

**Written answers to questions put forward from Councillor Paul Andrews,
Ryedale District Council**

1. *Fracking has been banned in a number of countries and states, including France, Germany, Holland and New York City. As far as I know, none of these countries or states was at the time led by any politician notable for having thorough-going environmental or left wing views. Fracking was banned in France by Sarkozy and not by Hollande. The question arises: if these countries thought it in the public interest to ban fracking, why should the UK be any less concerned than them?*

Many of the concerns around hydraulic fracturing cite environmental damage in the United States, where the concept of high volume hydraulic fracturing was initiated and developed. It is important to note that the regulatory system in the US is vastly different to that of the UK. Our regulatory regime, set out in the regulatory roadmap, oversees the whole oil and gas extraction process including by hydraulic fracturing, which sets out licensing, environmental permits, working practices, and well integrity requirements.

Regulatory roadmap: <https://www.gov.uk/government/publications/regulatory-roadmap-onshore-oil-and-gas-exploration-in-the-uk-regulation-and-best-practice>

In June 2012 the Royal Academy of Engineering/Royal Society independent review of the scientific and engineering evidence on risks associated with UK shale gas development concluded: "the risks can be managed effectively in the UK, if operational best practices are implemented and enforced through regulation."

Public Health England assessed the risk to human health of extracting shale gas in their June 2014 report. They evaluated available evidence on issues including air quality, radon gas, naturally occurring radioactive materials, water contamination and waste water.

Public Health England's review concluded that "... the potential risks to public health from exposure to emissions associated with shale gas extraction will be low if operations are properly run and regulated".

Where potential risks have been identified in the literature, the reported problems are typically a result of operational failure and a poor regulatory environment. Therefore good on-site management and appropriate regulation of all aspects from exploratory drilling, gas capture and the use and storage of fracking fluid is essential to minimise the risk to the environment and public health.

Independent expert regulators examine companies' proposals and will not allow high risk operations. You can find these reports at the links below:

Royal Society and Royal Academy of Engineering:

<https://www.gov.uk/government/publications/shale-gas-extraction-in-the-uk-review-of-fracking>

Public Health England: <https://www.gov.uk/government/publications/shale-gas-extraction-review-of-the-potential-public-health-impacts-of-exposures-to-chemical-and-radioactive-pollutants>

We have been successfully regulating for gas and oil drilling for over 50 years and have tough regulations in place to ensure on-site safety, prevent water contamination, mitigate seismic activity and air pollution.

- 2. At the DECC meeting, the DECC officials all agreed that fracking for coal gas in Australia and fracking for shale gas in the USA had been environmental disasters. Yet, we were re-assured that what happened in the USA and Australia cannot happen in the UK, because the UK will be much better at regulating the fracking industry.*

At the DECC meeting on 16 December, officials noted that the Department recognises there are legitimate concerns about environmental and safety risks, often drawn from experience in the US, and we need to explain how regulation will safeguard the environment and the public. However, that does not equate to saying these were environmental disasters.

The DECC official also noted that there was an expanding Coal Seam Gas (CSG) industry in Australia, but this is a very different industry to shale gas.

- 3. There are concerns about regulation in the UK, because it is understood that regulation will be largely by the gas extraction companies themselves and the UK government is not going to significantly increase its HSE inspectorate in regard to mineral extraction. Indeed the Environment Agency has had its budget cut by 40% and DEFRA have closed 600 air monitoring stations to cut costs. So, how will the government be able to police the fracking industry if these organisations are being cut back to the bone?*

The HSE and the EA have confirmed they have sufficient specialist inspectors to deliver the regulatory regime they are responsible for during the current shale gas exploratory phase.

If a large number of wells are drilled in order to produce shale gas (the production phase) HSE and EA may need to increase resource accordingly. There are plans in place to review their resource at the relevant times.

Government (including devolved governments) funds the work of the environmental regulators up to the point at which a company applies for a permit. The permit charge the operator pays is designed to cover the cost of permitting a facility.

There is no risk of production increasing too quickly for regulators to keep pace, as happened in some cases in the US. Before activities can begin the operator will need

to have received the relevant permits from the regulators, so any excess applications would be held until the regulator was able to take a decision.

The HSE can recover its costs from operators for assessment activities.

DECC already recovers costs from operators for offshore environmental regulation. It is developing plans for cost recovery from onshore operators for consenting drilling.

4. *There is an international treaty which is either in full force and effect now, or its completion is imminent. This is called the "Transatlantic Trade and Investment Partnership." It has been or is being negotiated between the EU and the USA. What I understand this says is that, if any state within the EU or USA has regulations which are more stringent than the regulations in another state, any company affected by the regulations will be able to sue the government of the state with the more stringent regulations, and obtain compensation. Any dispute will not be referred to a court of law, but be settled by a committee which will sit in New York. I believe this means that, as far as fracking is concerned, the treaty will not prevent states from banning it, but that if fracking is not banned, then the UK cannot impose any more stringent regulations than those which currently apply in the USA. We need to know, therefore:*

- *What stage has the TTIP reached – is it a done deal yet, and does it bind the UK?*
- *Does the TTIP (or draft TTIP – if not yet implemented) prevent a member state from banning fracking altogether?*
- *Does the TTIP (or draft TTIP – if not yet implemented) prevent the UK from imposing more stringent regulations on fracking than those which apply to USA?*
- *When reference is made to "industry standards" or "industry approved fluids" are these the standards etc. which are or will be applicable under the Transatlantic Trade and Investment Partnership – ie. The minimum standards etc. which apply in the USA?*

We recognise that people have concerns that TTIP will lower standards, and we should be clear that this will not be the case.

