

ABSTRACT

PRODUCING CHARACTERISTICS OF GAS-CONDENSATE RESERVOIRS OF TRINIDAD AND TOBAGO

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The objectives of this thesis are firstly to characterize the producing behaviour of the producing gas-condensate reservoirs and wells, and secondly investigate the likelihood, and consequences of condensate banking on well performance.

Production and test data from more than 30 gas-condensate reservoirs, and over 45 wells (located offshore Trinidad), were first studied to identify and group trends in production characteristics. Constant Composition Expansion laboratory data and Equations of State were also employed to generate predicted test yield vs. reservoir pressure profiles for comparison to actual data. The former data set, along with a pseudo-pressure simulator, were used to predict whether condensate banking would occur in these high permeability reservoirs.

The results indicate that there is a general increase in initial reservoir yield with reservoir depth and initial pressure. There is, however, an immediate and continuous decline in yields from the onset of reservoir depletion to abandonment.

Reservoirs were classified as either a) aquifer-supported or water-drive, or b) volumetric drive reservoirs. The former demonstrated an increase in both test

and allocated yields, with cumulative gas production that is attributed to water breakthrough. These reservoirs generally produced at higher yields due to aquifer support. Volumetric drive reservoirs showed a gradual decline in yield with cumulative production. There were 2 exceptions; these were reservoirs, which displayed an immediate drop in yield with cumulative gas produced, due to differences in initial gas composition.

Trial simulations indicated that condensate dropout will occur at drawdowns of 250 psi and greater. The wells under study in this report, except for Amherstia A-02 and -05, have been operated at lower drawdowns and produce at lower gas rates. Consequently, condensate banking was not evident.

These observations highlight the importance of a reservoir management strategy for optimizing well and reservoir performance. High gas rates allow the operator to maximize gas recovery, at the expense of condensate yield. The successful performance of water drive reservoirs hinges on producing the reserves prior to water breakthrough as water production hinders well performance. In this regard, the operating strategy for these reservoirs must take the drive mechanisms into account to optimize reservoir performance.