

New contaminants found in oil and gas wastewater

January 14 2015

Duke University scientists have discovered high levels of two potentially hazardous contaminants, ammonium and iodide, in wastewater being discharged or spilled into streams and rivers from oil and gas operations in Pennsylvania and West Virginia.

Levels of contamination were just as high in wastewater coming from [conventional oil](#) and [gas](#) wells as from hydraulically fractured [shale gas](#) wells.

"This discovery raises new concerns about the environmental and human health impacts of oil and gas wastewater in areas where it is discharged or leaked directly into the environment," said Avner Vengosh, professor of geochemistry and water quality at Duke's Nicholas School of the Environment.

"Our data clearly show that the current brine treatment practice in Pennsylvania is not sufficient to remove these contaminants," Vengosh said.

When dissolved in water, ammonium can convert into ammonia, which is highly toxic to aquatic life. The scientists detected ammonium levels of up to 100 milligrams per liter in oil and gas effluents they collected at the wastewater discharge sites. Those levels are more than 50 times higher than the EPA water-quality threshold for protecting freshwater organisms.

Elevated iodide in surface water can promote the formation of highly toxic byproducts in drinking water when the iodide mixes with the chlorine used to disinfect the water at municipal treatment plants located downstream from oil and gas operations. Such disinfection byproducts are not monitored by state or federal agencies.

The peer-reviewed study, appearing this week in the journal *Environmental Science & Technology*, is the first to document the presence of high levels of ammonium and iodide in oil and gas wastewater.

Public concern for water contamination has focused on the impact of hydraulic fracturing fluids from shale gas exploration, but the new study shows that wastewater from conventional oil and gas exploration contains levels of ammonium and iodide that are just as high.

"By measuring naturally occurring ammonium and iodide in numerous samples from different geological formations in the Appalachian Basin, including flowback waters from shale gas wells in the Marcellus and Fayetteville shale formations, we show that fracking fluids are not much different from conventional oil and gas wastes," said Jennifer S. Harkness, lead author of the study and a PhD student at Duke's Nicholas School of the Environment.

Previous studies have shown that fracking fluids contain high levels of salts, barium and radioactive elements, in addition to man-made chemicals added in the process of hydraulic fracturing.

To conduct the new study, the researchers collected and analyzed 44 samples of waters produced from conventional oil and gas wells in New York and Pennsylvania and 31 samples of flowback waters from hydraulically fractured shale [gas wells](#) in Pennsylvania and Arkansas. They also collected and analyzed oil and gas effluents that were being

directly discharged into streams, rivers and surface waters at three disposal sites in Pennsylvania and a spill site in West Virginia.

"Wastewater from both conventional and unconventional oil and gas operations is exempted from the Clean Water Act, which allows their disposal to the environment. This practice is clearly damaging the environment and increases the health risks of people living in these areas, and thus should be stopped," Vengosh said.

More information: "Iodide, Bromide, and Ammonium in Hydraulic Fracturing and Oil and Gas Wastewaters: Environmental Implications," Harkness, J., Dwyer, G., Warner, N.R., Parker, K. Mitch, W.; Vengosh, A. *Environmental Science & Technology*, Jan. 14, 2015. [DOI: 10.1021/es504654n](https://doi.org/10.1021/es504654n)

Provided by Duke University

Citation: New contaminants found in oil and gas wastewater (2015, January 14) retrieved 3 May 2024 from <https://phys.org/news/2015-01-contaminants-oil-gas-wastewater.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.