

### **Modeling of an Unconventional Gas Accumulation Taking into Account Spatial Correlation**

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The Greater Natural Buttes tight sandstone field, Uinta Basin, northeast Utah, is an unconventional gas accumulation that started production in the early 1950's from the Upper Cretaceous Mesaverde Group and three years later was extended to the Eocene Wasatch Formation. By 2007, with the exclusion of 1150 dry wells, we estimate that final recovery from the existing 2500 producing wells will be 1.7 TSCF. The use of estimated ultimate recovery (EUR) per well as the main source of information is typical of continuous accumulation assessments. Each calculated recovery value has an associated drainage area, which generally varies from well to well. Conversion to a EUR per unit cell allows expressing recovery relative to the same drainage area. Unit recovery per 5 acre cells at Greater Natural Buttes shows spatial correlation, hence application of the Monte Carlo method to randomly infer EUR values at those cells not drained by the existing wells is an unrealistic practice that does not take full advantage of all the information contained in the data. For analogous reasons, assignment of dry cells at random is also a suboptimal statistical practice that does not follow what is observed in nature. Sequential indicator simulation was used to model the dry cells, while areal fluctuations of cell EUR were obtained applying sequential Gaussian simulation, providing multiple equally likely versions of reality with spatial correlation. For each realization, summation of unit EUR at all those cells not drained by the existing wells allowed preparation of a stochastic prediction of undiscovered resources, which range between 2.2 and 2.7 TSCF with an average of 2.5 TSCF for Greater Natural Buttes. A histogram of undiscovered resources plus productivity maps of present and possible cell production showing also current and inferred dry areas clearly display information of main interest in unconventional gas assessments after maximizing the extraction of information from the data.