

**The environmental risks of fracking - written evidence
to the Environmental Audit Committee submitted by
FFBRA (Frack Free Balcombe Residents Association)
December 31st, 2014**

Executive summary

- This committee should ask to see an uncensored version of the fracking report by DEFRA, August 2014, in which over 63 segments were blacked out.
- This committee should consider the very relevant evidence now being published in the USA about the harm done by fracking – from distinguished institutions such as the Massachusetts Institute of Technology (MIT) and Princeton University.
- The British government says strong regulation here will make it safe. We do *not* have strong regulation, and monitoring is poor. The government constantly claims that its policies on fracking are sanctioned by the 2012 report on fracking by the Royal Society and Royal Academy of Engineering. In fact that report is full of concerns and caveats. Of its ten important recommendations, nine have *not* been implemented, and there are no plans to implement them.
- The committee should consider the *cumulative effect* of thousands of wells in our very densely inhabited country.
- A network of wells will isolate habitats and block wildlife corridors. It will multiply risks of air and water pollution.
- Only *one well* has so far been fracked in Britain by the modern high-volume, high-pressure method in long lateral wells. Government, regulators and industry often claim 200 previous fracks, but these historic fracks were tiny in comparison, employing low pressure and low volume.
- Britain's geology is highly faulted. Wells or fractures intersecting with natural faults could easily become conduits for leaking gases and liquids.
- Fracking waste is highly contaminated and created in great quantities. How to dispose of it is a worldwide dilemma. The Environment Agency have said (in response to an FOI) that they will not divulge how, by whom and where the waste will be treated, nor how it will be disposed of. Your committee should question the EA on this.
- In December, New York State banned fracking after a long moratorium. Much evidence is now emerging from the USA on the worrying health impacts of fracking. There is growing evidence linking birth defects, cancers, respiratory and dermatological problems to shale gas development.
- Air pollution is as concerning as water pollution. Not just escaped methane - emissions from flares, a variety of toxic chemicals, gases and particulates

would be carried by the wind into communities and environment. Gas wells as well as oil wells use flares.

- Any wells that are drilled will be there for ever. There are no plans for abandonment and long-term monitoring. Nor about who would deal with future problems. It is likely that the taxpayer will pay.
- The powerful and growing evidence of fugitive methane means that shale gas development could gravely undermine worldwide efforts to curb climate change. In our view this makes shale gas a dirty fuel.
- Shale gas and oil are unnecessary new sources of fossil fuels. The world cannot burn even the existing *conventional* fossil fuels and meet carbon targets. Shale gas distracts from development of renewables.
- We, out in the communities, feel our voice is being ignored by politicians from local to national level.
- We believe fracking is a violation of our human rights – to a clean environment, clean water, clean air and rural environment.
- We want a ban, not better regulation. You can make fracking less of an environmental disaster than it has been in the USA. You cannot make it safe.

A) Introducing FFBRA, declaration of interests, reasons for submitting evidence

1. FFBRA is an association of residents of the village of Balcombe in Sussex under the threat of fracking. It includes people of very different political persuasions, across a wide social spectrum. Many of us have given up a very large proportion of our time to this cause over the last three years. We consider ourselves very well informed.
2. We believe we are guinea pigs in a dangerous environmental experiment.
3. The government regularly accuses anti-fracking campaigners of being emotional. This is our land, where we walk, jog, garden, farm, pick blackberries and mushrooms, live peaceful country lives. We happily admit to feeling emotions about these things. But our opposition and arguments are based on hard facts and science.
4. We have seen very biased, pro-industry sets of evidence given to other parliamentary committees (EFRA, Lords) and are keen to flag up certain studies and to alert this committee to a variety of misleading information and techniques they may encounter from industry, and even from regulators and ministers.

B) The Infrastructure Bill

1. It is so important that MPs should understand the environmental and health implications of fracking for their constituents, and vote against the Infrastructure Bill, or at least against the fracking-related clauses.

