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## COLUMN-Shale revolution hits snag along the Delaware: Kimmerle

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By Chris Kimmerle

NEW YORK, June 10 (Reuters) - Shale gas and hydraulic fracturing have transformed the U.S. gas market in less than five years and are now central to the administration's strategy for reducing emissions, boosting energy security and improving the balance of payments by cutting reliance on imported oil.

But the transformative potential of these technologies is threatened by rapidly escalating political opposition to the environmental impact of drilling and potential chemical contamination from fracking fluids.

The flash point centers on the giant Marcellus Shale in the Northeastern United States, which covers portions of West Virginia, Pennsylvania, Maryland, Ohio and New York. ([here](#))

Development is pitting the gas industry and communities anxious to benefit from jobs and the income from royalties and leases against environmental groups and residents concerned about increased traffic and the risks to the environment from the disposal of a cocktail of chemicals injected into gas wells as part of the fracking process.

### DELAWARE RIVER BASIN COMMISSION

While the relatively poor state of West Virginia has welcomed shale development as a way to supplement income and jobs from its troubled coal industry, opposition has mounted in other states.

The New York City Department of Environmental Protection called for a prohibition on drilling within the watershed of the city's reservoir system in December 2009, and the governor of Pennsylvania banned new wells on state forest lands in 2010.

Last month, the speaker of the New York State Assembly announced the Environmental Conservation Committee had reported out legislation to suspend the issuance of new drilling permits for hydraulic fracturing in the state until June 2012.

But one of the most serious public challenges to drilling in the Marcellus has come from grass roots opposition to regulations being proposed by the Delaware River Basin Commission (DRBC).

The commission regulates water use and quality along the Delaware River under a 1961 compact among the states of Delaware, New Jersey, New York and Pennsylvania and the Federal Government. Its commissioners are the governors of the four riparian states as well as division engineer for the North East Division of the U.S. Army Corps of Engineers. ([here](#))

In May 2009, the commission notified the natural gas industry that new Marcellus wells cannot be drilled within the river's drainage area without first applying for and obtaining its approval. At the same time the commission released a set of proposed development rules as part of its water quality regulations.

The regulations are intended to protect the river's water resources and apply to all gas-development activities including withdrawing water from the river system and the disposal of wastewater (including fracking fluids) from fracking projects.

The public comment period on the proposed regulations, which closed on April 15, drew a heavy response with approximately 58,000 public submissions received, of which more than 36,000 were hostile to the further expansion of Marcellus drilling.

## TRANSFORMATIONAL TECHNOLOGY

The combination of shale gas discoveries and the hydraulic fracturing process, which makes it possible to exploit them, has probably been the most important new development in the oil and gas industry in last decade.

The revolution began with exploitation of the Barnett Shale under the Texas city of Fort Worth in the late 1990s. It has since spread to the Greater Green River Basin in Wyoming, the Uinta-Picance Basin in Colorado and Utah, the Haynesville Shale stretching across the Texas-Louisiana border, the Woodford Shale in Oklahoma, and the Fayetteville Shale in Arkansas. ([here](#))

Production from unconventional shale reservoirs has leapt from 0.39 trillion cubic feet in 2000 to 1.3 trillion in 2007, 3.1 trillion in 2009 and 4.87 trillion in 2010, according to the Energy Information Administration. It now accounts for 23 percent of all gas production in the United States.

Burgeoning shale production has transformed the outlook for the U.S. gas market. In 2005, the Hirsch Report for the U.S. Department of Energy forecast "Gas production in the United States now appears to be in permanent decline" and a period of rising gas prices.

Gas companies built a raft of regasification terminals to import LNG to alleviate predicted shortfalls in domestic production. Now surging output has caused prices to fall sharply and the gas companies are applying for permits to reverse the LNG terminals and use them to export domestic production.

Shale technology is now being deployed around the world and has effectively doubled the global resource base for natural gas. As a result, the International Energy Agency expects gas will play a much greater role in the global energy mix in future, according to a recent report in which it asked "Are we entering a golden age of gas?"

But that technological revolution has now run into an unexpected problem: mounting concerns about the content and disposal of fluids used.

## CHEMICAL COCKTAIL

Key to winning natural gas from low permeable shale is hydraulic fracturing, a process that involves the injection of typically 1-4 million gallons of water at high pressure into a well in order to break the rock and allow gas to follow.

The water is combined with sand, chemicals, and gels to lubricate the process and help keep the rock open after it is broken. During the fracking

process the fluid is returned to the surface for recirculation and ultimate disposal.

Between 2005 and 2009, the oil and gas industry introduced 780 million gallons of fracking fluid into U.S. wells, according to a staff report issued by the Democratic minority on the Energy and Commerce Committee of the House of Representatives.

According to the report, the fracking fluids used contained a total 750 chemicals and other components. The most widely used chemical, as measured by frequency of use, was methanol - designated by the Environmental Protection Agency as a hazardous air pollutant and candidate for inclusion on the list of regulated substances under the U.S. Safe Water Drinking Act.

Other widely used chemicals included benzene, lead, isopropyl alcohol, 2-butoxyethanol (also used as a paint solvent and in cleaning products) and ethylene glycol (also used in automotive antifreeze).

The report identified 29 chemicals used in fracking that are known or possible carcinogens and regulated under the Safe Water Drinking Act or listed as hazardous pollutants under the Clean Air Act.

It also identified 94 million gallons of fracking fluid that contained at least one chemical or component that its manufacturer deemed proprietary or a trade secret and is not available for public scrutiny.

#### POLITICAL CONTEXT

The unconventional gas revolution was born in the belt of midcontinental and western states stretching up to Wyoming where there was a favorable political, business and regulatory environment for energy producers. Shale production was welcomed as creating jobs and generating state and local tax revenues.

The political context in the Northeast is very different. The region has a broader economic base so it is less dependent on the energy sector for jobs and tax revenue. It also has poisonous legacy of 250 years of heavy industrial development along some of its rivers, including abandoned oil wells, acid drainage from abandoned coal mines, underground fires in the anthracite field and industrial pollution.

In New York state, the upper Hudson River is contaminated with PCBs (a known carcinogen) and the Monongahela River in western Pennsylvania and West Virginia remains scarred by the legacy of steelmaking and bituminous coal extraction industries.

Unsurprisingly, these states are more divided about shale development. The Delaware is part of the country's Wild and Scenic Rivers System and provides drinking water for over 15 million people including the New York and Philadelphia metropolitan regions.

Coming from the more benign climate in the south, southwest, and west the industry appears to have been blindsided by the extent of local opposition. In a belated attempt to reverse industry groups have saturated local television and radio with advertisements extolling the virtues of oil and gas.

Even if the commission gives its approval, the lack of an environmental impact assessment is likely to form the basis for a court challenge. Litigation may delay implementation for 2-3 years, and open up fracking practices to greater scrutiny. (Editing by John Kemp and Marguerita Choy)

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