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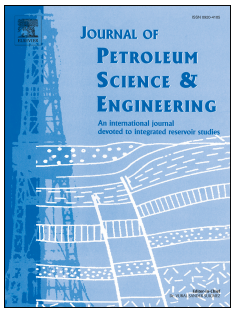

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Account of Hydraulically Fractured Onshore Wells in the UK and Seismicity Associated With These Wells

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Abstract:

The development of shale gas reservoirs through the use of hydraulic fracturing continues to raise debates on the possible environmental effects. Most dominant of this debate is the likely effect of seismic events upon stimulating the reservoirs through hydraulic fracturing.

Hydraulic fracturing remains the most effective technique for production optimisation from tight reservoirs. Although in the UK it has been in use since 1957 in one form or another plans to develop unconventional resource using this technique in the future has been met with stiff opposition especially since hydraulic fracturing operation at Preese Hall 1 conducted by Cuadrilla in 2010 resulted in induced seismic events of magnitude 1.5 and 2.3 on Richter's scale.

The link to hydraulic fracturing and the associated seismic effects, however, are unclear especially in the UK and even in cases where such seismic events are recorded, of what magnitude are they, and their likely effect on people, buildings etc. By reviewing data on over 2000 onshore wells in the United Kingdom, 7.4 % of the total wells were found to have had some technique performed on them that assumed fracturing of the reservoir rock, such as hydraulic fracturing and disposal water injection. This was in reasonable agreement to the figure of 10% reported by the royal society. Reviewing the seismic database of British Geological Society (BGS) at five kilometres radius around locations of identified wells the potential magnitude of seismic events at and around these wells were analysed.

Results show that there was no obvious correlation between the location of the seismic events and the location of the wells known to have been hydraulically fractured. Apart from Preese Hall 1 case post-treatment seismic activity levels ware identical to pre-treatment levels. Only Preese Hall 1 had a seismic activity spike around the date of treatment and location of the well. Also since the seismic recording timeframe was from 1970, majority of the wells identified to have had some form of hydraulic fracturing couldn't be reviewed for possible seismicity as the treatments happened before this recording time frame. Recorded seismic events around these wells were found to be too low to have caused any major effect, the highest occurrence between the ranges of 0.3 M_L – 1.5 M_L.

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