An Approach to Understanding Deep- to Ultradeep-Reservoir-Quality (Porosity) Risk using a Large, Regional Wireline-Log-Based Petrophysical Database in the Deep Shelf Area Along the Texas Gulf Coast

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Reservoir quality is a major risk factor in exploring for deep (15,000 to 20,000 ft) to ultradeep (20,000+ ft) sandstone targets in the Gulf of Mexico. Core analyses at these depths are not abundant and are commonly proprietary. The development of a large statistical database developed from analysis of wireline logs provided extensive coverage both areally and stratigraphically. Fifty-six wireline logs from deep wells, both onshore and offshore Texas, were processed for porosity values. The complete stratigraphic section for each well was analyzed, and approximately 106,000 porosity analyses along with associated temperature and pressure from the Wilcox through Pio-Pleistocene were calculated. The best use of the database is to separate porosity data by stratigraphic unit and area. The resulting scatter plots provide a realistic reference of the range of reservoir quality that can be expected in a particular area and in a particular depth zone. If values outside the range of what the database shows are expected, then a strong geologic reason must be presented to offset forecasts based upon actual data. Also, it was concluded that porosity should be plotted against temperature rather than depth because porosity is more dependent on temperature than on depth. Depth does not convey temperature, pressure, or time. Plotting porosity against temperature allows comparison of porosity data from areas with different temperature gradients. Wireline-log-based porosity databases are relatively easy to construct and are a basic risk-evaluation tool.