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CASE NO. 7352

APPLICATION OF YATES PETROLEUM CORPORATION
FOR DESIGNATION OF A TIGHT FORMATION
EDDY COUNTY, NEW MEXICO

APPLICATION

Yates Petroleum Corporation seeks tight formation designation for a portion of the Permo-Penn underlying lands in western Eddy County, New Mexico, which are described in Exhibit No. 1 and shown in map form in Exhibits No.2 and 3.

DESCRIPTION OF FORMATION BY GEOLOGICAL PARAMETERS

The formation sought to be covered by this application is that stratigraphic interval between the top of a marker named the Third Sister Cycle (of the Wolfcamp Series of the Permian System) and the top of the Canyon Series (of the Pennsylvanian System).

Correlations of the Third Sister Cycle and The Canyon Series are shown on a network of 4 crossections spread over the subject area. (Exhibits 5 through 8). Positions of the Third Sister and Canyon in the geologic column are illustrated in Exhibit 4.

The Third Sister Cycle to Canyon Series varies from approximately 1000 to 1400 feet in thickness.

STATEMENT OF MEANING AND PURPOSE OF EACH EXHIBIT

EXHIBIT NO. 1

Exhibit No. 1 is a list which describes the lands which overlie the Permo-Penn interval for which tight formation designation is sought in this application.

EXHIBIT NO. 2

Exhibit No. 2 is a map of 1 inch equals 5000 feet scale which shows the lands described in Exhibit No. 1. The subject area stretches over a portion of western Eddy County, New Mexico, from the Pecos River east of the City of Artesia to the Huapache Monocline some 40 miles to the Southwest.

Also shown, by circled well spots, are all wells within the outline which have penetrated the above defined Permo-Penn formation and/or lower horizons. Red-colored well spots are wells which are currently producing gas from the above defined Permo-Penn interval.

The deposits of the subject Permo-Penn interval are a complex of 3 major environments of deposition or "facies": shelf, bank and basin facies.

The shelf facies, lying in bands to the West or Northwest, is comprised of interbedded limestones, shales, siltstones and sandstones. Terrigenous clastics (shales, siltstones and sandstones) increase and marine limestones and shales decrease traversing from East to West or Southeast to Northwest, that is, in a shelfward direction. Deposits of the Shelf facies are effectively non-porous and impermeable and constitute

An updip "mega-seal" to the bank facies.

The bank facies is composed mostly of marine limestones with a few intercalated marine shales. These marine limestones are made up of bioherms and their associated debris aprons interfingering with oolite bars. The porosity that is present is a result of preservation of primary porosity, principally of bryozoan material, and creation of secondary porosity by leaching of oolitic grainstones and former aragonitic shell material.

Most of the gas production that has been established in the subject Permo-Penn interval has been from the deposits of the bank facies.

The basin facies consists mainly of thin-bedded, fine-grained sandstones, siltstones and shales which were transported to the relatively deeper basin from the bank and shelf areas during periods of lowered sea level. Main conduits for transport to the basin were through passes between segments of the bank facies.

Scattered within the overall basin facies are isolated limestone or carbonate buildups termed "isolated mounds". In some of the isolated mounds porosity has been developed and/or preserved, but many are effectively non-porous and impermeable. Some of the isolated mounds have produced gas. Wells in the basin facies which have encountered mounds are indicated by the letter "M" close by the well spot.

About one-third of the subject Permo-Penn interval, in the upper part, has been termed the "Antelope Sink Zone", named for an interval in the Sun (Tom Brown) No. 1 Antelope Sink Unit in Section 18 of T19S-24E. This well is shown on 2 crosssections, Exhibits 6 and 8. The geographical limits of shelf, bank and basin shown on Exhibit No. 2 are for the

Antelope Sink Zone alone. Lower zones of the subject Permo-Penn interval are not shown, but their facies trends are essentially parallel to those shown on Exhibit No. 2.

Exhibit No. 2 also Shows the traces of the crossections introduced in later exhibits.

EXHIBIT NO. 3

Exhibit No. 3 is identical to Exhibit No. 2 from the standpoint of scale, outline of lands, well spots and colored well spots.

The purpose of this exhibit is to illustrate the structural attitude of the Permo-Penn Formation in the subject area. Mapping was done on the top of the Antelope Sink Zone in the shelf and bank areas and on the top of the Canyon Series in the basinal areas. As the crossections will show, the Antelope Sink Zone is essentially parallel with the Third Sister Cycle above. Dashed contours are 100 feet contour intervals on the top of the Antelope Sink Zone. Solid contours are 100 foot contour intervals on the top of the Canyon Series.