2. Cutting the fracking-related sections out of the Infrastructure Bill would put a stop to fracking in this country. If the industry is *not* given the freedom to drill beneath us without our consent and deposit ‘any substance’ beneath us, if they are instead required to ask every individual house and landowner’s permission, they will go away, thwarted by expensive and slow procedural and legal difficulties.

3. The Infrastructure Bill proposes that ‘the economic recovery of petroleum’ should be a ‘principal objective’ of our nation. It makes no reference to the vital objective of curbing climate change.

C) DEFRA’s redacted report on fracking

1. A report on the potential impacts of fracking was prepared in March 2014 by DEFRA’s Rural Community Policy Unit and released in August, with 63 items and segments blacked out by Whitehall officials. The title was Shale Gas: Rural Economy Impacts, but some redacted sections specifically concerned environmental issues. The Daily Mail provides detail: <http://www.dailymail.co.uk/news/article-2722407/The-fracking-cover-Defra-censors-key-report-63-times-13-pages-described-comical-campaigners.html>.

2. The only possible conclusion to draw from this censorship is that the government is covering up serious concerns over fracking’s potential impact on environment, farming and rural affairs. We sincerely hope that *this* committee will have access to an uncensored version. We fail to understand how any MP can vote in favour of removing the right of property owners to stop fracking under their land without having seen this report. In mid December the Prime Minister was urged by various MPs to release the full report. He said he would ‘look into it’. It is vital that MPs should see the full report before they vote on the Infrastructure Bill. That means releasing it now.

D) Old and new fracking

1. Industry, regulators and ministers have often claimed that 200 wells have already been fracked in Britain. But only one well has been fracked using the modern high-volume, high-pressure method in long lateral boreholes. We have a DECC email confirming this. According to oil and gas engineer Mike Hill, comparing old and new fracking is like comparing a corner shop to a hypermarket.

E) Database of peer-reviewed studies

1. A ‘near exhaustive and evolving’ database of a very large number of peer-reviewed studies and journal articles on fracking was compiled recently by the American organisation Physicians Scientists & Engineers for Healthy Energy. It is organised into twelve categories, including air quality, water quality, climate, public health and regulations. This committee may find it useful: <http://www.psehealthyenergy.org/site/view/1180>

Our concerns

1. Validity of comparisons with America

(1) The USA first fracked a well using high volume hydraulic fracturing in 1998 in Texas. They have since fracked thousands of wells. It is therefore to the USA that we need to look for a wealth of experience of the environmental risks.

(2) Evidence of harm is only gradually emerging from America. In America, fracking was exempted from the Clean Air and Clean Water Acts in 2005. Operators have agreed to make regular deliveries of water to families whose water has been contaminated provided they, children included, signed away their right to comment – for life. The Environmental Protection Agency (EPA) in Pennsylvania has only recently issued details of over 200 water contamination incidents. Many incidents of pollution have been caused not by the actual fracking (the cracking open of the rock) but by disposal of waste. (Details and links below.) A quick glance at *The List of the Harmed* <http://pennsylvaniaallianceforcleanwaterandair.wordpress.com/the-list/> gives some idea of the extent of environmental damage (as well as medical and harm to farm animals) from effects of operators' procedures as well as accidents.

(3) The now extensive evidence of harm in the USA has been almost entirely ignored by the UK authorities and by ministers who have chosen to rely on bland assurances offered by un-named senior US federal officials, whose claims that that there has been no harm conflict sharply with the experience of farmers, householders, communities and states.

(4) The British government has said it must drill 40 wells and assess the results here in Britain – that means damaging 40 or more sacrificial communities like Balcombe in the south and the entire Fylde in the north, home to nearly a million people. The British government has said all will be different here because of great British regulations and monitoring. We contest this – see below, point 3.

(5) Two key differences between the USA and UK are size and population density. Our green spaces are more limited. A greater number of people will be living and farming closer to fracking wells. Thus potential impacts are more serious for the UK.

