From Waste to Drilling Aid

State's contaminated acid minewater is proposed to help with unlocking natural gas.

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By MATT HUGHES
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Pennsylvania has a vast supply of contaminated water flowing daily from its abandoned mine works; 300 million gallons a day by the state's estimate.

The natural gas industry needs vast quantities of water to unlock gas from the Marcellus Shale; between 2 million and 10 million gallons to stimulate a well a single time.

Using the state's latest natural resource boom to clean up the legacy of the last one seems like a natural pairing, and it's one state and environmental regulators as well as the natural gas drilling industry are taking seriously.

At the suggestion of the Governor's Marcellus Shale Advisory Commission last year, the state Department of Environmental Protection is in the process of establishing an approval process for the use of acid mine drainage in hydraulic fracturing.

It is tailoring that process to address concerns that could discourage the industry from using mine water.

Robert Hughes and Mike Hewitt of the Eastern Pennsylvania Coalition for Abandoned Mine Reclamation check the depth of mine water while intern Justyna Sacharzewska looks on.

SRBC Encouragement

The Susquehanna River Basin Commission, which permits drillers to withdraw water from within the Susquehanna's watershed, began encouraging drillers to use acid mine drainage when fracturing by reducing or eliminating permit fees for "lesser-quality waters," including water contaminated by mining and public wastewater.

It has since gone a step further in requiring companies that apply to withdraw fresh water from sources close to mine water to explain as part of their applications why they are unwilling to use the mine water instead.

“They’re going to have to justify to us why they’re not using that impaired water,” commission spokeswoman Susan Obleski said.

Acid mine drainage refers to the outpouring of water that has run its course through mine workings, where it has picked up minerals – often sulfides – and has often acquired an acidic pH.

Its use in hydraulic fracturing could have two environmental advantages: It could reduce the amount of higher-quality water withdrawn from rivers and streams for use in drilling and the treating the water for use in drilling could reduce the amount of mine water flowing elsewhere.

For those reasons the idea has captured the interest if not the outright support of environmental groups.

“Many of these abandoned mine sites have the potential to become coldwater streams and high-quality trout fisheries,” said Amy G. Wolfe, director of the Eastern Abandoned Mine Program for national environmental group Trout Unlimited. “This is a phenomenal good-citizen opportunity here for the natural gas industry to work with their local communities and watershed groups in utilizing this source of water and cleaning it up.”

Fresh water withdrawals aren’t harmful in and of themselves, Wolfe said, but truck traffic to and from withdrawal sites and the construction of roads leading to them contribute to erosion and sedimentation, which can impair water quality.

“It impacts trout spawning habitats (and) trout habitats in general,” she said. “I think the good thing about the use of mine drainage water is that… in abandoned mine work environments in many areas you already have existing road infrastructure.”

The Eastern Pennsylvania Coalition for Abandoned Mine Reclamation remediates acid mine drainage in the eastern portion of the state.

Executive Director Robert Hughes said his group is also interested in the idea, and any opportunity to partner with private-sector interests to remediate the problem, including power plants that use large volumes of water.

The natural gas industry is also interested, and late last year the Marcellus Shale Coalition, an industry group representing most of the companies drilling for gas in Pennsylvania, hosted a conference on the feasibility of using mine water in fracturing.

A key finding of that conference was that while mine water’s abundance makes it attractive, it is so plentiful the gas industry’s thirst would never be enough to solve the mine water problem alone.

Coal water in and around Pittsburgh alone could provide two to seven times the water needed by the industry annually, Paul Ziemkiewicz of the West Virginia Water Research Institute reported at the conference.

But Hughes said the industry's involvement could still help.

"What we see is, there's so many discharges out there in the region that don't have treatment systems on them to where we might be able to support aquatic life downstream," Hughes said. "Some of the discharges we feel can probably be cleaned up quite easily if other private industries come into play, because the state doesn't have enough money to do it all."

Contaminated minewater mixes with the water in Solomon Creek in Hanover Township. A recent proposal would have gas drillers use this type of polluted water in fracking operations.

Old Forge Borehole

For example, Hughes said that about 100 million gallons of water passes daily through the Old Forge borehole, Luzerne County's largest producer of mine drainage, depositing more than 5,000 tons of iron into the Susquehanna River.

If more partners were available to help remediate problems like the borehole, state environmental workers and nonprofits could devote more resources to closing points of ingress into the mines, which could in turn greatly reduce the volume of water flowing through the mines, Hughes said.

Participants at the Marcellus Shale Coalition-sponsored conference showed consensus that gas drillers would probably not encounter economically significant problems in hydraulic fracturing with much of the mine water available, though the pH and mineral content of mine drainage varies widely and can affect its suitability for use in drilling.

A cost analysis by Penn State professor David Yoxtheimer found that using mine drainage is more expensive than other sources of water for fracturing, but the cost could be reduced where the water source and well are located in close proximity.

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