
New Geological Data from a Pilot Campaign Illuminates the Understanding of Existing Waterflood Development

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In an elongated, tilted carbonate reservoir, focussed water-flood development with long strike parallel horizontal wells has co-existed with gas-oil-gravity-drainage. New geological data from a pilot project in this mature field (over 35 years production) has illuminated the understanding of the water-flood process and the need for integration with surveillance and production data to optimise the current development wells.

Four inverted 5 spot pilot patterns, each with 2 dedicated observation wells, have been drilled in 2004-05 to test the feasibility of field re-development. The data gathered has assisted the interpretation of the surveillance data acquired from the existing waterflood. As part of this programme cores were cut in 8 vertical wells over the field. The cores reveal a multitude of heterogeneity that was not previously recognised over the field life. This is a function of the remarkable core recovery achieved in a carbonate reservoir with marked contrasts in cementation. Examples include cemented and corroded features that influence these wells on a range of scales. The integrated data gathering in the pilots has enabled a ranking of the impact of this heterogeneity.

This new knowledge bank has been applied to understanding the well performance of the existing waterflood. The interpretation of recent production logs in the many of the existing horizontal injectors has been tied to existing bore hole image logs. The additional data and models from the vertical pilot data has been particularly useful in understanding the balance between matrix and fractures reservoir influences on well performance.

The understandings have also been used to further assist the completion of deeper horizontal water floods in the same field that was not originally targeted for study by the pilots.
