

ABSTRACT

Natural gas development activities (hydraulic fracturing or fracing) for a drilling site require large quantities of water for periods of weeks or months. In many cases this need is met by overland trucking, which is expensive and degrades the environment through increased road traffic, noise, and fuel consumption. Methods were examined to reduce trucking requirements by using infrastructure integration (shared use of rights-of-way and gas line water transport), local water harvesting, and top-hole water recovery. A site-specific modeling approach was presented to allow optimization of local water use based on historic stream gaging data. The model generated daily available stream pumping volumes for each year over the available data period based on withdrawal rates permitted by the Susquehanna River Basin Commission. Daily use requirements for multiple sequential fracing sites were then established for a future model period and compared to available daily water pumping rates for each record year, for the average year, and for a statistical confidence interval of the daily record. Differences between use and available water were routed through existing storage impoundment volumes to identify potential seasonal deficiencies. Fracing schedules were then adjusted to optimize available water use and determine the need for new storage capacity and/or imported water by trucking. Additional water savings options were presented for reuse of top-hole and drilling water through cyclonic separation and electrocoagulation. Case studies and economic analyses of water withdrawal modeling and drilling water reuse were also presented.