2) Wells, industrialisation and cumulative effect

(1) It is important to take into account the cumulative effect of the large numbers of wells that would be needed in order to extract commercial quantities of shale oil and gas. Because shale oil and gas does not flow unless fracked at close quarters, there would be well pads every few miles, each with 4-20 wellheads and many lateral boreholes. Furthermore, production declines much faster than for conventional wells so that new wells must constantly be drilled. Production of fracked wells may drop by between 60 and 70% in the first year alone. With shale it is therefore necessary to drill ever more wells – according to the International Energy Agency, 2,500 new wells per year would have to be drilled in order to maintain production of 1 million barrels per year in the Bakken Shale of North Dakota compared with 60 new wells for the same result in conventional fields in Iraq.

(2) First in line for this industrialisation is the Fylde region of Lancashire, famous for its farming, tourism and coastal wetlands, so important for birdlife. It has been estimated that 3,500 wells would be required in the Fylde, along with pipelines and compressor stations, 70-foot flares, noise, generators, invasive lighting, and polluting, heavy traffic. Habitats will be fragmented, the countryside polluted (see below). Here is a link to a fascinating satellite view of North America, showing the density of wells and the way habitats and wildlife corridors are disrupted: <https://www.youtube.com/watch?v=7jN6TSSPZwU> .

3. Well integrity, monitoring and abandonment

(1) Whenever anyone points to the increasing evidence of environmental harm in America, the British Government rests its case on our stronger regulatory regime. In reality, regulation in major US fracking states is now becoming much stricter than in the UK. Here in Britain, our key safety and environmental regulation (Design and Construction – DCR) was developed for offshore use after the Piper Alpha disaster and is entirely ‘goal-setting’ in approach, with few teeth and little enforcement onshore. It is already inadequate for onshore exploration and extraction, in no way specific to fracking, and is currently being weakened by government to make things easier and quicker for industry. Regulation is weak for production stage, almost non-existent during exploration.

(2) Mike Hill (Chartered Engineer, Nominated Expert to the TWG BREF-MTWR including shale gas for the EU Commission, and contributor to the Royal Society/Royal Academy of Engineering Shale Gas Report) has been speaking out strongly about the inadequacy of regulation of fracking in Britain since 2010: Here us a link to Mike’s website and documents and videos on regulation: <http://www.shalegasoffice.com> .

(3)Mike Hill wrote in a recent issue of *The Lancet* (28th June, 2014): *‘The need for specific regulations coupled with strict enforcement through an independent, competent body is clear. But no such body exists, and no such efficient regulations are forthcoming. The existing regulators are being scrapped - restructured (Offshore Safety Division) or downsized (Environment Agency to lose 15% of its staff within 18 months) - while any new shale regulations are being fiercely opposed by the UK Government. They choose to legislate to make fracking easier for the operators, but fail to make it safer for the public.’*

(4) Mike Hill explains how the industry is allowed by the regulators to self-monitor. We in Balcombe experienced this: the Health and Safety Executive never visited during the drilling of our well, never held the meetings they should have had with the Environment Agency. We have FOI proof of this. The Environment Agency never visited unannounced. The HSE relied on Cuadrilla’s a fax giving data and reassurances at the end of each week. In Lancashire, the HSE admitted in an FOI that they did not once inspect any of the four wells drilled there for well integrity. ‘You must inspect *whilst wells are under construction*,’ says Hill. This is backed up by John Bisset, discipline leader, well construction at Robert Gordon University, Aberdeen. The HSE failed to do so.

(5) Here is Friends of the Earth's criticism of the regulations surrounding shale gas and oil: <http://www.foe.co.uk/sites/default/files/downloads/executive-summary-all-glitters-critique-fracking-regulation-46661.pdf> .

