

The Historical Development of Prudhoe Bay Petrophysical Models

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Prudhoe Bay field has a truly impressive track record of 30 years oil production. After reaching peak production, it contributed 15-20% of the nation's average annual oil production for years, and even in decline continues to be a very significant producer. To date, the primary producing reservoir in the Prudhoe main field has been the Ivishak Sandstone with lesser production from the overlying Sag River Sandstone. The Prudhoe satellite fields have been making their great contributions through production in the shallow reservoirs such as, Schrader Bluff and Kuparuk. Apart from the vast natural reserves in the field, the enormous efforts made by geoscientists and engineers have contributed to the world-class performance of this super-giant field.

The earliest petrophysical data can be traced back to the year 1968 when the discovery well Prudhoe Bay State No. 1 was logged. Since then, logging technology and petrophysical interpretation techniques have developed tremendously, including computer-based analysis. We have accumulated a very large petrophysical database through data acquisition and interpretation studies. By the end of 2007 more than 3000 wells had been drilled and logged in the field including 140 cored wells.

In the early days, the major focus was on the Ivishak reservoir, which had the largest volume of oil and gas and was the most readily producible. BP and its partners developed formation evaluation procedures, generated interpretative algorithms, and produced a uniform database from these thousands of wells. The interpretative log models were calibrated with core data that provided a high level of confidence in the computed results. These models were recently modified to interpret wells where incomplete log suites were obtained.

The inevitable decline in Ivishak production has spurred recent interest in the Sag River Formation. Efforts to rejuvenate and update the Sag River petrophysical models have been successful and are providing much improved understanding of reservoir performance and characterization.

The poster gives an overview of the present petrophysical database, briefly reviews the historical development of the Ivishak and Sag River petrophysical models, and focuses on the features of the most recent models for these two formations.