Multidisciplinary Approach to Niobrara Gas Development in an Overlooked High Temp, High Pressure Reservoir: A Southeast Piceance Case Study

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Abstract

Early Piceance Basin test wells were completed in the Niobrara, a formation at the base of the Mancos group, beginning in 2009. These first wells were completed on projects which had assets primarily focused on the Williams Fork and Illes Formation. With the last widely known horizontal Niobrara activity circa 2015, the opportunity to incorporate recent technology became possible. To the southeast, little focus had been made on the underlying Mancos, where an overlooked high-pressure reservoir exists. In the early 2010's a few groups drilled test wells in the Niobrara in this area, beginning the uncharted development of the Niobrara in the Southeast Piceance.

This paper discusses the multidisciplinary approach needed to define a prospective resource, from concept to completion, using recent technology. Several evaluation steps were taken to achieve a reliable subsurface model. Along the way, challenges of limited data and model constraints were encountered, which the development team was able to successfully manage.

Available well data was processed and normalized with an appropriate model for petrophysical properties. An early development in the analysis suggested lithologic changes from the "main trend" differentiating the southern development area. Another determining factor used to define the project area was the learnings of the deep and high pressure mapped intervals from offset well data. Other log data including image logs and acoustic information was also a critical part of the subsurface geo model.

A vertical test well near the proposed project area revealed important gas production by zone using a normalized proppant per foot metric. This metric tied to the subsurface geologic model and gave the management team confidence to propose a plan in a focused target window.

3D Seismic information was acquired in the ideal project area identified from the subsurface model to identifying localized faulting and geohazards. Also, the seismic was a critical component of zone placement and geosteering of the planned well. The seismic quality allowed for the advanced processing of seismic volumes, which proved useful when drilling.

Outside of the subsurface evaluation, there was a wide scale logistics and surface infrastructure need, a challenging endeavor in a remote mountain setting. The installed infrastructure was critical to executing one of the largest completions in the basin to date, allowing implementation of recent technology in a geologic derived target window, for the first time in the area. Initial results suggest this well is expected to be one of the best performing wells in the Piceance, with a 6 hr IP test of 30+ MMCFD. It is hoped that the development

roadmap for this overlooked resource can be replicated, as the horizontal Niobrara play in the Southeast Piceance has a great deal of future potential.

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