(6) The one well so far fracked in Britain using the contested high-volume, high pressure, slick water method – Preese Hall 1 in Lancashire - has suffered two failures. The well casing was severely damaged over a considerable interval during the famous earthquakes of 2011. Then at some point between 2nd April, 2011 and 28th March, 2014, the well integrity failed. We know this from an FOI detailing '*an annular pressure of 300 psi between the production tubing and the 9 5/8" casing string (Intermediate)*'. This was almost certainly because of poor cementing during well construction. But no 'cement bond logs' were carried out – checks and monitoring of effective cementing. Because no one was then monitoring the surrounding environment, no one can prove whether the well leaked gas or liquids. The hole has apparently been patched up. In April 2015, this well will be officially abandoned, and nobody's business, unmonitored either by Cuadrilla or by the EA. Such wells were the subject of a recent study by Princeton in the US. The results are startling in terms of how many wells became 'emitters' and 'super emitters' of gases including methane and radon.

4. Air pollution

(1) Fracking operations will involve gas flaring, whether the target is oil or gas. Here in Balcombe we shall have a flare during the impending test-flow. The prevailing wind will blow emissions directly into the village. The Research Journal of Environmental and Earth Sciences 4(5): 525-528, 2012 states: '*Gas flares have harmful effects on the health and livelihood of the communities in their vicinity, as they release a variety of poisonous chemicals. Some of the combustion by-products include nitrogen dioxides, sulphur dioxide, volatile organic compounds like benzene, toluene, xylene and hydrogen sulfide, as well as carcinogens like benzo(a)pyrene and dioxins. Humans exposed to such substances can suffer from variety of serious ill-health effects.*' You can extrapolate the effects on fauna and other environment. (Oh, and they forgot to mention radon gas.) Oil wells produce heavier and more toxic emissions than gas wells – Balcombe and the Weald have oil. Heavy goods vehicle traffic and diesel generator emissions will also affect local air quality.

(2) There is no plan to monitor most of these airborne pollutants. Current emphasis (at parliamentary meetings we have attended) is on methane. Consider the cumulative effect of many wells.

5. Water use

(1) Vast quantities of water will be used in fracking, typically 22 million litres per well. Multiple lateral wells will be drilled on a multitude of well pads. Compare this to the vast amounts of water used on a golf course, the industry says. But the vital difference is that water sprayed on a golf course evaporates back into the water cycle. No one the world over has a viable clue as to how to deal with returned frack fluid. If not illegally disposed of onto land or into water courses, this highly toxic soup is generally 're-injected' down spent wells, lost forever to the water cycle. (More below on toxic waste.)

6. Britain's geology is too highly faulted for fracking to be safe

(1) The committee should read the work of David Smythe, former Chair of Geophysics, Department of Geology & Applied Geology, University of Glasgow: <http://www.davidmysmythe.org/fracking/fracking.htm>. He points out the much more highly faulted nature of the geology of Britain compared to the USA, and the danger these natural faults represent in a fracking scenario: *'A leaky fault is a fast-track back to shallow groundwater and to the surface for methane and other gases, as well as (perhaps) for the contamination of water resources by fracking chemicals. Juxtaposed against this, the question of earthquake triggering is but a sideshow. In France fracking has been banned partly because of this risk, which was pointed out in 2011 by geologists from the University of Montpellier.'*

7. Water contamination via the well

(1) But the most common route for contamination is probably via the well bore itself. In June, 2014, a team from Cornell University published the findings of a major study into well integrity of more than 41,000 wells in Pennsylvania in the journal *'Proceedings of the National Academy of Sciences'*: *'About 40 percent of the oil and gas wells in parts of the Marcellus shale region will probably be leaking methane into the groundwater or into the atmosphere,'* according to the report. Pennsylvania Department of Environmental Protection inspection records showed compromised cement and/or casing integrity in more than six per cent of the active gas wells drilled in the Marcellus region of Pennsylvania. This study shows up to a 2.7-fold higher risk for unconventional wells – relative to conventional wells – drilled since 2009 in the northeastern region of the Marcellus in Pennsylvania. This brief article on the study <http://www.news.cornell.edu/stories/2014/06/four-10-wells-forecast-fail-northeastern-pa> explains how well casing problems can occur. Well casing problems continue to develop over time. This is the case also in conventional drilling, but more so in a fracked well, which is subject to greater stresses.

