

## Reservoir Engineering Studies in Hugoton-Panoma Systems.

*Saibal Bhattacharya, Martin K. Dubois, Alan P. Byrnes, John H. Doveton, Geoffrey C. Bohling; Kansas Geological Survey, University of Kansas*

Reservoir engineering studies, in the Hugoton Asset Management Project (HAMP), included analyses of available pressure and production data, material balance studies, and simulation of single and multiple well systems in select areas. The intent of these studies is to validate the underlying reservoir geomodel, developed by integrating inputs from geology, log analysis, petrophysics, and neural-logic based lithofacies prediction, by matching the production/pressure histories at both regional- and well-levels given the volumetrically estimated original-gas-in-place (OGIP).

Surface shut-in (SI) pressure data from Chase (parent and infill) and Council Grove wells in 2 different regions indicate that reservoir pressures declined along a common trend. However, questions remain about how representative 48-72 hr surface shut-in recordings are of average reservoir pressures. Available data also indicate that new wells at completion record 20-30 psi higher SI pressures than older neighbors but pressures soon fall inline with the regional decline trend. Material balance (MB) calculations indicate that the later Council Grove well added reserve volume beyond that drained by earlier Chase (parent) well in the same Section. Possible overlapping of drainage areas of newer wells with those of older ones limits the applicability of MB-calculated OGIP in charging the geomodel. DST permeability matches corresponding plug and whole core permeability values when corrected for sub-surface conditions. Reservoir simulation studies at Flower 1 area indicate that an upscaled geo-model of 25-layer can match differential pressure depletion, evident from layer-specific shut-in pressure data available from the Flower 1 well, while producing under historic production constraints.