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Summary of exploration in the Seven Rivers embayment area, Eddy County, New Mexico

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This is one of many related papers that were included in the 1954 NMGS Fall Field Conference Guidebook.

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Very favorable sections of Pennsylvanian, containing some reef masses, are exposed in the Sacramento Mountains; however, no well drilled to date has found a complete section of Pennsylvanian in this area. The Mississippian formations contains many bioherms which under favorable conditions should contain petroleum. Favorable conditions in the Fusselman, Montoya, and El Paso formations exist over a large part of the area and all of these offer excellent reservoir characteristics. Major unconformities between the Permian and Mississippian are indicated by both surface and sub-surface control. Folds in the area of sufficient age to be of interest are known to exist; however, the masking effect of more recent movements makes the location of test wells difficult. Many dikes, sills, and plugs in the area makes the identification of the basement difficult. The Plymouth No. 1 Federal located south of Escondida is drilling at the time this is written at 2300 feet in the Pennsylvanian. This test encountered a sill from 1380 to 1790 feet.

A complete study of this area is justified in the exploration for petroleum and while many problems exist, the writer feels that the Tularosa Basin, the southern extension of the Sacramento Mountains, and the Hueco Mountain areas offer an excellent opportunity for the petroleum prospector.

SUMMARY OF EXPLORATION IN THE SEVEN RIVERS EMBAYMENT AREA EDDY COUNTY, NEW MEXICO

by

R. E. Murphy and Phil D. Helmig

The region involved in this discussion of exploration activities is defined as the area lying south of the Artesia-Cloudcroft Highway and between the Pecos River on the east across the Huapache Monocline to the Dog Canyon escarpment on the west. Southward the area extends across the state line to Guadalupe Peak, elevation 8751, the highest point in Texas.

The Seven Rivers embayment, as shown on the Index Map, is a physiographic feature expressed as a broad shallow valley developed between the Seven Rivers escarpment on the east and the Huapache Monocline on the west. The rim of the embayment converges to the south, terminating to form a bayhead at the point where the Huapache Monocline joins the Hess Hills. Here the Queen road climbs out of the valley and extends westward across the Guadalupe Hills toward Dog Canyon.

The Upper Permian rocks outcropping in the area range from Capitan Reef type limestones to the red bed evaporite type of back reef equivalents and they occupy the north-west shelf area of the Delaware Basin. The type locality of the Seven Rivers formation is located on the east side of the embayment where it was first described and differentiated by Meinzer, Renick and Bryan 1926, U.S.G.S. Water Supply Paper 580-A. Later more detailed description of the surface exposures were made by Fiedler and Nye 1933, U.S.G.S. Water Supply Paper 639 and by Lang 1937, AAPG Bulletin, Vol. 21. No. 7.

