

CBM Produced Water Treatment Options

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Biographical Sketch of Author

Brian Hodgson joined Marathon Oil Company in 1979 after receiving his degree in Chemistry from California State University, Fullerton. He has over twenty years of international and domestic, onshore and offshore experience. Brian is currently a member of Marathon's Technology and Engineering Services Group, where he is a technical consultant in the areas of water treatment, corrosion control, material selection, produced fluid separations, chemical treatment programs and equipment inspection programs. Brian provides technical support to Marathon's commercial development efforts in sulfate removal membrane technology and has been involved in feasibility, pilot plant and full scale operations of produced water reverse osmosis and seawater nanofiltration membrane units. He is currently assigned to Marathon's Baja Integrated Gas Project which includes a world scale reverse osmosis seawater desalination facility and a large wastewater treatment plant to provide process water from domestic wastewater.

Abstract

Large volumes of water must be produced from coal seams to enable the production of natural gas trapped within the coal. In Wyoming's Powder River Basin, produced water is relatively fresh and has generally been disposed of via surface discharge in drainages and containment ponds. As the volume of water has increased and development has moved to areas with poorer produced water quality and higher surface water quality, the need for cost effective water treatment techniques has increased. Water treatment methods must address issues such as excessive total dissolved solids, electrical conductivity, excessive Sodium Adsorption Ratio and elevated levels of certain metals and other ions. Several treatment techniques were evaluated for feasibility and their estimated cost per barrel of water treated. The treatment methods included the well known reverse osmosis and other membrane processes, a hybrid ion exchange/membrane process, new technologies such as capacitive desalination and natural processes such as artificial wetlands and irrigation with soil and water amendments. Each process will be briefly reviewed, focusing on their advantages and disadvantages. A summary of estimated capital and operating costs will be presented as will a list of links on the worldwide web that may be referred to for additional information.