

# Fracking , is it worth the risk?

## Introduction

1. I would like to thank you for allowing this late submission to the APPG on Shale Gas. As a consultant in Occupational medicine I would like to comment on the “cumulative effects” of the hydraulic Fracturing (fracking) industry . I understand this to mean the impact of the industry proliferating into a widespread production phase.
2. My area of professional expertise is in the risk assessment of the impact of work on health and health on work both with respect to employees and any local population impacted upon by industrial activities. I have worked in many environments including the manufacturing industry , public sector, armed forces and police. As part of my training I was seconded to the Health and Safety Executive (HSE) . I was responsible for the Occupational Health and Safety for a large multinational car manufacturing firm which involved all aspects of hazard management including the control of contractors. Therefore I feel I am suitably qualified to comment of the hazard risk profile of the fracking industry .

## Health Impacts of Fracking

3. I do not intend to discuss the extensive publications (> 1000 peer review articles) on the health impacts of fracking which I assume will have submitted by others. However, I would like to refer you to the following publications in which you will find comprehensive reviews and information on the potential health impacts of fracking ;

<https://www.medact.org/project/fracking/>

<http://concernedhealthny.org/compendium/>

<http://www.hpaf.co.uk/bibliography/>

4. I would like to bring to your attention to the issue of silica dust exposure which is an accepted significant occupational hazard in the hydraulic fracturing industry .<sup>12</sup> Clearly with any increase in onshore hydraulic fracturing and silica quarrying there will be a concomitant increase in silica exposure.
5. Silica sand is used in the fracking process and public health experts are increasingly concerned about its impact on those who work in the industry. Recent field studies conducted by the U.S. National Institute for Occupational Safety and Health found that nearly 80 percent of the samples it took at fracking sites showed unsafe levels of airborne silica.<sup>3</sup>

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<sup>1</sup> [http://www.osha.gov/dts/hazardalerts/hydraulic\\_frac\\_hazard\\_alert.html](http://www.osha.gov/dts/hazardalerts/hydraulic_frac_hazard_alert.html)

<sup>2</sup> [https://www.osha.gov/dts/infosheets/silica\\_hydraulicfracturing.html](https://www.osha.gov/dts/infosheets/silica_hydraulicfracturing.html)

<sup>3</sup> <https://www.theguardian.com/science/political-science/2015/jul/15/ground-to-dust-fracking-silicosis-and-the-politics-of-public-health>

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6. Respirable Crystalline Silica can cause fibrosis of the lung or silicosis and is associated with lung cancer . There are Occupational exposure standards and statutory health surveillance is required .<sup>4</sup> As a respirable dust , silica is spread through the air . Clearly if control measures are inadequate this will not only impact on the workforce but also on local communities . In the UK it is likely that such communities will be in close proximity of multiple fracking sites.

### Hazard Risk Analysis

7. In my medical opinion there is **NO** argument that the hydraulic fracturing industry is of an inherently hazardous nature whether that be due to the substances hazardous to health ; volatile organic compounds e.g. benzene or endocrine disrupting agents , physical hazards e.g. noise and vibration, radioactive material e.g. radon, accidents , excessive HGV traffic or respirable dusts e.g. silica .Some of these hazards are classed as carcinogens and as such it is accepted that there is no safe limit:

*“...exposure to asthmagens, carcinogens and mutagens are reduced as low as is reasonably practicable...”<sup>5</sup>*

8. In my view the area of contention is to what extent these hazards will impact either directly or indirectly (through climate change effects) on human health. And of course this means that any harm emanating from such hazards is, in my view, foreseeable and preventable.
9. In their 2014 report , Public Health England (PHE) acknowledges the hazardous nature of the injury but relies on mitigation to reduce the level of risk ;

*“...In conclusion, the currently available evidence indicates that the potential risks to public health from exposure to the emissions associated with shale gas extraction will be low **if** the operations are properly run and regulated. In order to ensure this, regulation needs to be strongly and robustly applied...”<sup>6</sup>*

10. It is important to consider the definitions of hazard and risk , terms which appear to be used interchangeably but in fact are quite different entities. A **hazard** is any source of potential damage, harm or adverse health effects on something or someone e.g. chemicals, noise, Particulate Matter 2.5 (PM2.5).**Risk** is the chance or probability that a person will be harmed or experience an adverse health effect if exposed to a hazard. It may also apply to situations with property or equipment loss, or harmful effects on the environment. This is measured in terms of frequency of exposure to that hazard

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<sup>4</sup> <http://www.hse.gov.uk/pubns/indg463.htm>

<sup>5</sup> <http://www.hse.gov.uk/pubns/books/eh40.htm>

<sup>6</sup> <http://www.hpapf.co.uk/wp-content/uploads/2018/01/public-health-england-2014.pdf>

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(daily, monthly yearly) and the consequences of exposure to the hazard (cancer, chronic lung condition , irritation) .

