Case No.

1367

Large Exhibits

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SEISMOGRAPH APPRAISAL

ETCHEVERRY RANCH AREA

TPS 14 and 15 S, RS 33 and 34 E,

LEA COUNTY, NEW MEXICO

FOR

FELMONT OIL CORPORATION

OCTOBER 12, 1957

App. 1367 2

SUMMARY AND RECOMMENDATIONS

A dome, based upon reliable seismograph data, has been found, the highest measured point of which is located on the west side of the NW¼ of the NW¼ of Sec. 4, T 15 S, R 34 E. This uplift covers the better part of four sections, and shows in excess of 200' of relief. Another dome is found in Secs. 1 and 12, T 15 S, R 33 E. It is recommended that any available acreage on these structures be acquired. It is further recommended that a test be drilled on the former, to the Devonian formation. This should be located as closely as practicable to the highest measured point. The second feature will require more seismograph work before drilling is initiated.

Leads to two possible structures are found in Secs. 27 and 19, T 14 S, R 34 E. The shooting of these leads is recommended, provided that the land situation makes such a course feasible.

INTRODUCTION

The greater portion of the area investigated centers on the common boundary between Tps 14 and 15 S, R 34 E, although three lines extend into R 33 E. It is situated four miles east of the Saunders Field, which produces from the Pennsylvanian and Devonian formations, north of the Townsend Field, which produces from the Wolfcamp formation, and west of the Caudill and Dean Fields, which produce from the Pennsylvanian and Devonian formations.

United Geophysical Company of Pasadena, California, was engaged for the field work. Part of the time two crews were used. One of these employed groups of twelve geophones, spaced thirty feet apart, for each recording trace; the other used groups of eighteen instruments, spaced 20' apart. Forty-eight trace cameras were available, so the outputs of the instrument groups were recorded simultaneously on mixed and unmixed circuits. The holes were offset 5,280', perpendicularly from the centers of the instrument spreads, and the positions of the instruments and shot holes were staggered along the lines, in order to afford up-hole weathering control on the end traces of each instrument spread. This method is not popular with many seismologists, but has proven very successful in this area, as attested by the fact that with it the Caudill Field was discovered. A line a mile and a half long, extending across and beyond Sec. 5, T 15 S, R 34 E, and employing normal incidence shooting was tried, but the record quality was far inferior to that secured from the single hole offset broadsides, even though shots fired simultaneously in three deep holes were used for the vertical records - a device that sometimes gives good data in bad areas.

VELOCITY CONTROL AND COMPUTATIONAL PROCEDURES

Velocity surveys from the Hunt - #1 State, Sec. 34, T 15 S, R 34 E; the Shell Oil Company - #1 Williams unit, Sec. 8, T 16 S, R 34 E; the Humble Oil and Refining Company - #1 Federal-Elliott, Sec. 1, T 16 S, R 34 E; and the Ada Oil Company - #1 Coalson, Sec. 13, T 15 S, R 35 E, were available. The velocity was distributed linearly between the Hunt, Humble and Shell wells, and a value projected along the strike so derived checked the experimental data in the Ada-Coalson well, very closely.

The time values were converted to depth according to the following procedure: a value of 0.100 of a sec. was subtracted from each time value, this comprized of: .035 for normal move-out; .037 for instrument lag; and .028 for phase. Correction for this latter category was made because it was evident that the trough which was picked was a second phase of the Mississippian reflection. The remainders were multiplied by one-half the velocities read from the nearest velocity contours, and the datum: +4,000' was subtracted from the products to yield the subsurface elevations.

RESULTS

There were many reliable reflections from the Permian and Pennsylvanian formations, but none was continuous, so no maps were made for these formations. It would have been possible to do so by use of considerable phantom projection, but this course was not elected because of the fact that it would have led to a hybridized map; besides, the structure in the Permian and Pennsylvanian formations is of only secondary interest, in any event, the principal drilling objective being the Devonian formation. Of the pre-Pennsylvanian reflections, the strongest, and the only one of which was nearly continuous, is the Mississippian, and this is the subject of Enclosure I.

