Coal Bed Methane Field Delineation and Reservoir Volumetric Estimation for CO2 Storage, Buzzard Bench Field, Emery County, Utah

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Abstract

An estimation is made of volumetric capacity in central Utah's Buzzard Bench coalbed methane field to evaluate potential for CO2 sequestration. The geometry of the reservoir is quantified using legacy wireline logs. Thickness and extent are estimated by identifying the continuity—and lateral heterogeneity—of coal seams across the basin and defining their geographical extent. The coal beds are part of the Cretaceous Ferron Sandstone and are interbedded with fluvial-deltaic sediments that create a complex series of depositional parasequences. Volumetric estimation was completed by evaluating the petrophysical attributes of coal in Buzzard Bench, first by defining the effective storage zones within each coal seam as well as the contribution of gas stored in the adjacent Ferron sandstone, and secondly by considering several wells throughout the reservoir to account for heterogeneity of the different lithofacies. Coal samples were obtained from a neighboring mine. The relevant lithofacies were assessed from a geological core and road cut outcrops. Proximate and ultimate analyses were used to obtain parameters that are conventionally used to correlate gas content with density log measurements. A series of adsorption experiments were performed to obtain Langmuir isotherms at downhole conditions to define the maximum in-situ gas content. Forecasting CO2 storage is difficult because of complicated adsorption behavior due to the development of a supercritical phase under realistic downhole conditions. Reduction in the storage capacity by the effect of lithostatic

stress and sorption-related volumetric swelling are also analyzed and used to correct the total CO2 storage capacity in the Buzzard Bench field.

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