(2) Wells once drilled will be there for ever. The Labour party has raised questions recently in the context of the Infrastructure Bill about monitoring wells after abandonment, about bonds to cover costs, and for how long they should be monitored for leakage. Labour amendments in the Lords had to be withdrawn. Many fracking companies are small, with limited assets. It seems likely that the costs of future problems will fall to the taxpayer. Money put aside in Britain under the bond system for restoration of opencast mining sites has proved to fall far short of what is required. And no bond of any size would be enough to repair irreversible damage to aquifers.

8. Waste treatment and disposal, and consequent earthquakes?

(1) The huge amount of waste produced is one of the main environmental hazards of fracking. Depending on the site, between 30 and 70 per cent of the original volume of frack fluid can be expected to return to the surface. The waste water that flows back from a fracked well contains not only the chemicals (lubricants, biocides etc) that were in the original frack fluid but also substances flushed out from deep underground. Fracking flowback fluid typically contains NORMs (naturally occurring radioactive materials) and heavy metals (lead, arsenic, cadmium...), and is many times more saline than seawater.

(2) This committee might ask the Environment Agency how they propose treating and disposing of all this hazardous waste. The EA will probably reassure you they have it in hand, or *will* have it in hand by the time volumes are significant. But fracking waste disposal remains a quandary the world over. It has been suggested in the UK that flowback fluid may be treated on site and re-used. If that is the case, flowback treatment will constitute a further environmental hazard on well pads. At some point it still has to be disposed of. Existing waste and water treatment plants are not equipped to deal with this kind of waste. We have heard suggestions that the flowback fluid would be partially treated and then diluted with human sewage until radioactivity falls below legal limits, and then it will be sent out to sea.

(3) But treatment is expensive. The American solution has been to ‘re-inject’ the waste water down spent wells. This article from the Center for Biological Diversity tells of the contamination of Californian aquifers by both illegal and legal re-injection of frack fluids:

http://www.biologicaldiversity.org/news/press_releases/2014/fracking-10-06-2014.html : *‘California has an estimated 2,583 wastewater injection wells, of which 1,552 are currently active. Wastewater injection wells are located throughout the state, from the Chico area in Northern California to Los Angeles in the south, and even include offshore wells near Santa Barbara... Benzene, toluene and other harmful chemicals used in fracking fluid are routinely found in flowback water coming out of oil wells in California, often at levels hundreds of times higher than what is considered safe, and this flowback fluid is sent to wastewater disposal wells. Underground migration of chemicals like benzene can take years.’*

(4) One of the fracking-related provisions of the Infrastructure bill is to allow ‘any substance’ to be injected into and left in the lateral wells that this government wants drilled under our property. In the North Yorks National Park planning permission is pending for an injection well. These injection wells will be liquid time-bombs.

(5) In some American states such as Kansas with almost no history of earthquakes, thousands of earthquakes have been linked to underground disposal of fracking fluid. These are sometimes of serious strength – 5 or more on the Richter scale, compared to the smaller earthquakes that can result from fracking itself. A recent article in the *Los Angeles Times* cites studies and discusses the plethora of strong earthquakes in Oklahoma where oil and gas companies have been re-injecting fracking flowback fluid down wells:

<http://www.latimes.com/nation/la-na-oklahoma-earthquakes-20140618-story.html#page=1> . According to Danielle Sumy, lead researcher of a study into the Oklahoma earthquakes published in the March 2014 edition of the *Journal of Geophysical Research*: *‘The heavily drilled ground was like a sponge that could hold injected water - to a point. You reach a critical threshold where the system can no longer support that much water being injected into the subsurface. The wastewater increases the pressure in the pores, which is sometimes released through an earthquake.’*

9. Silica sand – a valuable and finite natural resource

(1) The sand used in fracking as a proppant - to prop open the new fractures - has to be the hard, pure, spherical-grained, best quality silica sand. Until the mid 1990s, planning authorities were advised to protect silica sand carefully as it is a finite resource and has many uses, for example in foundry work. Planners were told they should not allow building on it, and should encourage recycling. Now they are to be encouraged to sanction shooting it down wells, to be lost for ever.

