

Biocides in hydraulic fracturing: A comparison to agricultural and assessment of hazard and vulnerability with respect to groundwater pollution

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Biocides are one possible chemical additive to frack fluids and their role is to control bacterial growth. Since biocides are designed to be toxic to particular organisms, their accidental or deliberate release into the environment has become a growing topic of concern, especially with regards to fracking. The objective of this study was to consider whether biocides proposed for use in fracking, could be a threat to English groundwater based on past groundwater monitoring data.

The study considered all groundwater samples analysed for biocides in English groundwater between 2005 and 2014. The monitoring records were compared to: records of application (both amount and area); and chemical and molecular data for the biocides. The study did not use traditional adsorption and degradation data as these parameters are prone to variability and are not pure molecular parameters.

The study showed that of the 110 biocides tested for in English groundwaters in the decade 2005 – 2014. The total number of detections was 2234 out of 1475000 observations of 95 compounds, and 38 were compounds that were not applied during the period of record. The detection of these 38 compounds did not decline over the 10 year period implying very long residence times and that once compounds do pollute an aquifer, then they will be a persistent problem. The study was able to develop binomial regression models of the probability of detecting pesticide in groundwater based upon molecular and application variables; and solely upon molecular properties. The solubility of the range of biocides used in frack fluids would imply a potentially higher hazard than for most agricultural biocides, but molecular modelling implied that one compound could be safer than others.