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Application of Well Test Rate Conversion to Gas Condensate Reservoirs in the Nile Delta Complex

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Arnaud Hoffmann, Petrostreamz AS

John Taeger, Dana Gas Egypt

Prof. Curtis H. Whitson, NTNU/PERA/Petrostreamz

Abstract:

Performance monitoring and production allocation rely on test separator measurements operating at varying pressure and temperature during periodic tests. Converting test separator gas and oil rates to a common set of separator conditions is necessary to ensure consistent rate allocation and valid inflow performance relations. This paper applies a well test conversion methodology to all historical well test measurements performed on gas condensate reservoirs in the Nile Delta Complex and explores the benefits of such an approach. The studied asset includes seven reservoirs with producing condensate-gas ratio (CGR) varying from 3 to 70 stb/MMscf.

The proposed method converts the reported test rates into a molar compositional wellstream rates, using (1) an appropriate EOS model, (2) a reasonable seed composition and (3) the test separator conditions. The seed composition is flashed at separator conditions. Equilibrium oil and gas compositions are then recombined in a specific ratio that yields exactly the test CGR. The obtained compositional wellstream is then re-processed (1) using a common set of separator conditions and (2) using the actual field-scale surface process model. The paper also discusses appropriate choices for the seed composition.

The procedure is implemented and fully automated using a commercial IAM platform. Results show that the separator conditions have a great influence (up to 50 %) on the CGR. We reprocessed the compositional wellstreams using a common set of conditions to compare individual well performance and fluid properties (1) over time and (2) against other wells for a given date. Furthermore, the proposed procedure enables the allocation of final-sales products to individual wells (gas, LPG and stabilized condensate).

ADDRESS
Skonnertvegen 7
7053 Ranheim
Norway

LANDLINE
+47 73 10 02 60
FAX
+47 73 84 80 81

EMAIL
info@petrostreamz.com
WEBSITE
www.petrostreamz.com