

## **Using an Uncertainty Assessment Approach for Estimating Recoverable Reserves from the Bakken Petroleum System in North Dakota**

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### **ABSTRACT**

In the mid 1990's Platte River Associates pioneered a technique of applying uncertainty to the inputs of a basin simulator, hence providing distributions of results rather than discrete output values. This study presents an approach for using an uncertainty-based assessment method for estimating the recoverable reserves and Yet-To-Find reserves from the Bakken and Three Forks reservoirs in North Dakota.

The Bakken is regarded as an unconventional tight oil play with the characteristic of a continuous type basin-centered accumulation. Production data reveals, however, that not all areas are equal and that certain regions stand out as sweet spots while others exhibit fairly high water cuts. The project is based on 28 well models, which have been porosity-calibrated and adjusted for the prevalent thermal regime. A geothermal anomaly in the deep part of the basin has been described by Price et al. (1984). Regional grids were used to capture as much geological detail as possible and served as input for a 3D surface model and play fairway analysis.

An uncertainty assessment approach was utilized for calculating the recoverable reserves and Yet-To-Find reserves from the Bakken and Three Forks reservoirs. The method used in this case study is built on placing uncertainty on various input parameters influencing the volumetric calculation. Often, critical values such as initial hydrogen index and thus initial TOC are based on educated guessing. In fact, there many values which are not absolutely known. By placing a range of uncertainty on each of the variables, hundreds to thousands of simulations can be run, using either the Monte Carlo or Latin Hypercube sampling methods. The results are displayed in reverse cumulative probability plots and tornado charts, as well as maps of the P10, P50, P90 values. This study is an extension to the work presented by Theloy et al., (2015).