

## Oil Classification and Exploration Opportunity in the Hugoton Embayment, Western Kansas and Las Animas Arch, Eastern Colorado.

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Hydrocarbons in the Hugoton Embayment have been considered the result of long distance migration from the deep Anadarko basin. Based on biomarker interpretation from 52 oils and incorporation of data from over 500 source rock samples, this study presents an oil family classification which improves our understanding of hydrocarbon migration pathways into the Hugoton Embayment. We investigated gas chromatography data from over 600 oil samples from published and proprietary databases to compare to our conclusions and, although each individual study provided valuable clues about oil classification, we found that the gas chromatography/mass spectrometry data provided a clearer understanding of the oil types in the Hugoton Embayment.

Four oil families identified are from Pennsylvanian and Mississippian reservoirs. Direct oil-source rock correlation identifies the Devonian Woodford shale as one of the primary hydrocarbon source rocks. Woodford-sourced oil (Family A) exists in reservoirs throughout the Upper Mississippian and Pennsylvanian section. Family B is primarily found in Morrowan-aged reservoirs and is suspected to be derived from the Pennsylvanian Morrow Formation. Family C is confined to reservoirs in the Middle and Upper Pennsylvanian section. Family D is directly correlated to Ordovician Viola Shale, but is relatively rare in the study area.

Our studies suggest that hydrocarbon migration into the Hugoton Embayment was from multiple sources and was focused along various, but somewhat predictable lateral and vertical paths. Results from our study improve our understanding about the present-day distribution of oil and gas fields and set up new exploration ideas in this mature hydrocarbon province.