(2) Cuadrilla, who hold the exploratory licence for Lancashire, have hauled their sand from the Congleton area in Cheshire – one of the few very good sources in the UK. Cuadrilla spokesmen say they will continue to do so. The Congleton-Chelford deposit is the largest and most valuable in the UK (ground up by glaciers from the local Triassic desert sandstones and redeposited by meltwater). For the small, earthquake-inducing test fracks on the well at Preese Hall, 463 tonnes of silica sand were used (information via Eric Ollerenshaw MP January 2012). In the USA, fracking a mile-long lateral uses about 5,000 tonnes. Sand is very big business in the USA. If the anticipated thousands of wells are drilled in the North West of England, then vast areas of Cheshire will be lost, hauled along our roads to dispersed rural sites.

(3) Not just any sand will do - in Poland, for example, the sand used in test fracks proved insufficiently hard to keep shale fractures open. In some parts of the USA specially made ceramic pellets are used instead of silica sand, but this is costly. This article by the Wisconsin League of Conservation Voters tells of the environmental damage done in the state by silica sand extraction, hugely expanded in recent years to meet the needs of the fracking industry: <http://conservationvoters.org/issues/frac-sand-mining/> The mining, they say, *'endangers productive soils needed for agriculture, damages surface waters, draws down groundwater reserves, exposes families to toxic chemicals, and exposes communities to airborne particulate matter that is damaging to lungs.'*

(4) Haulage of these large quantities of silica sand adds to fracking-related heavy goods traffic and diesel emissions. The sand is also a health hazard for workers on site.

10. Habitats and biodiversity

(1) Well pads are usually kept below 1 hectare so that, at exploration stage at least, no Environmental Impact Assessment is required. By the time a site scales up to extraction proportions and an EIA *is* required, the pad will already have had an impact on local wildlife – the baseline will have changed.

(2) In March 2014, a report was published by major British wildlife groups (Royal Society for the Protection of Birds, the Angling Trust and four other conservation bodies) on the affects of unconventional oil and gas exploration on wildlife and the environment. It warns that blowouts and equipment failures can lead to the contamination of ground water and surface water. The report says that in America, surface spillage of wastewaters has exposed ground and surface water to toxic chemicals, NORMs (radioactive substances), diesel, metals, and high salinity. It argues that even if strict regulation cuts the probability of serious spillages, any

spills that do occur will pose ‘*very high impact risk to surface and groundwater*’, and thus to wildlife.

(3) Apart from the air and water pollution risk, local fauna will be disturbed by light pollution (site lighting, flare) and noise. In Balcombe we had to buy our own sound testing equipment to make the authorities take note of our complaints.

10. Health impacts, human and animal, as a result of fracking

(1) Our health depends on our environment being safe. It would appear that the British government prefers to wait and evaluate the health impacts of our home-grown fracking industry rather than heeding reports and concerns now emerging from America. Communities near oil and gas wells do not want to be guinea pigs in an experiment that could lead to birth defects, cancers, respiratory and dermatological problems. The 2013 Public Health England report on fracking came out before the publication of much of the American evidence on the effects of fracking. Even on the existing evidence at the time, we considered the PHE report to be inadequate. Here is Balcombe’s (FFBRA’s) response to the PHE report: <http://www.frackfreebalcombe.co.uk/page21.php>. PHE made unfounded claims that the regulatory regime in the UK would mitigate the recognised health effects from shale emissions. In Balcombe no emissions limits from flaring have been imposed on Cuadrilla by the Environment Agency for the flow-testing. Cuadrilla is simply required to self-monitor, with one monthly spot test. There is no requirement on Cuadrilla to monitor atmospheric polycyclic aromatic hydrocarbons (PAHs), particulate matter or radon emissions from flaring.

