Novel "Field Lab" Technology Approach for Development of Unconventional Tight Oil Reservoirs: CORRALILLO Project —*CHICONTEPEC Basin MEXICO*

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Abstract

The Chicontepec Basin contains estimated remaining recoverable resources of more than 17 billion barrels of medium to light crude from a sequence of complex tight reservoirs. The basin covers approximately 3,731 km^2 (1,440 square miles), stretching across Mexico's Puebla and Veracruz states.

The Chicontepec Formation is a turbidite sequence deposited in shallow waters in a submarine canyon with submarine fans, composed of alternating well-cemented calcareous-clayey-sandstones, and dark gray calcareous shale. The effective porosity in the reservoir rock varies from 4% to 12% and the permeability from 0.2 to 10 millidarcies. The reservoir quality rock within any given well is highly variable because of the changing mineralogy of the sand grains and diagenesis. The subsurface development plan must address this complexity in order to optimize production and recovery from Chicontepec.

In 2010, Pemex implemented a new field management strategy involving a competitive integrated field technology management (field laboratories) approach. This pilot projects to obtain detail reservoir understanding of selected field areas together with application and testing of field development technologies to establish the best technologies for further deployment within the field.

This paper describes the Corralillo Field Laboratory project in which Baker Hughes and Pemex collaborated to manage the Corralillo field area, including reservoir studies, drilling and completion, and production management covering 35 km^2 with an initial 120 wells and baseline production of 2,100 B/D.

The reservoir studies, in particular those required to understand the rock-fluid interaction in the Turbidite bodies, provided essential input to design a Technologies Portfolio for ongoing development of the unconventional tight reservoirs. These studies led to selection of an improved architecture for new wells, well stimulation using new viscoelastic and binary fracture fluids, improved well placement, and the use of "Smart Well" technology. In all, 19 new technologies were tested in the field lab area, and 13 of those were identified to be implemented in other areas.

Three years after the start of the project, results have exceeded expectations. Production from the field lab area has increased by five times,

Datapages/Search and Discovery Article #90212 © AAPG Geoscience Technology Workshop, Expanding Unconventional Resources in Colombia with New Science-From Heavy Oil to Shale Gas/Shale Oil Opportunities, Bogota, Colombia, December 10-11, 2014

from 2,100 B/D to 10,200 B/D, and cumulative incremental production has reached 8.9 million barrels. Cost per barrel has been reduced by more than 66%, and the concentrated field lab activity has been accomplished with no personal injuries.