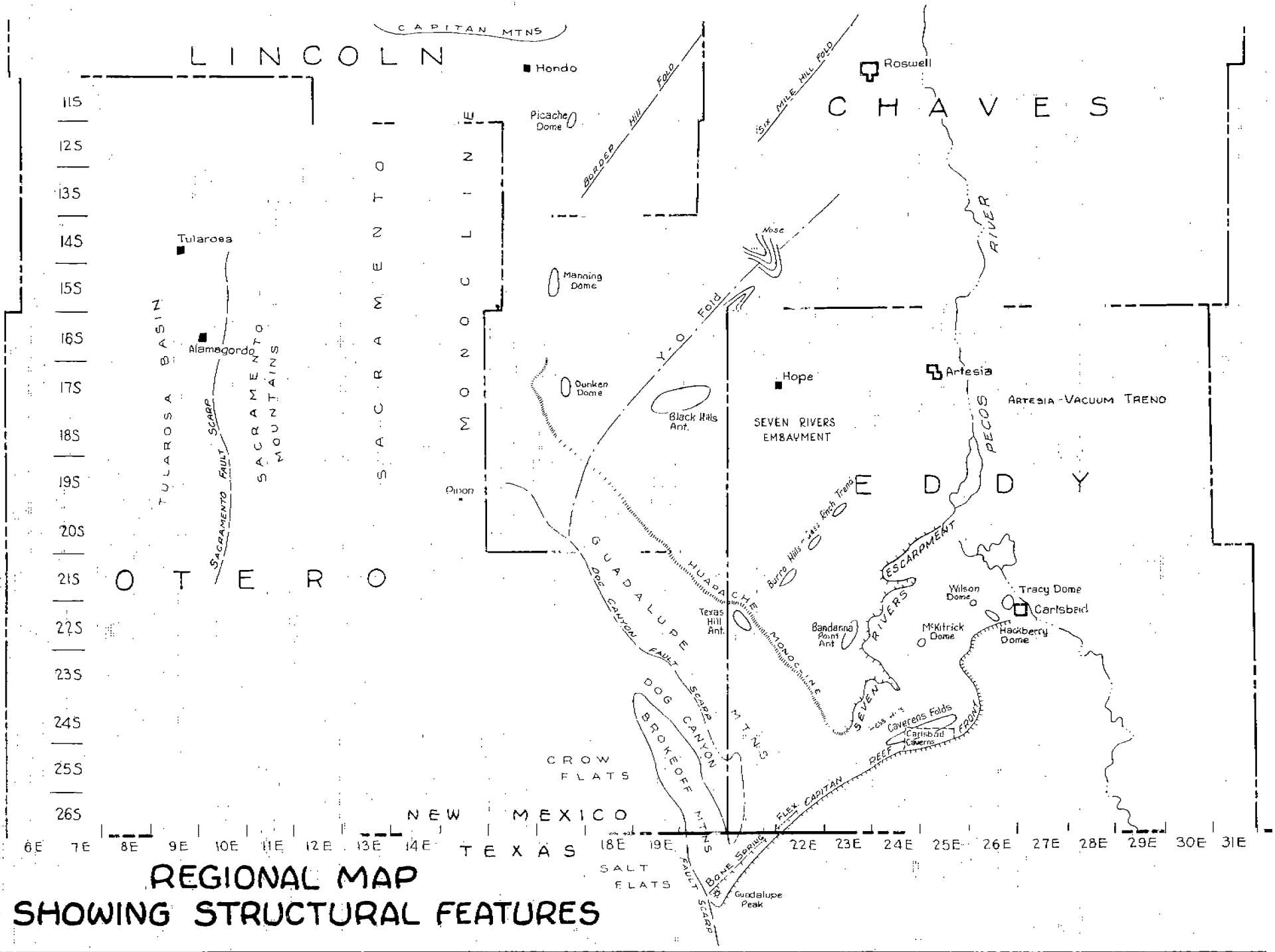
The surface rocks exposed from east to west across the Seven Rivers embayment are upper Permian in age. The following section taken from King 1942, AAPG Bull., Vol. 26, No. 4 and King 1948, U.S.G.S. Prof. Paper 215, is arranged in accordance with the position from reef to back reef area.

		REEF	BACK REEF
Permian Ochoan Series		Unknown	Castile
Permian Guadalupian Series	(	Capitan Lime	(Tansill - Dolomite silts & sand (Yates - Dolomite & sand (Seven Rivers - Red Beds & Gypsum (Queen - Grayburg - Dolomite & sand
	(	Goat Seep Lime	(San Andres - Dolomite (Glorieta - Sand
Permian Leonardian Series		Victoria Peak Lime	(Yeso (etc.

Many wells have been drilled in the area during the past thirty years. Twenty-four (24) wells are listed in tabular form as important developments that may provide clues to the subsurface petroleum possibilities. The formation identification given are those commonly reported and should not be interpreted as an attempt to establish controversial correlations.

NAME	ELEV. FEET	TD FEET	DEPTH TO PRE-PENN	FORMATION AT TD
Magnolia-Headley-Federal #1	4905	6085	4665	Pre-Cambrian
Magnolia-Headley-Federal #2	4963	5160	4456	Montoya
Westcoast Carbon-Blk. Hills #1	4768	5612	4550	Ellenburger
Southern Union-Elliot #1	3866	9887	8270	Granite
Magnolia-Hamilton Fed. #1	3850	3592	–	Yeso
Standard-Cass Ranch Unit #1	3764	9950	9455	Devonian
Stanolind-Lakewood Unit #1	3542	10486	9865	Devonian
Truitt & Tallmadge-Rudahl #1	3830	3005	–	Yeso
Humble-Hobbs #1	3588	11580	9680	Ellenburger
Stroup Hartz-State #1	3964	2887	–	Yeso
Potash-Riggs Federal #1	3846	4007	–	Yeso or Abo
Malco-Wills #1	3758	3940	–	Yeso
Ohio-Tracy #1	3860	5805	–	Delaware Mt. Group
Std. Texas-Wilson #1	3737	3248	–	Delaware Mt. Group
Stanolind-G.F.U. #1	3961	13034	10900	Ellenburger
Std. Texas-Smith #1	4272	3905	–	Yeso?
Spearow-McClelland #1	4150	4980	–	Yeso
Magnolia-Crosby #1	4250	3043	–	Yeso
Magnolia-Golden #1	4478	3907	–	Abo
Magnolia-State W #1	4464	11312	9380	Granite
Continental-E.T.H. #1	4584	10596	9180	Ellenburger
Continental-Bass #1	5512	5889	3810	Ellenburger
Pure-Hunter #1	5308	6650	3820	Ellenburger
Magnolia-Foster Unit #1	4077	3502	–	Yeso