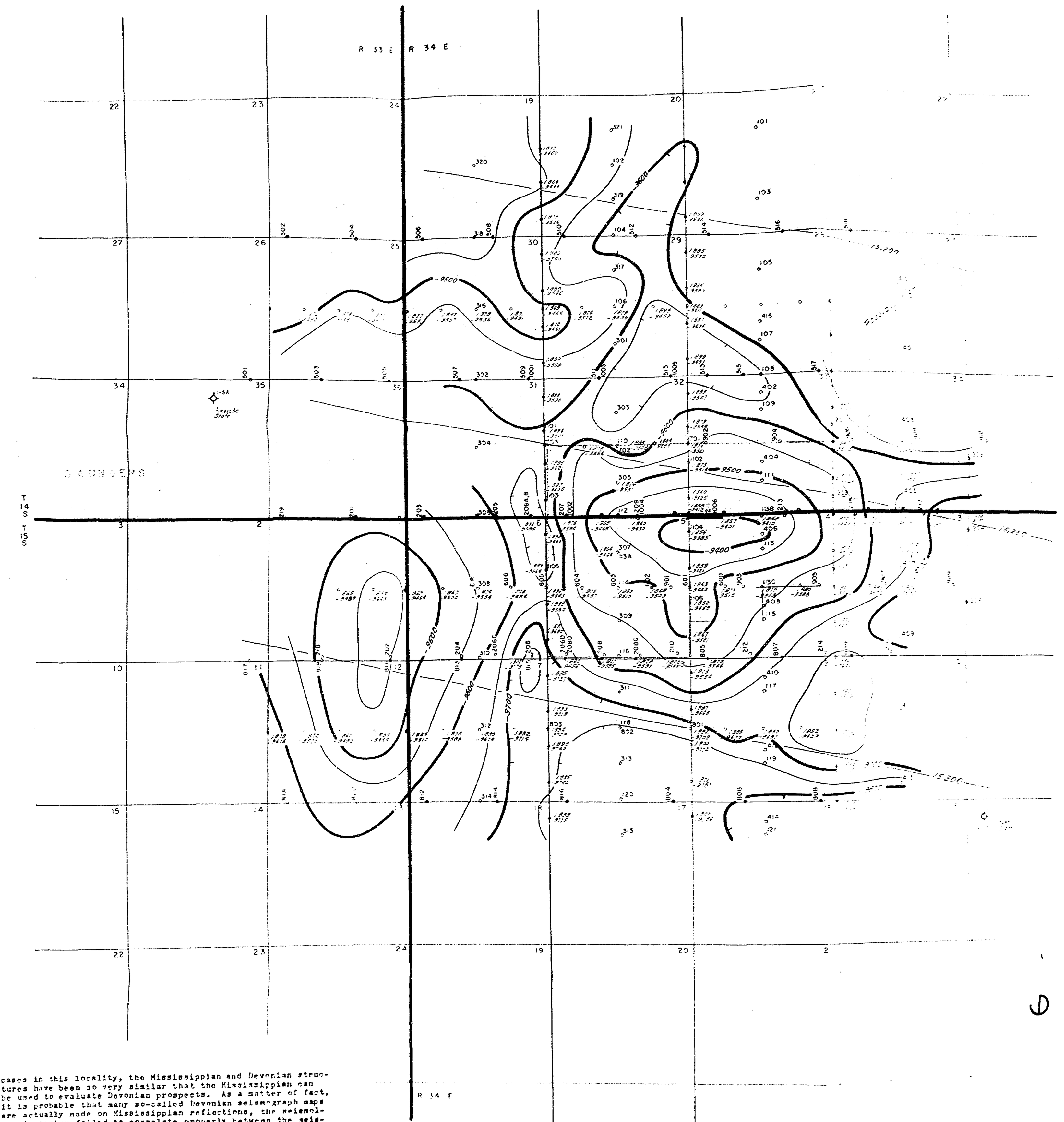
Enclosure I, Contours on a Reflection from the Mississippian Formation with Velocity Contours

Identification of the subject reflection with the Mississippian formation is based upon two factors: (1) an unconformity which can be recognized on some of the better records, and is believed to be the one between the Pennsylvanian and Mississippian formations; (2) the fact that the depth computations fall within the known range of [illegible] for the Mississippian formation, as evinced by the Hunt - #1 State well, Sec. 34, T 15 S, R 34 E. The Mississippian [illegible] is not a drilling objective, but in all known cases in this locality, the Mississippian and Devonian structures have been so very similar that the Mississippian can be used to evaluate Devonian prospects. As a matter of fact, it is probable that many so-called Devonian seismograph maps are actually made on Mississippian reflections, the seismologists having failed to correlate properly between the seismograms and the geological section. On some of the better records, on which the reflection character is well developed, it is evident that the continuous phase which was used in mapping, is the second one.

The structure of principal interest is the dome, the highest measured point of which is on the west line of the NW¼ of the NW¼, Sec. 4, T 15 S, R 34 E. This covers the greater part of four sections, and shows in excess of 200' of relief. The data which define this feature are very reliable and are, specifically, the following lines: the N-S line from the center of Sec. 34, T 14 S, to the center of Sec. 3, T 15 S; a N-S line along the west lines of Sec. 34, T 14 S, and of Secs. 3 and 10, T 15 S; a N-S line along the west lines of Sec. 33, T 14 S, and of Secs. 4 and 9, T 15 S; a N-S line along the west lines of Sec. 32, T 14 S, and of Secs. 5 and 8, T 15 S; an E-W line from the center of Sec. 3 to the W¼ corner of Sec. 5, T 15 S; an E-W line along the south line of Sec. 5, T 15 S; and an E-W line through the center of Sec. 9, T 15 S; all in R 34 E. The other data on this dome are not continuous, but dip components and dip projection of these poorer data tie in with the reliable network. None of these poorer lines may be considered critical.

Another dome is found in Secs. 1 and 12, T 15 S, R 33 E, but has not been completely delineated by the seismograph. It is possible that Sec. 27, T 14 S, R 34 E, is high, and may be the site of still another dome, but the seismograph data were not diagnostic. Another uplift is indicated in Sec. 19, T 14 S, R 34 E.

Respectfully submitted,



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RS 33 & 34 E.

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A REFLECTION FROM THE

MISSISSIPPIAN FORMATION