

Lunch and Learn Lloydminster Petroleum Society

Brígida Meza Díaz

Alberta Research Council

Wednesday, January 14, 2009

SAND ON DEMAND: AN APPROACH TO IMPROVING PRODUCTIVITY IN HORIZONTAL WELLS UNDER HEAVY OIL PRIMARY PRODUCTION



BIOGRAPHY

Brígida Meza Díaz is a research scientist at the Alberta Research Council (ARC) in Edmonton. She has 20 years of experience working in research and development in both the chemical industry and the oil industry. In the oil industry sector, she has been focused on in-situ heavy oil recovery processes. Since she joined ARC in 2003 she has been part of the primary heavy oil processes team where she has worked with topics related to sand production and control through horizontal well slots. She is also the Latin-American representative for the heavy oil and oil sands business unit. Previously Dr. Meza-Diaz worked for PDVSA-INTEVEP as a research scientist of heavy oil recovery processes. She holds a bachelor degree in Chemistry from the Universidad Simón Bolívar, Venezuela, and a M.Sc. and a Ph.D. in Petroleum Engineering from the University of Alberta. She is a member of the Petroleum Society of CIM and of the Society of Petroleum Engineers (SPE).

ABSTRACT

The cold production recovery process, as it is practiced in Western Canada, is successful for vertical wells. Applications of cold production technology with aggressive sand production in horizontal wells, however, have been much less successful.

This talk presents the results of experiments performed to assess the feasibility of applying cold heavy oil production with horizontal wells using less aggressive (i.e., controlled) sand production strategies. Specifically, the effects of slot size, confining stress, fluid velocity and sand grain sorting on sand production will be showing.

Preliminary results indicate that slot size selection is critical for establishing “sand on demand”. For proper slot size selection, it is essential to know the grain size distribution of the sand; in particular, attributes such as the size of the coarsest fraction of the sand and the sorting (uniformity coefficient) of the sand. For example, it was observed in the sand production experiments that the critical pressure gradient for maintaining continuous sand production is much lower for well sorted sands than for poorly sorted sands. Ultimately, poorly sorted sands may require different criteria than well sorted sands for slot size selection.

Flow rates are also crucial for managing sand production since a critical pressure gradient is required for initiating sand production and maintaining continuous sand production. The critical pressure gradient decreases as the slot width or confining pressure increases. Large permeability increases were observed in the sand production region. Persistent sand production led to the growth of a channel and/or the presence of a dilated zone which had an elliptic shape.