Hybrid Conventional-Unconventional Austin Chalk Plays in the Gulf Coast Basin: A Study to Show How Developing Drilling Technologies have Resulted in Peaks in Production

Xu, T., M. Turner, and M. McKechnie

ABSTRACT

The Austin Chalk is a major oil and gas producer in the Gulf Coast Basin. The IHS Markit database shows that cumulative of 1217 MMbbl of oil and 7.1 Tcf of gas had been produced from the Austin Chalk production zone between 1965 and 2020. Reservoirs within the Austin Chalk are characterized by fractures that require artificial stimulation to release the hydrocarbons. This study analyses the hybrid conventional-unconventional Austin Chalk plays under the framework of sedimentary facies, tectonic evolution, and reservoir characterization. Analysis of 25,051 production wells and major fields shows two major production peaks and an emerging production peak from the Austin Chalk since 1965, each of which records a revolutionary production technology. The first production peak in the early 1980s is attributed to widespread fracture simulation in vertical wells. With increased horizontal drilling, a second production peak occurred in the early 1990s with a record high annual production of 59.3 MMbbl of oil in 1991 and 459.5 Bcf of gas in 1996, respectively. However, annual production declined to 11.7 MMbbl of oil and 79.5 Bcf of gas in 2014. Since the mid-2010s, multistage fracture simulation in horizontal wells has been utilized, perceiving an evolving third production peak in the basin. Since 1976, about 7045 horizontal wells have been completed in the basin targeting the Austin Chalk. Cumulative production of more than 700 MMbbl of oil and 5.5 Tcf of gas has been recorded from these horizontal wells, accounting for 61% and 78% of total oil and gas production, respectively. Exploration of the Austin Chalk in the Gulf Coast Basin has evolved from vertical to horizontal drillings. The future reserve growth and the emerging third production peak from the Austin Chalk in the Gulf of Coast Basin rely on better reservoir modeling and advanced multistage fracture simulation in horizontal wells.

Xu, T., M. Turner, and M. McKechnie, 2021, Hybrid conventional-unconventional Austin Chalk plays in the Gulf Coast Basin: A study to show how developing drilling technologies have resulted in peaks in production: GeoGulf Transactions, v. 71, p. 559.

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