(2) Here is a link to a letter by oil and gas engineer Mike Hill to *The Lancet*, detailing research so far and the health risks of fracking: <http://www.thelancet.com/journals/lancet/article/PIIS0140-6736%2814%2960888-6/fulltext?rss=yes> . See also some useful links to studies and reports in the ‘Reference’ section at the end of his letter.

(3) In December 2014, New York State decided to ban fracking partly on public health grounds.

(a) Here is an important link to the New York State Department of Health report explaining their reasons:

http://www.health.ny.gov/press/reports/docs/high_volume_hydraulic_fracturing.pdf .

(b) And here is a letter to president Obama in February 2014 by ‘more than 1,000 health professionals nationwide’, urging him to apply standard water and atmospheric protection legislation to fracking, and ban fracking in sensitive areas: <http://environmentamericacenter.org/sites/environment/files/resources/Compiled%20HP%20Letters%20to%20President%20Obama.2.20.14.pdf>

11. Terminology and permission creep

(1) This committee sets out to consider ‘fracking’.

(2) You should be aware that the industry and regulators will use the word ‘fracking’ selectively when giving evidence – using it to relate only to the actual rock fracturing operation. This rock-fracturing moment has its dangers (including

the possibility of earthquakes, although fracture-moment earthquakes are way down our list of concerns). However, the *whole process* is a threat to the environment - from drilling to waste disposal and well abandonment and beyond - a greater danger, perhaps, than the actual fracking operations.

(3) In initial planning applications, operators often deny that they intend to frack. They are, they say, simply exploring for conventional, free-flowing oil and gas. It's easier that way to get planning permission (planners are not allowed to take the likelihood of future applications into account). With no fracking officially in the offing, operators hope to soothe local communities and make it all a non-story for the media. The operators drill, take samples, find no conventional oil or gas after all, but report enthusiastically to shareholders that they have after all found oil or gas in the shale below. This happened recently, for example, at Horse Hill in Surrey. Once the ground is sullied by an experimental pad, once an operator has spent millions on exploration, it is harder for a council to refuse planning permission at the next stage, which *will* include fracking. That is what we mean by permission creep.

12. Planning and permitting - local decisions overturned, councils influenced?

(1) West Sussex County Council planning committee was given training on handling oil and gas applications. Trainers included industry people and regulators. (I have to clarify here that following three years of contact with the regulators and numerous FOI requests, we at FFBRA do not trust the DECC, the EA or the HSE, and we consider most of the people we have dealt with in these organisations to be on the side of the industry). The planning committee was taken to visit a *conventional* Sussex well far from human habitation (Singleton) and told that it had never posed any problems. They were not told about the well integrity failure experienced there. They seemed unconcerned about the effects of flares on the environment. In any case, a conventional, free-flowing well is a totally different beast from a high-volume, high pressure, slick water, hydraulically-fractured shale well.

(3) We are concerned that local planning *refusals* will be overturned by central government. This has already happened in Borras, near Wrexham, North Wales. We feel our voice is being disregarded by politicians from local to national level.

13. Implications for carbon emissions reduction targets.

(1) According to American biologist and science writer Sandra Steingraber: 'Fracking is the deadly enabler that keeps the fossil fuel party going way beyond the time of its curfew.' We do not need a further source of fossil fuel, especially one that is difficult, invasive and energy-intensive to extract, and bad for the environment and public health. We cannot afford to burn even the remaining conventional fossil fuels. What's more, this government's obsession with gas means less subsidy and less effort behind renewables.

