Comparison of Texas shale plays – geologic characteristics and implications for production of the Eagle Ford/Tuscaloosa Marine Shale, Haynesville/Bossier, Wolfcamp/Bone Springs, and Barnett/Woodford plays.

Ursula Hammes, Hammes Energy & Consultants, Austin, TX

Texas shale plays are some of the most prolific oil and gas producers in the world and have been compared to many shale plays around the world. However, a comparative study of geologic characteristics of the Texas shale plays has not been presented. This study compares the carbonate-dominated shales of the Eagle Ford and Haynesville formations, the silica dominated shales of the Barnett/Woodford and Wolfcamp/Bone Springs formations and the argillaceous dominated shales of the Tuscaloosa Marine Shale. Knowing the impact of the shales' depositional environments on background mineralogy is important because it has a direct influence on reservoir quality (porosity, permeability, brittleness) of the shales.

The carbonate-dominated Eagle Ford and Haynesville/Bossier shales exhibit pore networks that are dominated by interparticle pores between calcite grains, intraparticle pores within skeletal grains, and pores in organic matter. These units were bordered by carbonate platforms that sourced carbonate debris into the basins. The Barnett/Woodford and Wolfcamp/Bone Springs shales were deposited in deep-water environments influenced by siliceous skeletal grains and invariable shedding of carbonate and silica-dominated turbidites into the basin. These shales are dominated by interparticle and intraparticle pores between silica and clay grains, but the majority of the porosity in these shales is related to organic-matter nanopores. Although, the Tuscaloosa Marine Shale is of the same age as the carbonate-dominated Eagle Ford Shale, the depositional setting was mainly siliciclastic and argillaceous sediments shed into the basin by Lower Cretaceous deltas. This shale contains interparticle porosity between clay and organic-matter pores.

Knowledge of the depositional setting and history, source and sediment transport, and environmental conditions in a shale play provides insight into pore networks, porosity and permeability, and brittleness of the rocks forming the shale play and these insights can be applied to other shale plays.