Production Characteristics of Coal Bed Methane Wells in the Powder River Basin

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After acquiring three degrees in Geology, Dr. Langhus has spent 37 years working in many aspects of the petroleum E&P business. In addition to the private sector, he served the Oklahoma Corporation Commission as Director of Class II (oil and gas) Underground Injection Control. He is a founding member of ALL Consulting and serves as chief geologist. He has been involved in produced water management projects in Canada, the Powder River Basin, Oklahoma, Texas, and the Middle East.

Jim Halvorson received his B.S. and M.S. degrees in geological engineering from the Montana College of Mineral Science and Technology, Butte, Montana. In 1982 he joined Gulf Oil Corporation and worked in various exploration and development assignments with both Gulf and Chevron. Since 1990 he has served as Petroleum Geologist for the Montana Board of Oil and Gas Conservation in Billings, Montana.

Dr. Layne earned his Bachelors of Science, Masters of Science, and Doctorate in Petroleum Engineering from the University of Missouri-Rolla (UMR). He serves as the Director of Technology for ALL Consulting and is experienced with a broad range of information solution approaches. His experience has included serving as the Data Manager for large data collection and management projects involving environmental and oil & gas data. His experience has ranged from analyzing pressure transient tests for injection well projects to developing custom information systems for public and private sector clients.

Abstract

The Powder River Basin (PRB) is a Tertiary aged feature largely filled with the coal measures of the Paleocene and Eocene Fort Union Formation. Coal Bed Methane (CBM) production began in 1987 but activity remained at minor levels until 1997 when drilling and production accelerated (WOGCC). Approximately 110 locally named coal beds exist in the basin and are prospective methane producers. The thickest and most attractive coal seams, however, can be found in the Tongue River Member of the Fort Union. These coals can exceed 50 feet in thickness and produce gas at depths ranging from less than 200 feet to 1800 feet.

PRB CBM production is accompanied by the production of large amounts of water. The quality of the produced water ranges from high to low across the basin with the highest salinity and lowest quality water being produced by wells on the western edge, near the basin's axis. Water being produced with CBM across the basin appears to be a result of mixing varying amounts of meteoric water with an originally sodium-bicarbonate connate water. Infiltration from the extensive recharge areas on the eastern limb of the basin produces the salinity gradient extending down to the axis of the basin. Water production rates vary between coal seams and geographically within a specific seam. Interference between wells in terms of water production may extend a large distance.