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Timothy R. Carr<sup>1</sup>, Kenneth M. Dean<sup>1</sup>, Martin K. Dubois<sup>1</sup>, Paul Gerlach<sup>2</sup>, Michael H. Maroney<sup>1</sup>, Ernie Morrison<sup>3</sup>, K. David Newell<sup>1</sup>, Kitt E. Noah<sup>1</sup>, Harald Poelchau<sup>4</sup> (1) Kansas Geological Survey, University of Kansas, Lawrence, KS (2) Charter Development Corp, Wichita, KS (3) Murfin Drilling Company, Inc, Wichita, KS (4) Geological Consultant, Dallas, TX

### **Use of Information Technology for Integrated Reservoir Characterization of Permian Gas Fields of the Hugoton Embayment**

After 75 years, the Hugoton embayment of southwest Kansas remains one of the most prolific gas producing areas in North America, with over 30 Tcf of cumulative production from Permian reservoirs. A solution to the challenge of maintaining production from these large mature fields is to use complex data analysis procedures and extremely large data sets to evaluate them as reservoir systems, specific small areas or as single wells. This approach is difficult given reservoir heterogeneity and spatial and temporal variability in data quality. As an example, the Hugoton gas area produces from five main zones within the Permian Chase Group (24 Tcf). Currently, the field covers 7000 sq. km and contains 5,550 producing wells drilled since the 1920's. Previous attempts at analysis were restricted to small subsets of the data, and did not take full advantage of information technology to manage and integrate databases to examine the entire field. During the last 5 years, over 25,000 wells in the Hugoton area have been examined and diverse geological and production information loaded into digital databases.

Using relational databases, technologies such as relational queries, neural networks, geostatistics, fast flowpath modeling, and visualization have been employed to generate a better understanding of the migration, trapping and current distribution of hydrocarbons at both the regional and local levels. One result has been the mapping of distinct reservoir compartments within the Hugoton fields. The recognition of large-scale heterogeneity and accurate reservoir characterization can be used to improve recovery at field and single well level.