(2) In any case, the time scale for fracking the UK simply makes no sense if we are to tackle climate change. Even with government and regulators on their side, the industry cannot develop significant production until well into the next decade. By that time we are committed to be seriously on our way to a renewable future. That extra gas would require infrastructure – pipelines, compressor stations, new

power stations, access roads. Investment in that infrastructure would demand 40 years' use. We cannot afford to be tied in to 40+ years of heavy gas use.

(3) And then there is fugitive methane. The industry stresses that, for the same amount of energy, burning natural gas creates half the CO₂ generated by burning coal. Let's set aside the fact that gas is unlikely to *replace* coal, at least from a world's-eye view (US coal was shipped to Germany and elsewhere with US gas in glut.) The big climate negative with shale gas is fugitive methane – gas escaping right along the process from drilling to end use, through wells, valves, pipes etc. Methane is hugely more potent and damaging in global warming terms than CO₂ – 85 times worse in the time frame in which we need to tackle global warming.

(4) Apart from one industry-funded Texan study, the science now emerging from the USA shows that fugitive methane makes fracked gas yet another bridge to global warming, and rather worse than coal. Researchers at Cornell University calculated that the loss (through leakage at various stages) of anything more than 3.4 per cent of the shale gas (methane) being produced would take its total greenhouse gas emissions above those of coal.

(5) For some time, the shale gas industry in the USA relied on an industry-funded study claiming that one per cent or less of shale gas was lost through fugitive methane emissions. Yet there is evidence suggesting that the leakage in some areas is anything from four to ten per cent of overall production.

(6) A study was published in the Proceedings of the National Academy of Sciences in November 2013. Scot Miller and 14 other scientists from Harvard and other top US universities, and a prestigious national body, the National Oceanic and Atmospheric Administration, revealed that above some wells in the drilling phase they had measured emissions between 100 and 1,000 times higher than industry estimates would have predicted. The study involved actual measurements in the atmosphere from aircraft and high structures.

(7) The British government has yet to offer anything resembling a convincing answer to the build-up of evidence of sky high methane emissions in America linked to fracking and oil and gas wells. Both the DECC and the Environment Agency have claimed that in Britain there will be much tighter environmental regulation to cut greenhouse gas leaks. But neither regulators nor Whitehall officials have offered convincing evidence as to how they will achieve this.

14. Human rights

(1) At the end of 2014, a report was published by the Bianca Jagger Human Rights Foundation, written by a small group of legal scholars: '[A human rights assessment of hydraulic fracturing and other unconventional gas development in the United Kingdom](#)'. It concludes that the UK Government has a duty to investigate the human rights implications of fracking before authorising any exploratory or extractive fracking. The human rights identified by the report as being under threat from fracking include the rights to life and to security of person, to water and to health, to respect for home and private life and to public participation in decision making processes for environmental matters, as well as the rights of future generations.

(2) For Anna Greer, one of the report authors and Director of the Global Network for the Study of Human Rights and the Environment (GNHRE): *'The report raises a very important question: when the economic case for fracking is in serious doubt, when the best climate science argues that fossil fuels should stay in the ground, when the effects of chemical spills into water courses and other human rights impacts are potentially so catastrophic (and in some cases irreversible), precisely why are the UK government in such a rush to dash ahead? It is not as if there are no alternatives on offer. Renewables increasingly offer relatively safe, clean and increasingly market-friendly alternatives. What rationale (or relationships) really explain the present, myopic focus on short-term profit and short-term energy 'fixes' offering little, promising much, and quite evidently deeply unpopular with ordinary members of the public?'* (*The Ecologist*. October 30th, 2014)

15. Necessary safeguards

(1) Here is American biologist Sandra Steingraber's take on regulation and safeguards, and (at the end) the reasons she gives as to why fracking should be banned: <http://www.yesmagazine.org/planet/pro-fracking-greens-called-out-in-sandra-steingraber-s-new-manifesto>. The experience of the members of FFBRA and their research over the last three years leads us to believe that while you can make fracking safer, you can never make it safe.