

MAR13-2012-020754

Abstract for an Invited Paper
for the MAR13 Meeting of
the American Physical Society

Environmental Dimensions of Shale Gas Extraction and Stray Gas Migration

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Shale gas extraction is growing rapidly in the United States and elsewhere, developed in part through advances in technologies such as horizontal drilling and hydraulic fracturing. Concerns over potential environmental impacts have accompanied the boom in natural gas extraction. For several years we have studied drinking water quality, asking the question, “Is water quality different for homeowners living near natural gas wells?” We have sampled shallow groundwater systems of > 300 homeowners, the majority of them in the Marcellus formation of Pennsylvania and New York, for brines, dissolved gases, and other attributes. We have also examined how much methane reaches the atmosphere during the extraction and distribution of natural gas. In a study published in May of 2011 (Osborn et al. 2011, PNAS 108:8172-8176), we found no evidence of increase salt concentrations or fracturing fluids with distance to gas wells for 68 sampled homes. However, dissolved methane concentrations were 17 times higher on average for water wells found within 1km distance of them. A subset of homeowners also had groundwater that indicated the presence of natural hydraulic connections to deeper formations, suggesting specific structural and hydrodynamic regimes where shallow drinking water resources might be at greater risk of contamination with fugitive gases during drilling and hydraulic fracturing of shale gas (Warner et al. 2012, PNAS 109:11961-11966). This presentation will discuss new results from shale gas sampling in 2011 and 2012.