The Transatlantic Trade and Investment Partnership (TTIP) is a significant economic and geo-political opportunity for the UK and EU. It could add up to £10 billion annually to the UK economy, and will demonstrate continued EU and US commitment to trade liberalisation based on fair rules and regulations;

There have now been seven rounds of TTIP negotiations. The next round of talks are scheduled to take place in Brussels during the week of 2 February 2015. There is no deadline by which TTIP negotiations must be completed.

There is widespread support for TTIP across the EU, not just from traditional supporters of free trade such as Sweden and the UK, but also from countries as diverse as Spain, Italy and Poland.

Environmental protection is an important part of the underpinning to the EU's approach to TTIP. The EU and US are discussing a Trade and Sustainable Development chapter on the environment and labour. The UK supports the inclusion of this chapter as part of its commitment to sustainable development. The Commission has released two position papers on Trade and Sustainable Development in TTIP. Both papers are publically available and outline the EU's position on environmental issues within the TTIP discussions.

Key areas of the EU position include:

- Safeguarding the environment and maintaining the right to regulate. Throughout the negotiations, the EU has been clear that there will be no compromise on environmental protection. For example, trade and investment will not be facilitated by lowering environmental laws, nor will TTIP affect the right of the EU, or the US, to regulate in order to achieve environmental objectives. Both parties have enshrined these principles in previous bilateral free trade agreements, TTIP will be no different.
 - Promoting further cooperation on environmental commitments and improving the role of trade in sustainable development. The objective for the TTIP negotiations is to identify how the EU and US can improve the cooperation and coordination on their environmental objectives. This does not mean that the negotiators are seeking to harmonise their two systems. The aim is not only to reaffirm existing commitments but to explore the opportunities for trade in sustainable development.
5. *In some states in Australia, the oil and gas companies have the right to enter any land and set up rigs to exploit underground gas or oil. The landowners have no power to stop them, and this has caused farmland and other land to become almost worthless. For the video, please follow this link and click on the video: <http://www.ryedale.co.uk/ryedale/fracking.html> . It is understood that the UK government is currently pressing ahead with an "infrastructure" bill to give oil and gas companies similar powers to what they have in Australia – subject only to planning consent. Is this correct? If this is not correct, how does the bill currently before parliament affect property rights?*

In the US, generally, the oil and gas is owned by the landowner or whoever owns that mineral right. In the UK, the Petroleum Act 1998 vests all rights to the nation's petroleum resources in the Crown, but the government can grant licences that confer exclusive rights to 'search and bore for and get' petroleum.

The tabling of amendments to the Infrastructure Bill is to provide for a statutory access for petroleum and geothermal companies to use deep-level land.

If a company enters any land without being entitled to do so that will amount to a trespass. That situation will remain unchanged and companies will still require the landowner's permission for access at the surface.

6. *In the USA there have been many instances of well failure due to fracturing of the pipe or concrete casing. Frack free Ryedale say that in the USA 5% of wells fail in the first year of operation, 25% will leak within five years and 50% leak within 15 years, and that eventually all wells fail, allowing contaminated water to escape into the water supply. Is this correct?*

DECC have not seen the analysis behind the statistics provided, although well integrity is a key issue.

A recent US study analysing the gas content in 130 water wells in Pennsylvania and Texas found that contamination of water wells by upward migration of natural gas due to hydraulic fracturing or horizontal drilling could be ruled out. Instead, methane found in the water wells could be linked to failures in the casing or lining of the gas wells. The importance of rigorous well design criteria was also highlighted by a report¹ published in March 2014 by the ReFINE research consortium.

The ReFINE report looked at the 2152 hydrocarbon wells drilled onshore in the UK between 1902 and 2013. Of the 143 active UK wells producing at the end of 2000, the report noted that evidence of well integrity failure has been found in only one case.

Consequently, if a well is designed, built and constructed properly, there is negligible risk of water contamination of actual or potential water supplies.

As previously mentioned, the US and UK have different regulatory regimes.

The UK has a robust regulatory regime in place to ensure shale gas operators are managing and controlling health, safety, and environmental risks. This includes a coordinated approach between the Health and Safety Executive (HSE) and the Environment Agency (EA) set out in a memorandum of understanding. Maintaining well integrity is central to this approach.

The operator is responsible for ensuring the safety of the well and the site. The HSE scrutinises the working practices adopted by operators for conformity with the requirements of the Health and Safety at Work etc. Act 1974, and regulations made under the Act.