Locations for the early exploration drilling were made on surface indications of anticlinal structure of which there are several outstanding developments in the area; notably the Black Hills Anticline West of Hope; Tracy Dome and Wilson Dome, just west of Carlsbad; Texas Hill Anticline on the west side and Bandana Point Anticline near the south end of the area.



REGIONAL MAP SHOWING STRUCTURAL FEATURES

Tracy Dome was drilled to a depth of 5805 feet in 1926 by the Ohio-Tracy #1 in a top reef position. The well reported continuous white lime to 2600 feet, then penetrated 2000 feet of sand without a break. Below 4900 feet black siliceous limestone was encountered and the well was reported bottomed in the same formation. Shows of oil were reported at 3125 feet and 4745 feet. Eighteen years later in 1944, the Texas Company drilled the Wilson Dome on a slightly back reef position six miles west of the Tracy Dome, to a depth of 3248 feet but reported no shows.

The Spearow-McClelland #1, drilled in 1934, was one of the earliest wells to penetrate the pre-Glorieta beds from a back reef position loated well out in the embayment proper. Oil and gas shows were reported in the Yeso section below 2000 feet. The well was still blowing gas at the open casing head in 1950.

Later wells drilled to 3000 feet in the early 1940's, reported oil shows but were unable to make commercial production. The Stroup-Hartz State #1, completed in 1942, and the Truett & Talmadge-Rudahl #1 completed in the same year, both reported shows of oik and gas from the yeso section between 2000 feet and 3000 feet.

The Black Hills Anticline was first tested in 1946 by the Magnolia-Headley Federal #1 (Black Hills Unit) found several zones of porosity in the pre-Pennsylvanian beds but recovered sulphur water on all drill stem tests. The well topped quartzite at 6065 feet, presumably pre-Cambrian basement, and was pulgged and abandoned at 6085 feet. Three years later another well was drilled higher on structure. The Magnolia-Headley Federal #2 in 1951 was drilled on the apex of the anticline in an attempt to test above water. In 1953 the Westcoast Hydrocarbon-Black Hills #1 was drilled in a down-flank position to try for a possible Pennsylvanian stratigraphic pinch-out trap. Both wells found sulphur water in all zones of porosity and were abandoned although the Westcoast Hydrocarbon well did recover several gallons of distillate along with sulphur water in the top of the Siluro-Devonian.

In 1947, a deep test was located in the north middle portion of the Seven Rivers embayment on geophysical information. The Southern Union-Elliott #1, drilled to pre-Cambrian granite at 9883 feet, found over 3000 feet of Permo-Pennsylvanian section which showed several zones of porosity, but recovered only a few feet of gas-cut mud on drill stem tests. A full pre-Pennsylvanian section was reported from the well and the information coupled with the prospects of a favorable Pennsylvanian section focussed considerable interest on exploration activities west of the Pecos River for the next few years.

About the same time the Southern Union-Elliot #1 was drilling, Magnolia Petroleum Company spudded the Magnolia-State W#1 in November 1947. The well, like the Elliot #1, was located in the middle of the Seven Rivers embayment, but further south on the Burro Hills trend. The Magnolia-State W#1 cut over 4000 feet of Permo-Pennsylvanian section as well as a possible full pre-Pennsylvanian section and topped pre-Cambrian granite at 11305 feet.

The porosity in the pre-Pennsylvanian section in State W#1 showed sulphur water on the DST's. The Permo-Pennsylvanian section had scattered shows of porosity that were later tested by Standard of Texas in March 1954, and ten zones in the Permo-Pennsylvanian section were tested on an old well work-over program. All DST's recovered sulphur water with no shows.

Before abandonment of the State W#1 in July 1948, scattered zones of oil and gas shows in dolomite porosity of the Yeso formation were worked-over from 2010 feet to 2350 feet without success. The Permian shows appeared to be sufficiently favorable to step out and explore for better porosity and possible reef development. As a result five Yeso tests were drilled along the Burro Hills-Cass Ranch Unit trend without finding effective permeability in the scattered shows that were found in the 2000-3000 foot zone of the Yeso dolomites.

