

Watershed Wednesdays Week 3: Centralized Wastewater Treatment Facilities – Frack wastewater and produced water

--The Delaware River Basin Commission's (DRBC) proposal to allow Centralized Waste Treatment facilities that would import into the Basin wastewater produced by fracking containing toxic and radioactive substances jeopardizes the water quality of the Delaware River Basin. DRBC themselves says that disposal of frack wastewater poses "significant risk" if the wastewater is not properly managed. Spills at these fracking facilities are unavoidable and, according to the US Environmental Protection Agency (EPA) and DRBC, can pollute both surface and groundwater resources. EPA reports that in Pennsylvania spills have caused pollution outside the basin where fracking is occurring and that 457 fracking related spills occurred between January 2006 and April 2012 in eleven states due to equipment failure, human error, failure of container integrity, and other causes. DRBC does not even have an enforcement division. DRBC must prohibit accepting outputs of CWT facilities or any fracking waste to prevent spill pollution and water contamination.

-- Radioactive materials, including radium, are in the wastewater produced by fracking, as reported by DRBC themselves. A study by Duke University of treated wastewater from fracking shows that radium concentrations in a Pennsylvania creek downstream of a frack wastewater facility were roughly 200 times higher than background levels. Radium 226 has a half-life of 1600 years and is linked to cancer. The removal of radium is expensive and difficult and the final residue would need to be handled similar to nuclear waste. (Vengosh et al, Environ. Sci. Technol., 2013, 47 (20), DOI: 10.1021/es402165b, pp 11849–11857, 2013). The DRBC must not allow any potential for the Watershed's residents and environment to be exposed to these levels of radioactivity; banning it is the only responsible course of action.

-- There's no national set of standards that guides this treatment process. The EPA notes that the Clean Water Act's guidelines were developed before fracking even existed so no federal treatment or design standards have been adopted by the federal government to establish uniform effective treatment. Scientists have conducted relatively little assessment of the wastewater to ensure it is safe after being treated. In fact, evidence of the lack of the effective removal of pollutants by frack wastewater treatment plants is found in reports that measure contaminants in sediments and surface water below frack treatment plants such as high chloride concentrations in Pennsylvania waterways. It is known that chloride is difficult to remove at high concentrations, toxic to fish and negatively impacts water quality. (Olmstead et al, PNAS Vol. 110, No. 13, PP 4962-4967, 2013). It is not safe to risk this contamination; it must be banned.

Background Information

Please feel free to take this additional information into account as you write your comments. We highly encourage personalizing comments as much as possible. Thank you!!

Smithsonian Magazine BLOG:

Radioactive Wastewater From Fracking Is Found in a Pennsylvania Stream

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New testing of treated wastewater from fracking shows that it contains high levels of radioactive radium, along with chloride and bromide. Image

via Environmental Science and Technology/Warner et. al.

In the state of Pennsylvania, home to the lucrative Marcellus Shale formation, 74 facilities treat wastewater from the process of hydraulic fracturing (a.k.a. “fracking”) for natural gas and release it into streams. There’s no national set of standards that guides this treatment process—the EPA notes that the Clean

Water Act’s guidelines were developed before fracking even existed, and that many of the processing plants “are not properly equipped to treat this type of wastewater”—and scientists have conducted relatively little assessment of the wastewater to ensure it’s safe after being treated.

Recently, a group of Duke University scientists decided to do some testing. They contacted the owners of one treatment plant, the Josephine Brine Treatment Facility on Blacklick Creek in Indiana County, Pennsylvania, but, “when we tried to work with them, it was very difficult getting ahold of the right person,” says Avner Vengosh, an Earth scientist from Duke. “Eventually, we just went and tested water right from a public area downstream.”

Their analyses, made on water samples collected repeatedly over the course of two years, were even more concerning than we’d feared. As published today in the journal Environmental Science and Technology, they found high concentrations of the element radium, a highly radioactive substance. The concentrations were roughly 200 times higher than background levels. In addition, amounts of chloride and bromide in the water were two to ten times greater than normal.

“Even if, today, you completely stopped disposal of the wastewater,” Vengosh says, there’s enough contamination built up that “you’d still end up with a place that the U.S. would consider a radioactive waste site.”

The scientists tested wastewater released by the Josephine Water Treatment plant (black square) into Blacklick Creek, which feeds into the Allegheny River, a drinking

water source for Pittsburgh. Image via Environmental Science and Technology/Warner et. al.

In recent years, the use of fracking to extract natural gas from shale formations has boomed in several areas, most notably Pennsylvania's Marcellus Shale, which has been called "the Saudi Arabia of natural gas." The process involves injecting mix of water, sand and proprietary chemicals deep into rock at high pressure, causing the rock to fracture and allowing methane gas to seep upward for extraction.

Between 10 and 40 percent of the fluid injected during the fracking process resurfaces, presenting a treatment problem for processing plants. Image via Wikimedia Commons/Mikenorton

Much of the concern over fracking has related to the seepage of these chemicals or methane from drilling wells into groundwater or the fact that high-pressure injection can trigger earthquakes, but the wastewater recently tested presents a separate, largely overlooked problem.

Between 10 and 40 percent of fluid sent down during fracking resurfaces, carrying contaminants with it. Some of these contaminants may be present in the fracking water to begin with. But others are leached into the fracking water from groundwater trapped in the rock it fractures.

Radium, naturally present in the shales that house natural gas, falls into the latter category—as the shale is shattered to extract the gas, groundwater trapped within the shale, rich in concentrations of the radioactive element, is freed and infiltrates the fracking wastewater.

Other states require this wastewater to be pumped back down into underground deposit wells sandwiched between impermeable layers of rock, but because Pennsylvania has few of these cavities, it is the sole state that allows fracking wastewater to be processed by normal wastewater treatment plants and released into rivers.

These plants, many scientists note, are not designed to handle the radioactive elements present in the wastewater. Neither are they required to test their effluent for radioactive elements. As a result, many researchers have suspected that the barely-studied water they release into local streams retains significant levels of radioactivity.

This new work confirms that suspicion for at least one plant—which is about an hour east of Pittsburgh, and releases effluent into the watershed that supplies the city's drinking water—and Vengosh believes that the findings would likely be similar for many of the other facilities in Pennsylvania. Especially concerning is the fact that, apart from in the water, the team found high levels of radioactivity accumulating on the sediments at the bottom of the stream over time. Radium has a half-life of 1600 years, so unless these sediments are removed, they'll keep releasing radiation into the water for an extremely long period.

In addition, the high levels of bromide found in the wastewater is a concern, because even in slight quantities, the compound can trigger the formation of a toxic class of chemicals called halomethanes when it's combined with chlorine. This is a problem because in rural areas, many residents treat well water by chlorinating it.

The study—which is part of a larger Duke project studying the effect of fracking on water—doesn't show that fracking is inherently unsafe, but does show that without proper controls, the wastewater being dumped into the environment daily represents a very real danger for local residents.

Vengosh notes that there are better methods of treating fracking wastewater (he points to the plants operated by Eureka Resources as a model for adequately removing radioactivity), but these are more expensive to operate. But currently, without the push of federal regulations, companies looking to dispose of wastewater have no incentive to pay for this type of solution.

<http://blogs.smithsonianmag.com/science/2013/10/radioactive-wastewater-from-fracking-is-found-in-a-pennsylvania-stream/#ixzz2gaB8X86f>