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Strategies for the management and treatment of coal seam gas associated water



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ABSTRACT

Coal seam gas (CSG) is a growing industry in Queensland and represents a potential major employer and deliverer of financial prosperity for years to come. CSG is a natural gas composed primarily of methane and is found trapped underground in coal beds. During the gas extraction process, significant volumes of associated water are also produced. This associated water could be a valuable resource, however, the associated water comprises of various salt constituents that make it problematic for beneficial use. Consequently, there is a need to implement various water treatment strategies to purify the associated water to comply with Queensland's strict guidelines and to mitigate environmental risks. The resultant brine is also of importance as ultimately it also has to be dealt with in an economical manner. In some ways it can be considered that the CSG industry does not face a water problem, as this has inherent value to society, but rather has a "salt issue" to solve. This study analyzes the options involved in both the water treatment and salt recovery processes. A brief overview of the constituents present in Queensland CS water is made to illustrate the challenges involved and a range of treatment technologies discussed. Water treatment technologies examined include clarification (ballasted flocculation, dissolved air flotation, electrocoagulation), membrane filtration (ultrafiltration), ion exchange softening and desalination (ion exchange, reverse osmosis desalination and capacitance deionization). In terms of brine management we highlighted reinjection, brine concentration ponds, membrane techniques (membrane distillation, forward osmosis), thermal methods, electro dialysis, electro dialysis reversal, bipolar membrane electro dialysis, wind assisted intensive evaporation, membrane crystallization, eutectic freeze crystallization and vapor compression. As an entirety this investigation is designed to be an important tool in developing CS water treatment management strategies for effective management in Queensland and worldwide.

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