Use of Horizontal Wells in the Development of the Chachahuén Sur Field, Neuquén Basin, Argentina*

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Search and Discovery Article #20473 (2020)**
Posted February 17, 2020

*Adapted from poster presentation given at 2019 International Conference and Exhibition, Buenos Aires, Argentina, August 27-30, 2019
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Abstract

The Chachahuén Sur field is located on the eastern margin of the Neuquén basin. The productive unit is the Rayoso Formation, a succession of early Cretaceous fluvial cycles. These cycles are truncated by the Intersenonian unconformity, which lies between the reservoirs of the Rayoso Formation and the shaly base of the Neuquén Group and works as a regional seal. The field is compartmentalized into five blocks (I to V), limited by faults with very low to no vertical through. Oil in the Rayoso Fm lies typically between the unconformity and the oil-water contact. Block IV is the only block displaying a gas cap. It also presents the largest dip, which significantly reduces the oil halo. To keep the gas cap pressure and to produce the oil reservoir efficiently, a development with horizontal wells and a peripheral water injection was the best scenario chosen for development. In this contribution we present the methodology and lessons learnt during this experience. A static model was developed at first to identify the best zone to be navigated by the horizontal wells. The target in Block IV is the thickest sandy cycle of up to eight meters in thickness and the largest areal extent. This cycle presents the best petrophysical properties in the three basal meters, which made it the target for navigation. Well architecture was designed to satisfy the reservoir, production and drilling requirements to optimize production and costs reduction. Before the drilling campaign started, a geosteering model was prepared for each proposed well using resistivity as the input property. Wells were correlated on real time using LWD tools to position the well path in the best level of the reservoir and to avoid unwanted shaly layers. Given the results of this project, new opportunities for other cycles were visualized. Horizontal drilling in the Rayoso Fm, using resistivity geosteering models, resulted in a good development strategy to optimize production and cost reduction in oil fields located on the eastern margin of the Neuquén basin.
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- **Objectives**
  - The field is compartmentalized into 5 blocks (I to V), limited by faults with very low to no vertical throw. Oil in the Rayoso Fm lies typically between the unconformity and the oil-water contact.
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- **New Targets**
  - Eight horizontal wells were drilled and designed parallel to the structure strikes, with an average horizontal length of 850 m. Wells were positioned so that the reservoir fluid flow was maintained to the best level of the reservoir and to avoid excessive skin damage. The use of mud logging was very important too.
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- **Conclusions**
  - Use of horizontal wells resulted a good development strategy because of the reservoir areal extent, the good petrophysical properties of Cycle 2a and the reduced oil halo due to the gas cap.
  - The Block IV oil remainder could be drained with eight horizontal wells.
  - The geosteering allowed to:
    - Optimize the landing point in the 8 1/2” section.
    - Position the well path in the best level of the reservoir and make corrections in real time.
    - Maximize the reservoir exposure at the best petrophysical levels.
    - Underground better knowledge.
  - Add new horizontal wells for the development of cycles 2b and 1c within block IV.

- **Acknowledgments**
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- **Location and geological settings**

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