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Expandable Screens: Optimized Horizontal Gas Production Through Collaboration

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Abstract

A total system analysis approach was applied to achieve the desired results for a National Oil Company (NOC). The Service Company and NOC worked very closely together to optimize production from a gas well in the General Field near Reynosa, Mexico.

The horizontal gas well, General 16H, was drilled and completed in February 2007. Once the well was placed on line, it initially produced up to 40 MMscf/day (1.132 MMcm/day) before settling at a rate of 18 MMscf/day. Average daily production from other wells in this area is 4 to 5 MMscf/day.

Production optimization included determining via nodal analysis how system pressure losses affected total production. The system was analyzed from three points of view: from the reservoir to the surface, near the sand face, and at the surface. The team used an analytical model to determine the drawdown effect, establishing the loss of pressure in the reservoir as a function of rock properties, well and reservoir geometry, well position within the reservoir, and reservoir fluid properties.

Without a joint effort and understanding between the NOC and the Service Company, the results would have never been achieved. Working diligently together enabled both parties to understand what was required to meet the initial objective of production optimization. The solution presented itself in the form of expandable screens, which provided a much greater inflow area than other methods available.

Introduction

General, a dry gas field operated by PEMEX, is located in the northern region near Reynosa, Mexico, and currently consists of three vertical wells, which are currently producing at 17, 15 and 12 MMscfd. New areas in the reservoir were evaluated to determine reserves and profitability at current gas prices.

Techniques were used to evaluate the production system from reservoir to surface, taking into account the near wellbore, wellbore hydraulics, production tubing and flowline pressure drop. Analysis showed that two main aspects would affect production: surface facilities (flowline diameter) and wellbore completion. This paper will focus on the wellbore completion technique required to maximize deliverability.

Reservoir parameters and fluid properties considered in this study were:

Permeability:	100 md
Porosity:	22%
Kv/Keff:	0.5
Reservoir Pressure:	2,800 psi *(193 bar)*
Reservoir Temperature:	204.8°F *(96*°C)
Thickness:	55 ft *(16.7 m)*
Specific Gas Gravity:	0.57
Gas Volumetric Factor:	0.00457 rcf/SCF
Gas Viscosity:	0.02010 cp

The current production gathering systems pressure is 2,075 psi *(143 bar).* This systems pressure could be reduced by considering a larger-diameter flowline.