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'Fracking' Mobilizes Uranium In Marcellus Shale, UB Research Find

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Scientific and political disputes over drilling Marcellus shale for natural gas have focused primarily on the environmental effects of pumping millions of gallons of water and chemicals deep underground to blast through rocks to release the natural gas.

But University at Buffalo researchers have now found that process -- called hydraulic fracturing or "fracking"-- also causes uranium that is naturally trapped inside Marcellus shale to be released, raising additional environmental concerns.

The research will be presented at the annual meeting of the Geological Society of Americ Denver on Nov. 2.

Marcellus shale is a massive rock formation that stretches from New York through Pennsylvania, Ohio and West Virginia, and which is often described as the nation's large source of natural gas.

"Marcellus shale naturally traps metals such as uranium and at levels higher than usually naturally, but lower than manmade contamination levels," says Tracy Bank, PhD, assista professor of geology in UB's College of Arts and Sciences and lead researcher. "My ques was, if they start drilling and pumping millions of gallons of water into these underground will that force the uranium into the soluble phase and mobilize it? Will uranium then show groundwater?"

To find out, Bank and her colleagues at UB scanned the surfaces of Marcellus shale sam from Western New York and Pennsylvania. Using sensitive chemical instruments, they cr a chemical map of the surfaces to determine the precise location in the shale of the hydrocarbons, the organic compounds containing natural gas.

"We found that the uranium and the hydrocarbons are in the same physical space," says "We found that they are not just physically -- but also chemically -- bound.

"That led me to believe that uranium in solution could be more of an issue because the p of drilling to extract the hydrocarbons could start mobilizing the metals as well, forcing the the soluble phase and causing them to move around."

When Bank and her colleagues reacted samples in the lab with surrogate drilling fluids, tl found that the uranium was indeed, being solubilized.

In addition, she says, when the millions of gallons of water used in hydraulic fracturing co back to the surface, it could contain uranium contaminants, potentially polluting streams a other ecosystems and generating hazardous waste.

The research required the use of very sophisticated methods of analysis, including one c Time-of-Flight Secondary Ion Mass Spectrometry, or ToF-SIMS, in the laboratory of Jose Gardella Jr., Larkin Professor of Chemistry at UB.

The UB research is the first to map samples using this technique, which identified the pre location of the uranium.

"Even though at these levels, uranium is not a radioactive risk, it is still a toxic, deadly me Bank concludes. "We need a fundamental understanding of how uranium exists in shale. more we understand about how it exists, the more we can better predict how it will react t 'fracking.'"

Bank conducted the experiments with UB Department of Geology graduate students Tho Malizia and Lauren Fortson, and Lisa Andresky, an undergraduate student from Slippery University in Pennsylvania. Andresky worked in Bank's lab during the summer while on a National Science Foundation-funded Research Experience for Undergraduates in UB's Ecosystem Restoration through Interdisciplinary Exchange (ERIE) program.

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SOURCE: University at Buffalo