Resource Potential of the Middle Three Forks in the Central Williston Basin, North Dakota

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Abstract

Oil production from the unconventional Bakken-Three Forks petroleum system in North Dakota recently surpassed a cumulative 5 billion barrels of oil, predominantly from the Middle Bakken and upper Three Forks. Of the greater than 16,500 active wells, only ~300 are producing from the middle Three Forks. In the past five years (2019 – 2023), approximately 20 new middle Three Forks wells were completed per year. The middle Three Forks has produced greater than 92 million barrels of oil, 107 million barrels of water, and 238 billion cubic feet of gas as of the end of 2023. The middle Three Forks represents an under-developed oil-charged reservoir in the Bakken-Three Forks petroleum system. In the central Williston Basin, predominantly in McKenzie County, ample opportunities exist for infill drilling in the middle Three Forks. This study examines fifty-four 1280-acre drill spacing units with and without middle Three Forks horizontal wells to complement upper Three Forks and Middle Bakken horizontal wells. Twenty-five drill spacing units with one or more middle Three Forks horizontals and 29 drill spacing units without any middle Three Forks (Middle Bakken and upper Three Forks only) development are included for comparison, for a total of more than 600 wells. An analysis of production results and reservoir quality is presented, which documents the lithology and reservoir potential of the two main reservoir facies in the middle Three Forks from core descriptions and core analysis data, as well as the production uplift resultant from middle Three Forks infill drilling. In the areas compared in this study, adding three to four middle Three Forks horizontal wells per 1280-acre spacing unit adds between ~1–2 million barrels of oil in estimated ultimate recovery and indicates tremendous potential for additional drilling inventory.