

From the Bottom to the Top: Identifying and Assessing Natural Geological Linkages from Deep Formations to Shallow Groundwater Resources

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ABSTRACT

The potential migration of hydraulic fracturing (fracking) fluids from deep shales to shallow groundwater resources along natural geological pathways is a major environmental concern shared by the public, governments, and regulatory bodies. England is just beginning to develop a shale gas industry and therefore research into the subsurface migration of fracking fluids is timely and will be important for developing shale gas resources in an environmentally responsible way. Because widespread fracking is yet to take place in England, groundwater risk assessments cannot draw from observational data from fracking sites. Consequently, a different approach is required. This unique project intends to assess fluid migration pathways and groundwater contamination risk in the Bowland Basin, northwest England, using a combination of seismic reflection interpretation, water sampling, and numerical modelling. The James E. Hooks Memorial Grant from the AAPG Foundation is being used to fund the water sampling fieldwork in the Bowland Basin and the subsequent laboratory analyses. The overall project aim is to investigate hydrogeological factors which increase, or decrease, the upward migration of fracking fluids and subsequently identify areas that may be more, or less, susceptible to groundwater contamination. The project will provide the first fully integrated groundwater risk model of a prospective shale gas basin prior to widespread fracking activity, thereby establishing a new groundwater risk assessment methodology for nations considering using fracking technologies. Furthermore, it may redefine which hydrogeological factors are considered important in groundwater risk assessments.