11. In contrast to the USA and Australia , our island is densely populated therefore it is inevitable that with the proliferation of the fracking industry there will be an increase in the exposure to the inherent hazards to the public with a consequential increase in potential health effects. An interesting recent study from Durham and Newcastle University estimated the risk to groundwater contamination through spillage or leaks from HGV movements in the UK.

*“Rapid growth of hydraulic fracturing for shale gas within the USA and the possibility of shale developments within Europe has created public concern about the risks of spills and leaks associated with the industry. Reports from the Texas Railroad Commission (1999 to 2015) and the Colorado Oil and Gas Commission (2009 to 2015) were used to examine spill rates from oil and gas well pads. Pollution incident records for England and road transport incident data for the UK were examined as an analogue for potential offsite spills associated with transport for a developing shale industry. The Texas and Colorado spill data shows that the spill rate on the well pads has increased over the recorded time period. The most common spill cause was equipment failure. Within Colorado 33% of the spills recorded were found during well pad remediation and random site inspections. Based on data from the Texas Railroad Commission, a UK shale industry developing well pads with 10 lateral wells would likely experience a spill for every 16 well pads developed. The same well pad development scenario is estimated to require at least 2856 tanker movements over two years per well pad. 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 pads developed and a road spill for every 19 well pads developed. Consequently, should a UK shale industry be developed it is important that appropriate mitigation strategies are in place to minimise the risk of spills associated with well pad activities and fluid transportation movements.”<sup>7</sup>*

12. The British Geological Society (BGS) have warned about the overlapping of shale gas licence areas and drinking water aquifers ;

*“New maps of underground Britain released by BGS and the Environment Agency show that almost half the area of England and Wales where major drinking water aquifers are located have shale gas deposits below them.”<sup>8</sup>*

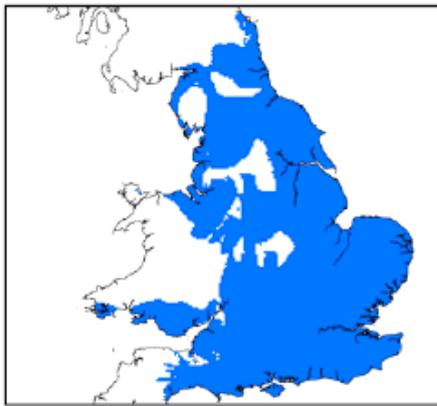
13. Now consider how the cumulative effects of spillages as a result of many fracking sites on the following maps taken from the BGS site. Are you really confident this risk can be managed?

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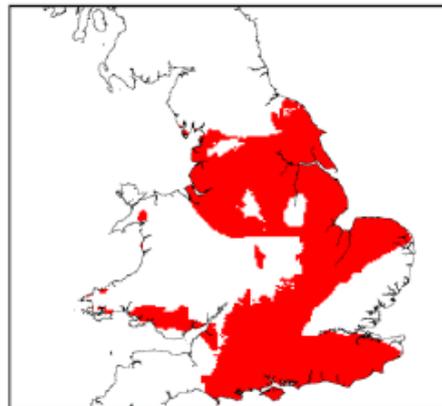
<sup>7</sup> <http://www.hpaf.co.uk/wp-content/uploads/2018/02/The-potential-for-spills-and-leaks-of-contaminated-liquids-from-shale-gas-developments.pdf>

<sup>8</sup> <https://www.theguardian.com/environment/2014/jul/03/uk-complex-geology-challenge-fracking-drinking-water>

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**Aquifer formations**



**Shales**

14. The BGS state that very little is known about the potential contaminant pathways from hydraulically fractured shale to aquifers below 100 m level.<sup>9</sup> In my view this raises the level of uncertainty and potential risk to the drinking water supply especially combined with the spillage risk above. Ask yourself what is your acceptable level of risk with respect to a contamination of our water supply?
15. Hazard risk calculation involves using criteria which are accepted by the occupational health and safety professionals. The calculator takes into account the likelihood of exposure e.g. daily and consequences e.g. multiple fatalities, cancer. I have included two examples here. I would like to request that you consider some of the issues discussed in this group and how you would assess them. Are they an acceptable risk?

