OIL & GAS POTENTIAL OF UPPER CRETACEOUS SEDIMENTS, SOUTHERN PICEANCE BASIN

by

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INTRODUCTION

The oil and gas potential of Upper Cretaceous Mancos and Mesaverde sediments in the southern Piceance basin has barely been tapped. To date only one oil field, the DeBeque field, has been discovered. This field was drilled in 1902 and later abandoned. Little is known about the field except that oil and some gas was apparently encountered in the upper Mesaverde. Twelve upper Cretaceous gas fields have been discovered. The first in 1955 when the Hunters Canyon field discovery well encountered commercial gas from the Cozzette Sandstone of the Mancos-Mesaverde transitional zone. Primary objectives are usually the Cozzette and Corcoran sandstones with stray Mesaverde sandstones as secondary objectives. A few wells have been completed in the Lower Cretaceous along the western edge of the area. Practically no information is known of the Lower Cretaceous in the deeper portion of the basin, but depths would exceed 10,000 feet.

The southern Piceance basin encompasses parts of Mesa, Garfield, Delta, Gunnison, and Pitkin counties including Townships 6 through 14 South, Ranges 89 through 101 West, as outlined in Figure 1. The basin is bounded on the east by the White River uplift and on the south by the Gunnison and Uncompahgre uplifts. The Douglas Creek arch to the west and northern Piceance basin are discussed elsewhere within this guidebook.

Altitudes within the southern Piceance basin range from 5,000 to 11,000 feet. The topography is characterized by mesas which have been incised by intermittent streams which created nearly vertical canyons. This has caused considerable problems in logistics and has impeded exploration within the basin.

STRATIGRAPHY AND SEDIMENTATION

Upper Cretaceous sediments were deposited on the broad west flank of a Cretaceous seaway which extended northward from the Gulf of Mexico into Canada and covered most of the western interior. Major source areas of sediments were to the west and transgressive seas came from the east.

Sediments of the Upper Cretaceous, for the purpose of this paper, include the interval from the top of the Dakota formation to the base of the Tertiary and consist of the Mancos Shale and Mesaverde group, illustrated by the cross section Plate 1. Only the upper few feet of the main body of Mancos Shale is shown on the cross section since most wells did not drill deeper, thus limiting the information. The Upper Cretaceous interval reaches a maximum thickness of 8,000 feet in the eastern part of the area and thins to less than 5,000 feet westward due to nondeposition and erosion.

The dominant sedimentary pattern during late Cretaceous was one of eastward regression since a depositional sequence grading upward from marine to transitional to continental is represented in the Upper Cretaceous sediments. This pattern was apparently interrupted by minor westward transgressions of the Cretaceous sea as illustrated by intertonguing of Mancos Shale with the Cozzette and Corcoran sandstones.

The main source area of the Mancos and Mesaverde sediments was in western Utah with the Ancestral Uncompahgre uplift contributing minor amounts. Mancos and Mesaverde sediments outcrop along the flanks of the Piceance basin, but are masked by Tertiary sediments in the deeper portion.

Mancos Shale

The Mancos Shale is defined for purposes of this paper as all strata from the top of the Dakota formation to the base of the Corcoran sandstones. It is approximately 4,000 feet thick and represents a marine environment of deposition. The shale is bluish gray to dark gray in appearance and contains veinlets of gypsum and calcite (Fisher, 1960, p. 8). Some silty zones occur throughout the section.

Transitional Zone

Corcoran Sandstone

The Corcoran sandstones are very fine grained, coaly, and micaceous. Porosities vary from fair to good with low permeabilities due to the clay mineral content and silty nature of the sandstones. Beds of coal and Mancos Shale separate the sandstones with the shale increasing and coal decreasing eastward. Maximum gross thickness of the sandstones is 100 feet at Hunters Canyon field and thins basinward grading to a siltstone.