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Refining Best Practices of Horseshoe Wells – A New Case History

Matt Offenbacher and Richard J. Toomes, AES Drilling Fluids; Michael Linse, Canvas Energy

Abstract

A new horseshoe well in Oklahoma utilized brine and lubricant to drill and run casing without issues. While horseshoe wells are becoming a new standard to improve well economics, oil- or synthetic-based drilling fluid is the standard to mitigate risk of excess torque and drag. Engineering best practices and hazard considerations demonstrated the feasibility of drilling a tortuous well with clear fluid. The well design accounted for sliding requirements, risk of losses, and wellbore instability cited in prior case histories. With these concerns mitigated, the horseshoe well was delivered without issue with lower cost.

The drilling campaign, taking place within the Anadarko basin, consisted of two 1-mile lateral wells and the single 2-mile horseshoe well. Proper risk mitigation across the horseshoe well operation resulted in approximately 10,900 feet of producing footage and approximately 12,500 total lateral footage in 16 days. By comparison, the two 1-mile lateral wells required 18 days to achieve approximately 10,000 feet of producing footage in the same predominately limestone-based Osage producing formation.

This paper discusses the principles of horseshoe wells, including drilling assemblies, torque and drag considerations, and well operations. A brief review of the completion design and results are also highlighted. The authors will compare other case histories and discuss distinctions between horseshoe well requirements.

Introduction

The term “horseshoe” well refers to wells where a traditional lateral is drilled followed by a 180º turn with a second lateral, creating an azimuthal shape like a horseshoe. Another common term used interchangeably with horseshoe well is a u-turn well.

Well Path

The horseshoe well profile can be separated into its constituents based on well trajectory (Huycke 2024). These terms aid the discussion on drilling and completion practices (Figure 1):

- Intermediate section – the vertical section between surface and production which may or may not include the curve
- Curve – the traditional section where the vertical wellbore transitions to a horizontal well
- Outgoing Leg – the traditional horizontal wellbore
- Turn – the 180-degree curve across the horizontal plane
- Return Leg – the lateral drilled back towards the intermediate section

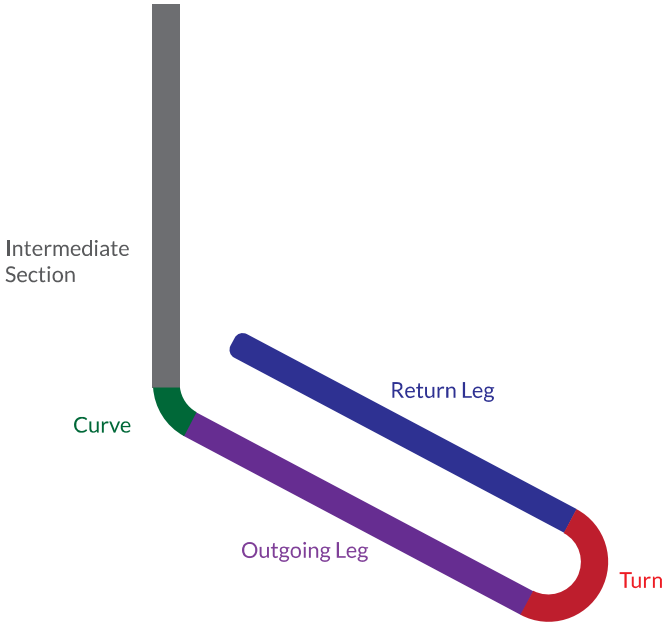

Figure 1: Perspective view of horseshoe well features

Most horseshoe wells are drilled with a single mile outgoing leg and a mile return leg, but longer lengths have been drilled. Other variations include j-hook wells where the drilling location is centered on the lease. A short lateral extends to the lease line, followed by the turn, and a return leg running the length of the lease. An second j-hook lateral extends to the opposite side of the lease with the turn extending across the other lease line. This has the potential to replace three conventional laterals with two j-hooks as shown in Figure 2 (Vital Energy, 2025).