STRATIGRAPHY AND OIL AND GAS POTENTIAL OF ENTRADA SANDSTONE (JURASSIC), NORTHEASTERN UTAH

by
E. P. Otto
and M. Dane Picard

In northeastern Utah, the Entrada Sandstone contains two lithologic facies: a lower pale yellowish-orange, fine- to medium-grained sandstone (sandstone facies), and an upper moderate reddish-orange, very fine-grained silty sandstone (silty sandstone facies). The silty sandstone facies is present only in the western part of the area where it interfingers with the sandstone facies.

Differences in lithology and sedimentary structures provide a means for separating the sandstone facies into informal lower and upper units. The lower unit thickens eastward and is dominantly fine grained. Sedimentary structures include: small- to large-scale trough cross-stratification, horizontal stratification, small- to medium-scale tabular- and wedge-planar cross-stratification, large-scale tabular-planar cross-stratification, and multiple parallel-truncation bedding planes.

The upper unit of the sandstone facies is dominantly very fine- to fine-grained sandstone. Locally glauconite and limy sandstone are abundant. The upper unit thins eastward and primarily is composed of horizontally stratified or structureless sandstone; small- to medium-scale tabular- and wedge-planar and trough cross-stratification are rare.

The silty sandstone facies appears structureless. Disturbed and horizontal stratification are locally present where interfingering occurs with the underlying sandstone facies.

Dominant paleocurrent directions, based on 275 measurements, are west, south, and southwest. Nine of 11 locations show a unimodal distribution; seventy-nine percent of these measurements are between 150° and 299°; eighty-three percent are between 180° and 359°. The remaining two locations show bimodal distributions; southeast-northwest and southwest-northeast. Azimuths of trough cross-stratification formed in subaqueous environments differ significantly from all other types of cross-stratification. The mean azimuth for these troughs is 326°, compared with 232° for all other types of cross-stratification.

The lower unit of the sandstone facies probably was deposited in an arid or semi-arid, inland-dune environment in the eastern part of the area, and as coastal dunes and shallow-water marine deposits (upper shoreface) bordering the Preuss seaway on the west. The upper unit may represent a reworking of the Entrada during a minor transgression of the Preuss sea. The silty sandstone facies is probably a shallow-water marine deposit.

Eolian beds in the lower unit of the sandstone facies exhibit an average porosity of 15.9 percent and offer the best potential as reservoir rocks. Where eolian beds are close to favorable source rocks, low porosities in the overlying upper unit (9 percent) and the silty sandstone facies (1.9 percent) may provide stratigraphic traps for the accumulation of oil and gas.

INTRODUCTION

The Entrada Sandstone in northeastern Utah crops out on the north and south flanks of the eastern end of the Uinta Mountains (Fig. 1). In this area, the Entrada is a well-exposed sequence of clastic rocks that reaches a maximum thickness of 234 ft. Although the Entrada does not attain as great a thickness as other eolian sandstone formations in the Colorado Plateau region, it has the widest aerial extent (Poole, 1963, p. 395; Tanner, 1965, p. 564). The Entrada is also one of the youngest eolian sandstone units, representing the termination of a long period of wind deposition that began in the Permian and ended in the Jurassic.