Study reveals high levels of toxic element in UK shale

December 23 2015

Research led by the University of Aberdeen has found high levels of toxic selenium in shale from an area of the UK targeted for shale gas extraction.

Scientists from the University of Aberdeen have discovered high levels of a toxic element in rock samples taken from an area of the UK targeted for shale gas extraction.

A study by a team from the University's School of Geosciences and published in the journal *Applied Geochemistry* has revealed high levels of selenium in rock samples from the Bowland Shale, a geological formation in the north of England rich in resources of shale gas.

The significance of the discovery lies in the risk of high levels of the element being released into groundwater during drilling or 'fracking' operations. Excessive levels of selenium are known to pose a risk to human health, and so care must be taken during extraction to ensure that levels are kept to a minimum.

Professor John Parnell, who led the study, said: "A major factor to be considered during shale gas drilling is the accompanying water, which may contain chemicals that require careful treatment.

"Recently, there was widespread concern in the US when water wells near a shale drilling site were found to contain selenium at levels that exceeded the maximum amount considered safe to drink, and this was assumed to have been released from the shale during drilling.

"The samples we have analysed from the Bowland Shale are some of the most selenium-rich in the British Isles, and far in excess of the levels of selenium found in the US example.

"Indeed, a number of the samples we tested exceeded the far stricter European Union limits, so it is clear that any drilling to extract shale gas in the Bowland Shale area must be carefully managed."

In addition to the UK, the study reveals similarly high levels of selenium existing in equivalent rocks in Ireland. It is well known that shales in Ireland have caused selenium toxicity in livestock, further underlining the importance of the issue.

Despite these concerns, the study also highlights the opportunities that exist as a result of the high levels of selenium found in Bowland Shale.

Professor Parnell explained: "While this is first and foremost an environmental issue, the concentration of selenium and other trace elements in extraction waters could be regarded as an opportunity.

"Selenium is a rare element for which demand is likely to increase, so there is a commercial incentive here which companies will no doubt be mindful of."

Sam Spinks, from the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia's National Science Agency, co-authored the study.

He added: "This study emphasises the importance of research when looking at areas to explore, in order to be fully aware of the potential impacts."

More information: John Parnell et al. Selenium enrichment in Carboniferous Shales, Britain and Ireland: Problem or opportunity for shale gas extraction?, *Applied Geochemistry* (2016). DOI: 10.1016/j.apgeochem.2015.12.008

Provided by University of Aberdeen