These contours indicate that over most of the outlined area the Permo-Penn interval dips to the East or Southeast at approximately 100 feet per mile; however, in the southwestern part of the outlined area, near the Huapache Monocline, the Permo-Penn interval dips East to North-easterly at 200 to 300 feet per mile and structure is complicated by faulting.

Structural relief on the top of the subject Permo-Penn is approximately 3300 feet in the outlined area. Ground level elevations rise approximately 1500 feet from wells near the Pecos River (in T17S-R26E) to wells near the Huapache Monocline (in T21S-R21E).

The drill depth to the top of the Third Sister Cycle in the highest well (Pennzoil No. 1 United Federal in Section 28 of T21S-R21E) is 4927 feet; and, the drill depth to the top of the Third Sister in the lowest well (Heyco No. 1 Big Boggy State in Section 36 of T17S-R26E) is 6717 feet. The average depth to the top of the subject Permo-Penn Formation is thus 5827 feet.

EXHIBIT NO. 4

Exhibit No. 4 illustrates the stratigraphic column present in western Eddy County, New Mexico. This geologic section was compiled from New Mexico Oil Conservation Division reference crossections and other industry-accepted correlations.

The main purpose of this exhibit is to show the Permo-Penn stratigraphic interval sought to be covered by this application in relation to geologic time and other major stratigraphic horizons.

EXHIBIT NO. 5

Exhibit No. 5 is a Northwest to Southeast stratigraphic crossection (A-A') hung on the Third Sister Cycle of the Wolfcamp Series. This crossection is tranverse to the three major facies trends of shelf, bank and basin.

Other pertinent correlations shown are the top of the Antelope Sink Zone of the shelf and bank facies, top of the Pennsylvanian (by correlating with the New Mexico Oil Conservation Division reference crossections) and the top of the Canyon Series.

Drill stem test, core and completion data are shown on the crossection. Well 6 was cored in the Permo-Penn and the core analysis report is given

in a later exhibit. Wells 2,3 and 5 are currently producing Permo-Penn gas and have been assigned to the Eagle Creek Permo-Penn (Gas) Field by the New Mexico Oil Conservation Division. Wells 4 and 6 should produce Permo-Penn gas, but they have not yet been completed in that interval. Note that well 8 produced gas from an isolated mound. This well was assigned to the Atoka Cisco, West (Gas) Field and produced 64,125 MCF of gas and 146 barrels of condensate before abandonment in 1980.

EXHIBIT NO. 6

Exhibit No. 6 is a Northwest to Southeast stratigraphic crosssection (B-B') which is, again, hung on the Third Sister Cycle and is transverse to the 3 major facies of shelf, bank and basin.

A key correlation well, the Sun (Tom Brown) No. 1 Antelope Sink Unit, is well 3. Tops pertinent to this application are picked in this well as follows: Third Sister 5860', Antelope Sink Zone 6080', top of the bank facies 6140', top of the Pennsylvanian (by correlation with New Mexico Oil Conservation Division reference crosssections) 6190', base of the bank facies 6420' and Canyon Series 7060'. Note that the perforated interval straddles the systemic boundary between the Permian and the Pennsylvanian. The Antelope Sink Unit No. 1 has been assigned to the Antelope Sink Upper Penn (Gas) Field. Well 4 should also produce Permo-Penn gas, but it has not yet been completed in the zone.

EXHIBIT NO. 7

Exhibit No. 7 is another Northwest to Southeast stratigraphic crosssection (C-C') which is also hung on the Third Sister Cycle.

Wells 4 and 6 are producing gas from the Permo-Penn Formation and have been assigned to the Box Canyon Permo-Penn (Gas) Field.

EXHIBIT NO. 8

Exhibit No. 8 is a Southwest to Northeast stratigraphic crossection (D-D') which is hung on the Third Sister Cycle. This longitudinal or strike crossection is more or less parallel to the major facies of shelf, bank and basin.

The purpose of this crossection is to tie the three previous transverse crossections. It may be noted that the main gas-productive Antelope Sink Zone bank facies correlate very well from Box Canyon Permo-Penn (Gas) Field to Antelope Sink Upper Penn (Gas) Field to Penasco Draw Permo-Penn (Gas) Field to Eagle Creek Permo-Penn (Gas) Field.