

## **SPE 169257-MS**

### New Approach For In-Line Production Testing for Mature Oil Fields Using Clamp-on SONAR Flow Metering System

#### **Abstract**

Monitoring produced oil, gas and water rates from individual wells plays an important role in reservoir management and production optimization. While beneficial, obtaining timely and accurate wellhead measurements can be challenging due to a range of factors. This paper describes a cost-effective and convenient approach to production surveillance of black oil wells using clamp-on sonar flow meters (SONAR), integrated with a PVT and multiphase flow engine to calculate the properties of the produced fluids, and the individual phase flow rates. The PVT engine calculates the gas and liquid properties of the produced fluids, at the pressure and temperature conditions measured where the sonar flow meter is clamped-on. The sonar flow meter provides a direct measurement of the mixture flow velocity within the flow line. The mixture flow velocity is then interpreted in terms of actual gas and liquid flow rates. Once the gas and liquid flow rates are determined at actual conditions, the oil, water, and gas flow rates are reported at standard conditions based on the PVT data calculated by the PVT engine. The new approach was deployed in a mature field to test 6 different wells against existing CTS available as reference. The tests showed that the SONAR could be installed either upstream or downstream of the choke manifold thus allowing more flexibility in terms of field installation. Some of the wells were tested at fixed flowing conditions while others were tested at multiple choke settings. All data is found to be within acceptable limits. The results show that, overall, the new SONAR-based approach could perform within  $\pm 15\%$  or better from the reference, depending on the accuracy of the input PVT data (including water cut) and the flowing conditions. The new clamp-on approach requires about 90min for installation and commissioning which allows the possibility to perform multi-rate testing of the wells in one day. Therefore, the sonar clamp-on methodology offers the opportunity to increase the well test frequency at a field-wide level thus allowing a better field/production management.

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