

# **USING A THREE-TIERED SYSTEMS APPROACH FOR MANAGING THE ENVIRONMENTAL RISK OF CBM OPERATIONS: RISK ANALYSIS, ENVIRONMENTAL MANAGEMENT, AND QUALITY ASSURANCE**

**Anthony W. Gorody, Ph. D., CPG-9798**

## **Biographical Sketch of Authors**

Dr. Gorody is a consulting geoscientist with 26 years of diverse international and domestic energy industry experience dedicated to evaluating natural gas and groundwater resources. He specializes in designing and implementing state-of-the-art risk mitigating and environmental monitoring methods for characterizing surface and groundwaters surrounding natural gas properties. Since 1988, he has participated in every aspect of litigation, gas and water production, and environmental monitoring related to coalbed methane in the San Juan, Powder River, Black Warrior, Raton, and Green River Basins.

## **Abstract**

Concern over the environmental impact of CBM operations is posing a significant risk on the rate of return of highly leveraged investment dollars used to finance leasing and development. This concern is manifesting itself in the form of accelerating litigation that is unprecedented in the history of the oil and gas industry. The CBM industry must do a better job of assessing and prioritizing environmental risk, communicating risk to stakeholders, implementing strategic environmental monitoring and management systems, and instituting quality assurance programs. Currently available ISO 9001 and 14001 standards provide good templates for such programs. Most risk assessments used to evaluate the impact of CBM operations on groundwater quantity and quality are based on heuristic approaches. Because such approaches are subject to cognitive bias, the information can be too easily manipulated for political or financial gain. Statistical approaches are limited because environmental baseline information is largely unavailable. We present a summary of baseline groundwater data collected by BP in the San Juan Basin during the past two years, and groundwater data collected by the COGCC in the Raton Basin last year. A significant percentage of water wells contain dissolved ions and bacteria that exceed primary and secondary drinking water standards. Such data support detailed site investigations indicating that bacterial fouling and mechanical problems are the principal cause for observed declines in domestic water well yields. Dissolved methane, of bacterial origin, is also a naturally-occurring and common constituent of groundwater in both basins. Declining yields and the occurrence of dissolved methane are rarely a consequence of CBM operations. Such risk is largely confined to stacked aquifers within 100' of producing coal seams. The alleged impact of CBM operations on groundwater environments cannot be objectively assessed unless all stakeholders help leverage the financial resources needed to complete reliable environmental baseline studies.