

**Beneficial Use of Produced Water Project
Marathon Oil Company
Indian Basin Field**

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Biographical Sketch of Author

Paul Peacock is a Senior Health, Environment and Safety Professional for Marathon Oil Company's Southern Business Unit. Paul has a BS in Mechanical Engineering from Texas Tech University and began his career with Marathon in 1988. Paul currently manages groundwater remediation projects and supports the environmental compliance for the Southern Business Unit's exploration and production operations of oil and gas in New Mexico, Texas and Louisiana. Paul has also managed groundwater remediation projects and supported the environmental compliance for Marathon's Terminal and Transport Organization in the Midwestern States.

Abstract

Marathon Oil Company (Marathon) demonstrated beneficial use of produced water in the Indian Basin Field located in Eddy County, New Mexico. Marathon is using an existing technology to treat produced water for use in drilling operations, which reduces local groundwater usage. Groundwater is a precious resource in the Chihuahuan Desert of South Eastern New Mexico. Local groundwater is regulated by the New Mexico Office of the State Engineer (OSE). The OSE appropriates the state's water resources to ensure a adequate supply of groundwater for agricultural and industrial uses.

In an effort to save precious groundwater resources for future needs and properly manage existing water rights, Marathon evaluated the feasibility of using produced water for drilling operations. The water produced with oil and gas in this area has naturally occurring hydrogen sulfide (H₂S) gas entrained in it. H₂S gas reacts with water to form a weak acid that is very corrosive to drilling equipment. In order to safely use the produced water for drilling operations, the H₂S gas is removed using an existing water treatment technology. The treatment process uses sulfuric acid to lower the pH of the water, which forces ionic H₂S into a gas phase. The produced water is then circulated through a packed tower with a reverse flow of "sweet" natural gas to remove the H₂S gas. The system removes H₂S gas to a level that allows the produced water to be safely used for drilling operations. Produced water usage by Marathon's drilling projects saves over 4,000,000 gallons of groundwater annually.