TECHNOLOGY OVERVIEW

INTRODUCTION

Understanding the unique physical and chemical properties of coal is necessary for CBM production. Coal accumulation and development is not a new topic to the Illinois Basin, but CBM presents new challenges that demand new solutions. Details on coal production and depositional settings, stratigraphy of the Illinois Basin and a discussion of coal rank and maturity are presented. Diagenetic processes combined with changes in depositional setting alter fossil plants to coal, resulting in different coal ranks from anthracite to lignite in different parts of the basin. Thermochemical changes and accumulations affect the capacity of the coal to adsorb gas. As coal rank increases, its capacity increases. Moisture content, cleat formation and rank also affect the potential for CBM production.

Porosity is found in the coal cleats, not in the interstitial area between mineral grains as in conventional natural gas reservoirs. Adsorption capacity of a coal is controlled by several factors: coal rank, form of ash, moisture content and vitrinite content. Coal gases contain various gases including: methane (75-98%), ethane (trace to 6%), C3 through C6, carbon dioxide (1 to 15%), nitrogen (trace to 15%) and rarely hydrogen sulfide. Gas content is measured by core sampling. The core must be sealed in canisters immediately upon getting to the surface to avoid loss and maintained under controlled temperatures. Collection of pressure cores is ideal. Several capture and analysis techniques are discussed. Undersaturation affects the amount of methane that can be absorbed.

The crucial question for development is how much methane is in a given reservoir? And can it be economically recovered? Coal fractures or cleat formation (orientation and stress fields) affect permeability in methane reservoirs. Injection/fall-off tests are a common means of CBM testing for in situ permeability/transmissibility of gases in a reservoir. Coals are highly compressible and there can be a loss of permeability with increased overburden stress at depth.

Hydrology of coal seams and how much water is present can affect dewatering by depressurizing the coal seal through leaks, karsted zones or fracture stimulations that break out of zone, all of which allow recharge. CBM reservoirs are dependent on maintaining hydrologic pressure over geologic time. Dewatering coal seams means that in


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