Example 1

Likelihood	Consequences				
	Insignificant	Minor	Moderate	Major	Severe
Almost certain	M	H	H	E	E
Likely	M	M	H	H	E
Possible	L	M	M	H	E
Unlikely	L	M	M	M	H
Rare	L	L	M	M	H

<sup>9</sup> <http://www.hpaf.co.uk/wp-content/uploads/2018/05/Shale-GasHydrologyPresentationBGS.pdf>

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## Example 2

How severely could it hurt someone? or How ill could it make someone?	How likely is it to be that bad?			
	Very likely could happen anytime	Likely could happen sometime	Unlikely could happen but very rarely	Very unlikely could happen but probably never will
<b>Kill or cause permanent disability or ill health</b>	1	1	2	3
<b>Long term illness or serious injury</b>	1	2	3	4
<b>Medical attention and several days off work</b>	2	3	4	5
<b>First aid needed</b>	3	4	5	6
	The numbers show you how important it is to do something: 1: top priority: do something immediately 6: low priority: do something when possible			

## Risk Management

16. The Oil and Gas Industry and Government argue that these risks can be mitigated and reduced to an acceptable level through “ **Gold Standard Regulations** “. However what does this phrase mean? I have been unable to find a definition . My own interpretation would be a system of risk management which either eliminates or reduces the risk to a minimum and which is fully resourced , transparent and audited.
17. In my opinion the risk management of the hydraulic fracturing industry will be labour intensive given the number of proposed wells and the inherently hazardous nature of the industry. With respect to occupational health and safety the main enforcer in the UK is the Health and Safety Executive (HSE)
18. Over the last few years the HSE has been subject to a significant reduction both with respect to numbers of safety inspectors and medical resources. The BBC announced that they were (HSE) facing up to a 35% cut in its government , leading to concerns about workplace safety.<sup>10</sup>

*“Figures obtained by Unite, via a Freedom of Information request, reveal that since 2010 there has been a 25 per cent reduction in the number of Health and Safety Executive (HSE) inspectors. In 2010 there were 1,311 frontline inspectors by 31 December 2016 that number had reduced to just 980. ”<sup>11</sup>*

<sup>10</sup> <https://www.bbc.co.uk/news/business-12621073><https://www.bbc.co.uk/news/business-12621073>

<sup>11</sup> <http://www.unitetheunion.org/news/unite-reveal-shock-25-per-cent-cut-in-health-and-safety-inspectors/>

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19. This state of affairs was discussed by the All-Party Parliamentary Group on Occupational Safety and Health

*“is clear that it will not be possible for the HSE to maintain its current level of operations with a cut of 35 per cent in its government grant as charges can only fund regulation and overheads that relate to those charges. The presence of inspectors in the workplace, or the possibility that they may visit, is a major driver for behavioural change by employers.”<sup>12</sup>*

20. I have been unable to find any specific Health and Safety legislation pertaining to the onshore hydraulic fracturing industry. The HSE plan appears to consist of two pages with little detail and a nine page guidance document. All other referenced documents appear to pertain to the offshore oil and gas industry and borehole regulations. None of these documents include any mention of silica or other substances hazardous to health.<sup>131415</sup>

21. The HSE clearly state that they do not have the resource to risk manage any large scale production phase.

*“HSE has sufficient wells expertise to cope with the current exploratory phase of shale gas but would need to reassess the situation if it moved into large scale production.”<sup>16</sup>*

22. Contrary to the mantra of the oil and gas industry being exemplary with respect to safety ,in April this year, the Director of Energy Division at the HSE issued a statement expressing his concerns over “ failings across the board “ causing too many hydrocarbon releases asking them to respond to him with respect to their safety management systems .<sup>17</sup>

23. Therefore I would put to you that a system of “gold standard regulations” does not exist as evidenced by a lack of regulation, lack of guidance, a lack of enforcement officers , on-going serious incidents within the industry and a predilection for self-reporting by the industry .