Since 1949 six deep tests have been drilled by various companies, apparently, on a combination of geophysical, surface and subsurface information. All were dry holes and all but one had a full pre-Permian section.

Hunble drilled the Federal-Hobbs #1 to the lower Ordovician, April 1950, and found porosity in the Permian, Pennsylvanian and pre-Pennsylvanian sections but the DST's recovered salt water and sulphur water with no shows.

The Texas Hill Anticline, one of the last untested surface structures, is located on top and on the north end of the

Huapache Monocline. This anticline was tested in 1952 by the Continental Bass #1. The well was abandoned in Ellenburger dolomite at 5889 feet. The Continental Bass #1, drilled on top of the Huapache Monocline, did not find the thick Permo-Pennsylvanian section that was present six miles east in the Magnolia-State W#1. The thinning of section was an outstanding development of the subsurface geology on the west side of the Seven Rivers embayment which aroused considerable geological interest and renewed exploration activities.

During 1953, three more of the deep tests were spudded, the Standard of Texas drilled their Cass Ranch Unit well through a full pre-Permian section to the Devonian. Drill stem tests had slight shows in the lower Permian, and in the Pennsylvanian. The Devonian porosity made 7020 feet of sulphur water on DST and the well was plugged dry and abandoned. Stanolind drilled two wildcats, the Guadalupe Foot Hills Unit and the Lakewood Unit. Both wells found a full pre-Permian section present and had gas shows in the Wolfcamp and Pennsylvanian sections, but no commercial production. Salt water was recovered in the pre-Pennsylvanian porosity zones.

January 5, 1954, Continental completed the most recent deep test in the area. The Continental-East Texas Hill Unit #1, bottomed in Ellenburger dolomite at 10596 fee, was drilled four miles east of the Continental Bass #1 and down in the embayment area immediately east of the Huapache monoclinal flexure. At this location a section was drilled similar to that found in the Magnolia-State W-1 and again approximately 4000 feet of Permo-Pennsylvanian beds were present that were absent in the Continental-Bass #1.

The history of the exploration activities in the Seven Rivers embayment area has been marked by periods quiscence and renewed effort, and in all probability the cycle will be repeated in the future. The stratigraphic section now known in the area appears to have the geological features that can provide the conditions necessary for the generation and accumulation of oil in the Permian, Pennsylvanina, and Pre-Pennsylvanian beds. The problem remaining apparently is to find a suitable trap.

SOUTHEASTERN NEW MEXICO PETROLEUM STATISTICS

BY
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Oil in southeastern New Mexico was discovered in August 1923, in Eddy County in what became the Artesia pool. In late 1927, the Rhodes pool, on the south end of the Central Basin platform in Lea County, was found. The year 1928 saw considerable expansion of oil activity north along the platform.

In 1930, self-pro-rationing of oil production was instituted by the Hobbs pool operators with Mr. Glenn Staley as umpire. The group, known later as the Lea County Operators, conducted pro-rationing of oil in the Lea County area and southeast New Mexico.

In 1935, the New Mexico legislature passed the Oil Conservation Law and state supervised pro-rationing commenced.

In 1936, the first year after state pro-rationing, the state's oil wells produced 26.8 million barrels of oil. Lea County produced 94½% of the output; Eddy County produced 4% and the San Juan Basin produced 1½%.

In 1946, ten years later the oil wells of the state produced 36.7 million barrels of oil – a gain of 37% in the decade. Lea County produced 85.3% of the oil output; Eddy County produced 13.6% and the San Juan Basin produced 1.1%.

Now in 1953, the oil wells of the state yielded 70½ million barrels of the black gold – a gain of 92% in the past 7 years. Lea County produced 94.2% of the oil output; Chaves, Eddy and Roosevelt Counties produced 4.8% and the San Juan Basin produced 1%.

The accompanying ratio-graph shows gross monthly oil production in the state from 1943 to June 1954, inclusive. The daily average protluction of oil in 1953 was 192,500 barrels.

While the oil wells of the southeastern area were producing this large stream of oil in 1953, they were producing 209 million MCF of casing head gas and the gas wells were producing 109 million MCF of dry gas.

The gasoline plants in the southeast purchased 253 million MCF of the produced gas for processing in 1953. They sold 160 million MCF of dry gas to the pipe-lines for use in the state and for export. They also produced 4¼ million barrels of natural gasoline and 2.8 million barrels of LPG (propane and butane).

The five carbon black plants in the area had an