Preparation of Water Management Plans for the Development of Coal Bed Methane in the Powder River Basin

Jon Seekins[1], ALL Consulting, 1305 E. 15th Street, Suite 205, Tulsa, Oklahoma 74120
Phone: 918-382-7581 ext. 14; Email: darthur@all-llc.com; Web Site: http://www.all-llc.com

J. Daniel Arthur, P.E.[2], ALL Consulting, 1305 E. 15th Street, Suite 205, Tulsa, Oklahoma 74120
Phone: 918-382-7581 ext. 14; Email: jseekins@all-llc.com; Web Site: http://www.all-llc.com

Tom Richmond[3], Montana Board of Oil & Gas Conservation 2535 St. Johns Avenue, Billings, Montana
Phone: 406-656-0040; Email: trichmond@state.mt.us; Web Site: http://www.bogc.dnrc.state.mt.us

Biographical Sketch of Author

Mr. Seekins is an Environmental Scientist having a degree from Slippery Rock University of Pennsylvania. He has 15 years experience in the environmental field performing projects ranging from phase I audits to large remediation efforts in a variety of industrial sectors. Mr. Seekins has worked extensively with governmental agencies performing environmental investigations and studies at military installations throughout the United State and in Europe. He currently serves as the Assistant Project Manager for Montana Statewide Environmental Impact Statement and Amendment of the Powder River and Billings Resource Management Plans.

Dan Arthur is a founding member and the Managing Partner of ALL Consulting (www.all-llc.com). Mr. Arthur earned is bachelors degree in Petroleum Engineering from the University of Missouri-Rolla. He is a recognized authority on environmental issues pertaining to coal bed methane development and production. Currently he serves as the lead researcher on several significant projects involving coal bed methane, including the Montana Statewide Environmental Impact Statement and Amendment of the Powder River and Billings Resource Management Plans; a U.S. Department of Energy (DOE) funded research project involving the development of best management practices utilizing Geographical Information Systems technologies for efficient environmental protection during Coal Bed Methane Development and Production; a DOE funded research project to develop a national primer on coal bed methane; a DOE funded research project to develop a Handbook on the preparation and review of environmental documents for CBM development; and a project managed by the Ground Water Protection Research Foundation (GWPRF) and funded by DOE and BLM involving analysis of produced water management alternatives and beneficial uses of coal bed methane produced water. Mr. Arthur has published many articles and reports and has made numerous presentations on environmental, energy, and technology issues.

Tom Richmond is a native of Montana, attending grade school and high school in Great Falls. He attended Montana Tech in Butte, graduating with a B.S. degree in Petroleum Engineering in 1971. Richmond worked for Phillips Petroleum Co., Great Falls Refining Division before taking a position at the U.S. Geological Survey's Conservation Division offshore operations office in Metairie, Louisiana. He moved with the USGS to offices in Tulsa and Oklahoma City, Oklahoma and Thermopolis, Wyoming before moving back to Montana as the Billings District Engineer. He joined the Montana Board of Oil and Gas Conservation as Senior Petroleum Engineer in 1982 and was named Administrator in 1990. Richmond is Montana's Associate Official Representative to the Interstate Oil and Gas Compact Commission, an association of the Governors of oil and gas producing states and serves on the Board of Directors of the Ground Water Protection Council, an association of state groundwater program managers and oil and gas agency officials. He has chaired state data management committees for both associations and is currently working with GWPC member states and the Department of Energy to implement a Risk Based Data Management System to manage public and agency data needs in state oil and gas programs. Richmond participated in development of the 1989 Programmatic Environmental Impact Statement on Oil and Gas Drilling in Montana that is being supplemented by the current

Statewide EIS covering Coal Bed Methane extraction, and has had primary responsibility for developing programs and regulations to apply environmental requirements, manage federal primacy delegation, and implement legislative changes for the Board of Oil and Gas Conservation.

Abstract
Management of produced water associated with the production of coal bed methane in the Powder River Basin of Montana and Wyoming is a key aspect of the successful development of this valuable resource. It is becoming apparent that coal bed methane development is neither a geologic play or engineering play, but an environmental play. Managing environmental issues, including how produced water is managed, it instrumental to successful development. This paper will present and discuss considerations for water management plans, which are required in both Wyoming and Montana. Various components that can be incorporated into plans will be discussed for both the states of Wyoming and Montana. Further, the paper will present methodologist and tools that should be considered when preparing a plan, including the use of geographic information systems, publically available data, Internet Resources, and other options for obtaining source data for analysis. Lastly, the paper will present a summary of many of the hurdles and complications that are commonplace and likely to be encountered.