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**Relation between Coalbed Permeability and In-situ Stress Magnitude for Coalbed Methane Exploration in Jharia and Raniganj Coalfields, India**

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**Abstract**

India is among the top five countries in the world in terms of proven coal reserves and coal production. As such, significant potential exists for commercial recovery of coalbed methane (CBM). Two coalfields, Jharia and Raniganj, located in eastern India are currently under development for CBM. This paper describes work done to determine coal seam properties, ambient stress conditions, and effects of depletion at these coalfields that influence CBM production. Coalbed permeability is a parameter that has a major influence on CBM production. Other influences include in-situ stress direction, gas content, and the application of suitable stimulation techniques. A robust methodology is required to determine both initial coalbed permeability and its relation to in-situ horizontal stress magnitudes. Coalbed permeability at the Jharia and Raniganj coalfields was estimated from porosity and known cleat spacing. Initial permeability of major coalbeds was correlated with effective horizontal stress, yielding satisfactory to very good exponential fit using data from Raniganj and Jharia wells. Acoustic televiewer image-logging tool measurements in a single well in the Jharia coalfield were used to infer a maximum horizontal stress orientation between N25°W and N25°E. Reservoir-pressure-dependent permeability models are presented for coalbeds under uniaxial strain condition. The coalbed permeability is dominated by the existing effective horizontal stresses normal to the cleats. Two prospective coal seams from Jharia have been identified through assessment of the response of horizontal stress to the decline of CBM reservoir pressure. Coalbed permeability increases with the drawdown of reservoir pressure and is exponentially related to the change of effective horizontal stress during reservoir depletion. The results of this study are to be used for production history matching for wells in Jharia and to determine optimal horizontal drilling directions for increased CBM production.

**Keywords:**

Wells, Coal, Borehole geophysics

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