Enhanced Microbial Natural Gas Generation from Coalbeds, An Overview

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Enhanced microbial natural gas (EMNG) production refers to approaches for accelerating and increasing the yield of biogenic natural gas (methane) produced in-situ from fossil energy deposits. This presentation will review the science behind EMNG production approaches in coal, and the development of a test site for EMNG of coal in eastern Montana, USA. Factors influencing EMNG from coal include: (1) redox conditions, (2) coal bioavailability, (3) numbers and types of microbes present, and (4) formation water quality (salinity, pH, and presence of nutrients, electron acceptors). Coal bioavailability may be influenced by natural fracturing in the coal, or enhanced by oxidation (e.g. by dewatering the coal) followed by flooding. EMNG production from coal requires both Bacteria and methanogenic Archaea to fully convert organic polymers in coal to methane, with this process only partially understood. Microbial populations in coal are usually in low abundance, and EMNG production strategies are aimed at increasing microbial numbers by addition of easily biodegraded substrates and nutrients. Lab studies indicate that promoting acetogenic methanogenesis produces greater methane yields in a given time frame compared to other methanogenic metabolic pathways.