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Fracking Shown to Mobilize Uranium in Marcellus Shale

BUFFALO, New York, October 26, 2010 (ENS) - Fracking - pumping millions of gallons of water and chemicals deep underground to fracture shale rock, releasing the natural gas it contains - is controversial because it may pollute groundwater used for drinking with proprietary chemical cocktails that drilling companies keep to themselves.

Now scientists at the State University of New York at Buffalo have found that a chemical everyone recognizes - uranium - also can be released by fracking in Marcellus shale and that it too may pollute groundwater.

UB geologist Tracy Bank with shale rock from Marcellus shale. (Photo courtesy UB)

The researchers examined uranium released by fracking in Marcellus shale, a massive rock formation that stretches from New York through Pennsylvania, Ohio and West Virginia, considered to be the nation's largest source of natural gas.

"Marcellus shale naturally traps metals such as uranium and at levels higher than usually found naturally, but lower than manmade contamination levels," says lead researcher Tracy Bank, PhD, assistant professor of geology in UB's College of Arts and Sciences.

"My question was, if they start drilling and pumping millions of gallons of water into these underground rocks, will that force the uranium into the soluble phase and mobilize it? Will uranium then show up in groundwater?"

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

The research required the use of sophisticated methods of analysis, including one called Time-of-Flight Secondary Ion Mass Spectrometry, or ToF-SIMS, in the laboratory of Joseph A. Gardella Jr., professor of chemistry with the University at Buffalo.

Bank's research is the first to map samples using this technique, which identified the precise location of the uranium.

"We found that the uranium and the hydrocarbons are in the same physical space," says Bank. "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 process of drilling to extract the hydrocarbons could start mobilizing the metals as well," said Bank, "forcing them into the soluble phase and causing them to move around."

When Bank and her colleagues reacted samples in the lab with surrogate drilling fluids, they found that the uranium was indeed, being forced into the soluble phase.

When the water used in hydraulic fracturing comes back to the surface, it could contain uranium contaminants, potentially polluting streams and other ecosystems and generating hazardous waste, warned Bank.

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

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