Study finds abnormalities in drinking water in Eagle Ford Shale region

September 22 2016

Gas well in Eagle Ford Shale. Credit: Jeff Williams of Brand Spells.

An initial study by University of Texas at Arlington chemists of well water quality in the Eagle Ford Shale region found some abnormal chloride/bromide ratios, alongside evidence of dissolved gases and

sporadic episodes of volatile organic compounds, all indicative of some contamination from industrial or agricultural activities in the area.

"The infrequent detection of volatile organic compounds in the groundwater overlying the Eagle Ford Shale is certainly good news for citizens; however, there were instances of abnormalities on the water that we cannot quite explain," said Kevin Schug, UTA's Shimadzu Distinguished Professor of Analytical Chemistry and director of the University's Collaborative Laboratories for Environmental Analysis and Remediation, or CLEAR lab.

The study identified two highly differentiated types of chloride/bromide ratios in the groundwater: samples classified as A, which had normal levels, and samples classified as B, which all showed very high levels of bromide, indicative of contamination events. There were also multiple cases of water effervescence indicative of dissolved hydrocarbon gases and a few volatile organic compounds in areas near oil and natural gas extraction sites.

"The next step in this research is to further characterize what these gases and chemicals are attributed to. Hopefully a closer collaboration with industry to gain a more intimate knowledge of the chemicals used during shale energy extraction will allow us to better assess whether or not unconventional oil and gas development is having a significant impact on groundwater quality in the south Texas region," Schug added.

The research was published recently in *Science of the Total Environment* as "A reconnaissance analysis of groundwater quality in the Eagle Ford shale region reveals two distinct chloride/bromide populations." Schug was joined by co-author Zacariah Hildenbrand of Inform Environmental and scientists from the University of North Texas, Tarleton State University and Ohio State University also contributed to the study.

This peer-reviewed study comes on the heels of another investigation by the same researchers in *Science of the Total Environment*, "Point source attribution of ambient contamination events near unconventional oil and gas development," which found that chemical emissions from specific surface components on oil well pad sites could be attributed to mechanical inefficiencies that can be monitored and remediated.

CLEAR is dedicated to the development of remediation technologies and best management practices to effectively handle and decrease the occurrence of contamination events. The CLEAR team hopes to build on these findings to further understand the environmental implications of human activities, and to develop remediation strategies and best management practices to limit ecological impacts.

Frederick MacDonnell, chair of UTA's Department of Chemistry and Biochemistry, underlined the importance of this research within the university's focus on global environmental impact within the Strategic Plan 2020: Bold Solutions|Global Impact.

"CLEAR continues to provide reliable information to the scientific community, industry and the public about the potential effects of large-scale unconventional oil and gas development on the environment," MacDonnell said. "This is a service we can provide to all these different sectors."

More information: Zacariah L. Hildenbrand et al, A reconnaissance analysis of groundwater quality in the Eagle Ford shale region reveals two distinct bromide/chloride populations, *Science of The Total Environment* (2016). DOI: 10.1016/j.scitotenv.2016.09.070

Zacariah L. Hildenbrand et al, Point source attribution of ambient contamination events near unconventional oil and gas development, *Science of The Total Environment* (2016). DOI:

10.1016/j.scitotenv.2016.08.118