1 State
Sec. 36, T. 23 S., R. 2 E.

(Ref.: Kottlowski, and others, 1956, p. 82; scout tickets in Bureau files)

At a surface elevation of about 4,240 ft, this well spudded in Quaternary deposits, about one mile south of the Hueco limestone exposure at Tortugas Mountain. Below the valley fill, the top of the Permian Hueco may be at 526 ft, and definite Hueco limestone was drilled from 1,420 ft to 1,865 ft. Probably at the total depth of 2,585 ft the well was in upper Pennsylvanian strata.

Water was encountered at 520 ft in valley fill. In the Hueco limestone, the following shows were reported: gas and dead oil from 553 ft to 573 ft (at 573 ft, one-half barrel of oil was bailed in 16 hours, hole filled with water), slight amount of oil from 1,025 ft to 1,035 ft, oil at 1,161 ft, oil and gas from 1,492 ft to 1,518 ft, and slight amount of oil and gas from 2,540 ft to 2,560 ft.

Grimm, Hunt, Brown, and Am. Arctic Ltd.
No. 1 Mobil-32
Sec. 32, T. 25 S., R. 1 E.

(Ref.: This information is provided through the courtesy of Mr. Jack F. Grimm, Grimm Oil Co., Abilene, Texas. Because he has plans to re-enter the well, all other information remains confidential at this time.)

The location is on a faulted anticline, with the west side down-thrown several thousand feet. Seismic data indicate a closure of over a thousand feet. Beginning at the surface elevation of 4,220 ft, the well drilled valley fill, volcanic rocks, and the Santa Fe Formation down to 12,100 ft. From 12,100 ft to 12,800 ft, fossils indicate a sandstone and coal unit of early Eocene to Paleocene age. In the Mesozoic section the following units are recognized: Cretaceous-Albian at 13,050 ft, marine Jurassic-Oxfordian at 14,100 ft, a quartz monzonite sill of Tertiary age at 14,400 ft, and more Jurassic beneath the sill at 15,130 ft. This marine Jurassic section is the first reported between Mexico and Wyoming.

In the Permo-Pennsylvanian section, the following tops are given: Wolfcampian at 15,500 ft; Pennsylvanian (Cisco) at 19,120 ft; Canyon at 19,200 ft (with *Triticites* sp. down to 19,300 ft), Lower Strawn at 19,400 ft, and Atoka at 19,900 ft. For the rest of the Paleozoic, the remaining tops are given: Mississippian at 20,480 ft, Devonian-Percha at 20,655 ft, Canutillo at 20,855 ft, Silurian (Fusselman) at 20,900 ft, and Ordovician-Montoya at 21,555 ft. At the total depth of 21,759 ft the well was still in the Montoya, only about 150 ft from the top of the El Paso.

Shows of hydrocarbons were found in Tertiary, Cretaceous, Pennsylvanian, and Ordovician (Montoya) units. Unfortunately, none of the seven attempted drill-stem tests were completed. Moreover, only an incomplete wire-line log is available owing to the difficult hole conditions. However, the samples are of good quality and some cores were taken in the Tertiary rocks. Significant porosity and permeability were observed in Tertiary sandstone and Silurian dolomite. Source rocks include the marine Jurassic beds, black carbonaceous limestone in the Permian-Wolfcampian, and dark shale of the Devonian-Percha.

In addition to setting a depth record of 21,759 ft for the Basin and Range Province, this well demonstrated a definite petroleum potential for the deep parts of the Rio Grande depression. Several sills were encountered in addition to the one from 14,400 ft to 15,130 ft, but in no case was the zone of alteration greater than 20 ft. Thus the igneous activity of intrusions and volcanism had little effect on these deeply buried sedimentary rocks.

In fact, the only serious deterrent to exploration is the problem of drilling such a deep hole. With a rig designed to go 15,000 ft, this well was drilled to 21,759 ft, but the drill-pipe failed leaving the drill collars and the test tools in the hole. After plugging back to 20,688 ft a side-track hole was started, but the drill-pipe again twisted off at a depth of 20,767 ft in that hole. After 10 months in operation, the well cost \$1,600,000. Its present status is listed as temporarily abandoned. As soon as a large-enough rig and adequate drill-pipe are available, plans are to re-enter the hole to finish the evaluation of the Montoya, and then go on to test the El Paso and Bliss units. A commercial discovery of oil and/or gas at these great depths in the Rio Grande depression would greatly en-

hance the outlook for petroleum in the Basin and Range Province.

**Texaco, Inc. No. 1 S. H. Weaver-Federal
Sec. 25, T. 26 S., R. 1 E.**

(Ref.: Kottlowski and others, 1969, p. 192; scout tickets in Bureau files)

At a surface elevation of 4,164 ft on the La Mesa surface (east of the Potrillo Mountains), this well drilled Quaternary deposits and Santa Fe Formation down to 2,430 ft. From that depth to the total depth of 6,620 ft the well was probably in Tertiary volcanic rocks, generally flows and tuffs of rhyolitic to andesitic composition with interbedded silty calcareous red shale.

Three cores were taken in the volcanic sequence from 5,256 ft to 5,281 ft, 6,592 ft to 6,602 ft, and 6,602 ft to 6,620 ft, but no shows were reported.

**Pure Oil Co. No. 1 Federal "H"
Sec. 24, T. 28 S., R. 2 W.**

(Ref.: Kottlowski and others, 1969, p. 190, 192; log by Foster in Bureau files)

At a surface elevation of 4,404 ft, this well was spudded in Lower Cretaceous limestone on the east side of the East Potrillo Mountains. Much of the well was drilled with air, and those cuttings are too small to determine stratigraphic correlations in the subsurface with any degree of confidence. The limestone and shale down to about 3,800 ft possibly are Lower Cretaceous. The dolomite and shale from about 3,800 ft to 4,200 ft possibly are Paleozoic. A gouge-like material was encountered

from 4,200 ft down to the total depth of 7,346 ft, with some diorite below 6,960 ft. The fault zone which bounds the eastern side of the mountains apparently was penetrated from 4,200 ft to total depth.

Five cores were reported: from 3,252 ft to 3,263 ft recovering fractured shale, from 4,503 ft to 4,513 ft and 6,175 ft to 6,185 ft recovering limestone, from 6,966 ft to 6,974 ft and 7,129 ft to 7,135 ft recovering diorite. One drill-stem test from 4,354 ft to 4,412 recovered 3,480 ft of mud-cut water with a chloride content of 4,000 ppm. Possibly this fluid is diluted by meteoric water which has descended along the fault zone.

(Note: Mr. Kay C. Havenor, consulting geologist in Roswell, N.M., suggests an alternate interpretation that this well was in steeply dipping Lower Cretaceous beds from the surface to about 6,900 ft, and then in intrusive diorite from that depth to the total depth of 7,346 ft. We plan to make additional studies in hopes of resolving these questions.)

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