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<sup>12</sup> [https://www.ucu.org.uk/media/4289/Health-and-safety-and-the-Health-and-Safety-Executive-What-the-spending-cuts-will-mean-Dec-10/pdf/hsecuts\\_allpartygroupreport.pdf](https://www.ucu.org.uk/media/4289/Health-and-safety-and-the-Health-and-Safety-Executive-What-the-spending-cuts-will-mean-Dec-10/pdf/hsecuts_allpartygroupreport.pdf)

<sup>13</sup> <http://www.hse.gov.uk/offshore/unconventional-gas.htm>

<sup>14</sup> <http://www.hse.gov.uk/offshore/shale-gas-planners.pdf>

<sup>15</sup> <http://www.hse.gov.uk/aboutus/strategiesandplans/sector-plans/onshore.pdf>

<sup>16</sup> <http://www.hse.gov.uk/shale-gas/about.htm>

<sup>17</sup> <https://www.ioshmagazine.com/article/failings-across-board-cause-too-many-hydrocarbon-releases-says-hse>

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### Acceptable level of Risk

24. The Government and the Oil and Gas Industry appear to believe that the level of risk can be managed to an acceptable level but ask yourself why is it that all of England's neighbours have banned or have a moratorium in place? Fracking has been banned in several countries in Europe, States in the USA and Australia.
25. Why has it been banned? Since the PHE report on shale gas in 2014, there has been over a 1,000 peer reviewed articles about the health impacts of fracking . As a result of the publication the Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking (Unconventional Gas and Oil Extraction) Fifth Edition in March 2018 ( referenced earlier in this document),New York State banned Fracking and indeed is suing several Oil and Gas companies. However to date PHE and the Government refuse to update and review the PHE report despite calls from the British medical profession.
26. A question, what makes English Regulatory bodies any better than Scotland, Wales, Ireland, France, the Netherlands? Over the past few years the HSE and the Environment Agency resources have been reduced and self -regulation become acceptable.
27. Often in my professional role I am asked about behaviour and particularly with respect to unwanted behaviour e.g. risk taking in the workplace. Generally the answer I give is that often the best predictor of future behaviour is their past behaviour. So I would ask you to consider is giving Cuadrilla ( Fracking company at Preston New Road) a permit to treat water on site then really an example of Gold Standard regulation? When they did not report a damaged well at Preese Hall for 6 months while continuing to frack , has breached its current environmental permit at PNR at least 5 times and has been prosecuted by the HSE for dumping toxic waste into a public water course
28. So ask yourself what is an acceptable level of risk with respect to Fracking ? It would appear that many other countries with robust health and safety legislation have considered that there is an unacceptable risk associated with Fracking. I would like to refer you to the following statement:

*“And, from New York, the Department of Environmental Conservation’s final environmental impact statement and attendant Findings Statement—which, together, implemented New York’s statewide ban—incorporated the earlier health review into a larger analysis of the impacts of fracking. The Findings Statement made clear that no known regulatory framework can adequately mitigate the multiple risks of fracking:*

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*Even with the implementation of an extensive suite of mitigation measures...the significant adverse public health and environmental impacts from allowing high-volume hydraulic fracturing to proceed under any scenario cannot be adequately avoided or minimized to the maximum extent practicable....*<sup>18</sup>

### Conclusion

29. In my medical opinion if there is uncertainty we should err on the side of precaution rather than the balance of probability particularly when we are looking at health conditions such as cancer, chronic lung disease neurodevelopment issues and perhaps even more worrying damage to DNA.

30. My personal and professional view is that there is sufficient evidence to follow a precautionary principle with respect to Fracking;

*“The Wingspread Declaration on the Precautionary Principle counsels that ‘When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not established scientifically.’*<sup>19</sup>

31. I believe there is more than enough scientific evidence to cast a shadow over the safety of this industry. Why is the government taking such a risk of adverse outcomes for a fossil fuel which we do not need or want? I believe the population of England is being ignored and the public health of the nation is being put at risk. So just ask yourself, is it worth risking your health , that of your families and that of the British public?

I would like to thank-you for your attention.

Kind Regards

Dr Barbara Kneale

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14-6-18

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<sup>18</sup> Excerpt from <http://www.hpaf.co.uk/wp-content/uploads/2018/03/PSRfracking-compendium-5.pdf> footnote 333 New York State Department of Environmental Conservation. (2015, June 30). Final supplemental generic environmental impact statement on the oil, gas and solution mining regulatory program: Regulatory program for horizontal drilling and high-volume hydraulic fracturing to develop the Marcellus Shale and other low-permeability gas reservoirs, findings statement. Retrieved from [http://www.dec.ny.gov/docs/materials\\_minerals\\_pdf/findingstatevhf62015.pdf](http://www.dec.ny.gov/docs/materials_minerals_pdf/findingstatevhf62015.pdf)

<sup>19</sup> <http://www.hpaf.co.uk/wp-content/uploads/2018/06/A-review-of-the-public-health-impacts-of-unconventional-natural-gas-development.pdf>