

**AN INNOVATIVE APPROACH TO MANAGING PRODUCED WATER
AND FRAC FLOWBACK IN THE MARCELLUS SHALE PLAY**

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One of the limitations in developing natural gas fields in the Marcellus Shale is management of the produced water and frac flowback. Evaporation pits are not feasible in this part of the country and the use of injection wells is fraught with uncertainty about their viability and political acceptance. Treatment of these waters with conventional technologies such as membranes is limited due to the high total dissolved solids (TDS) content (100,000 mg/L to 300,000 mg/L). Consequently, evaporation and distillation systems are often viewed as the only option. One company, Somerset Regional Water Resources, has taken a unique approach to treating and recycling these waters at a first of its kind commercial disposal facility. SRWR is constructing a treatment facility on a site that has significant acid mine drainage from an abandoned coal mine. Acid mine drainage (AMD) is Pennsylvania's single greatest source of water pollution. SRWR plans to combine the AMD and the produced water and treat them together. This approach allows SRWR to "kill two birds with one stone." Also, by blending the produced water with the lower TDS acid mine drainage, the overall TDS of the combined water can be treated for reuse and surface discharge using membranes. Evaporation and crystallization will still be needed for the membrane concentrate and very high TDS waters, but the overall quantity to be managed in this manner is significantly reduced.

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