

ReFINE Briefing Note



This research is based on the article "The potential for spills and leaks of contaminated liquids from shale gas developments" by Sarah Clancy, Fred Worrall, Richard Davies and Jon Gluyas. The article was published in *Science of the Total Environment* and is available for free download at www.refine.org.uk.

What is fracking?

Fracking, or as it's more scientifically known 'hydraulic fracturing', is a process in which rocks are deliberately fractured by high pressured injection of fluids. The hydraulic fractures created allow fluids to flow through the rock more easily. This can be beneficial for the recovery of oil and gas from rocks which don't normally allow oil and gas to flow through them at commercial rates, for example shales.

The rapid growth of fracking in the USA and the possibility of shale gas developments within Europe have created public concern about the risk of surface spills and leaks associated with the industry. Researchers at Durham and Newcastle Universities have investigated the likelihood of a spill should a shale gas industry go ahead in the UK and suggested mitigation strategies to help avoid such incidents occurring.

What types of liquids could be spilled?

- **Hydraulic fracturing fluid** primarily consists of water and sand, with <1% of the volume composing of chemical additives.
- **Chemical additives** are added to a base fluid

to create the fracking fluid, generally between one and 12 additives are added depending on the characteristics of the shale.

- **Produced water** is the water that comes to the surface as a by-product along with the oil and gas.
- **Flowback water** is the highly saline fluid that returns to the surface after a well has been fracked.

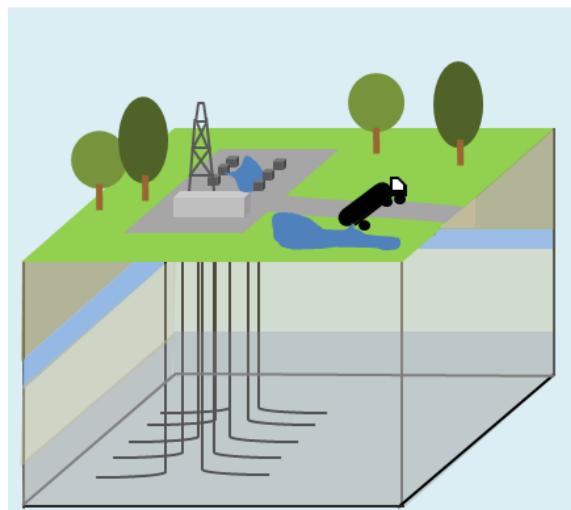


Figure 1: Surface spills associated with the shale gas industry occur both on the well site and during fluid transportation to and from the well site.

Where do spills and leaks occur?

Spills and leaks occur on the well sites themselves and during fluid transportation to and from the well sites (Figure 1 and Figure 2). This study looked at datasets from Texas and Colorado and found that the most common spill cause in both states was equipment failure. In Texas this was followed by corrosion (rust), which was subsequently followed by 'Act of God' (e.g. floods, lightning strikes) and human error.

What are the impacts of these spills and leaks?

Within the USA there have been reports of human errors leading to the accidental release of fracking fluid onto cattle pastures, leading to the death of cattle. There have also been reports of equipment failure causing the release of fracking fluid onto goat pastures, which is thought to have led to breeding complications within the residing goat population. It should be noted however that these cases had no control baseline. Therefore, it is difficult to know what would have happened had no spill occurred, or if another spill had occurred.



Figure 2: The clear up operations after an oil tanker spill on the road.

What is the likelihood of a spill?

Based on data from Texas, a UK shale industry developing well sites, each with 10 lateral wells,

would likely experience a spill for every 16 well sites developed (Figure 3). The same well site development scenario is estimated to require at least 2856 tanker movements over two years per well site. Considering this tanker movement estimate with incident and spill frequency data from UK milk tankers, a UK shale industry would likely experience an incident on the road for every 12 well sites developed and a road spill for every 19 well sites developed.

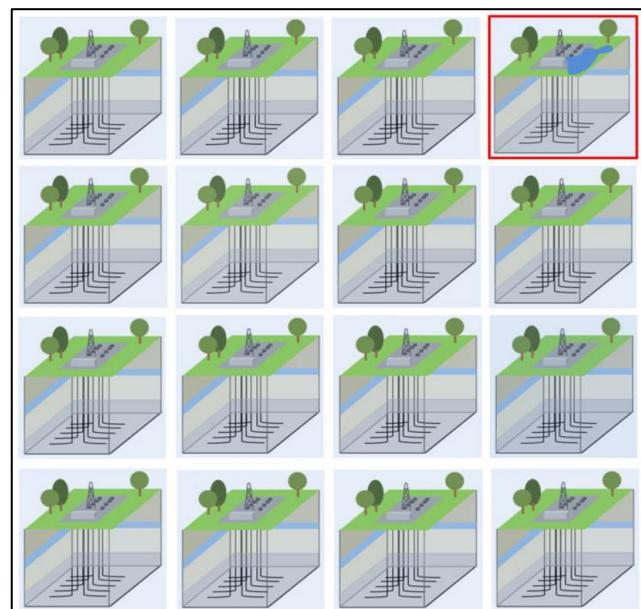


Figure 3: A spill onsite is likely for every 16 well sites developed.