¹ Oil and gas wells and their integrity: Implications for shale and unconventional resource exploitation, Marine and Petroleum Geology, March 2014. <https://www.dur.ac.uk/resources/refine/Publishedversion.pdf>

The HSE has confirmed that "the HSE is also committed to inspect jointly with the Environment Agency all shale gas sites during the current exploratory phase of shale gas development." HSE inspectors can visit any site at any time if there is a matter of concern. They will publish information, for each visit to a shale site, on the assessments that they do.

We take the safety of wells very seriously and will look to learn from the ReFINE report and international practices. We welcome greater transparency including the UK shale gas and oil industry's commitment to make monitoring data available for all new wells.

The key aim of the procedure for decommissioning a well is to ensure that the well will require no further work and ensure that it is permanently sealed.

This is done by inserting cement plugs to seal the well, cutting off the casing at a suitable depth and fitting a steel cap, in compliance with HSE regulations and Oil & Gas UK guidelines. These plugs run for hundreds of meters. To comply with industry standards there must be at least two plugs in the well and each permeable rock strata must have a plug above it. HSE check that the well is decommissioned and abandoned to the relevant standard.

When operations finish, the operator is responsible for safe decommissioning of the well and for restoring the site to its previous state or a suitable condition for re-use.

The relevant planning authority may require suitable restoration of the site as a condition of the planning permission. The Environment Agency require that a site condition report is submitted by the operator as part of its Environmental Permitting regime that demonstrates that the site is in a satisfactory state when they surrender their environmental permit.

7. Whenever the question is asked: what was the reason for well failure in the USA, the answer always seems to be: "We don't know." It is understood the reason for the absence of knowledge is that in the USA oil and gas companies are not required to make available to the public information which would be required anywhere else in the developed world. The result is that nobody really seems to know or understand what the real risks of fracking in shale are. The USA is a vast open country with generally a sparse population density. Is it really a good idea to allow what has failed in the USA to take place in the densely populated UK, before we fully understand the risks encountered in the USA and the lessons which have been learnt or should have been learnt there?

The Government agrees that there are many lessons to learn from US experience, although allowance has to be made for the many differences in regulatory practice and requirements between the UK and the US, and between different States within the US. We have already benefited from many valuable reports from the US, including from the Secretary of Energy's Advisory Board and the National Academy

of Sciences. DECC officials have also visited Washington, Houston and Pennsylvania to learn at first hand from regulators, industry and other interest groups.

Well failure may be the result of numerous factors, for example from inappropriate design of the well, selection of cement or casing or drilling technique. Where failure has been observed, the reasons will vary from site to site – there is no one answer.

While the UK will benefit from the fact that the drilling and fracturing techniques used in the US are generally transferable to the UK, there is a very different regulatory environment in the UK.

DECC are not in a position to comment on disclosure requirements in the US. However the UK has a different regulatory regime to the US. Appropriate well design is the key to ensuring well integrity. In the UK, there is a legal requirement for the well operator to appoint an independent well examiner for the complete lifecycle of the well. HSE will be informed of the identity of the independent well examiner as part of the well notification process.

This role is in place to give assurance to the operator company that the well is being designed, constructed, operated and abandoned in accordance with the industry and the operators own standards and that relevant regulations are complied with.

Any unplanned release of fluids from a well or unplanned release of blowout prevention equipment is reportable to HSE. And so the reasons for any well failure in Britain will be investigated and well understood.

8. *How far are the points made and the facts stated in the attached document: "How would fracking affect your land?" correct? Please supply answers to all issues in this document which are not covered in this note.*

Most of the issues raised in the "How would fracking affect your land?" document have been provided in this response. For other issues, please visit the following website to access documents prepared by DECC:

<https://www.gov.uk/government/publications/about-shale-gas-and-hydraulic-fracturing-fracking>

9. *Considerable concern has been voiced about the chemicals used in the fracking process and the disposal of waste. At the DECC meeting I asked if it was possible to do fracking without using hazardous chemicals. The answer given by the HSE representative was that his department would ensure that the chemicals used would be limited to those on an agreed list. He added that this list was not one agreed by the HSE, but it would be an "industry approved" list. He said he would provide a copy of the current list. A number of questions follow this:*

- *What are the chemicals on the current industry approved list?*

In the UK, unlike the USA, operators are required to disclose fully the composition of fracturing fluid additives as part of their application for environmental permits. In England, for example, the Environment Agency (EA) requires operators to disclose the chemicals they propose to use and the maximum concentration of each one, which enables the EA to consider any potential environmental risks.

The Environment Agency (EA) assesses the hazards presented by fracturing fluid additives on a case-by-case basis and will not allow substances hazardous to groundwater to be used where they may enter groundwater and cause pollution.

The Agency has the power to restrict or prohibit the use of any substances where they would pose an environmental risk.

This is a key strength of our regulatory regime, in stark contrast to the situation in parts of the US, for example, where companies have failed to disclose information on the chemicals being used, raising public concerns about health and safety.

Information on chemical substances and their maximum concentrations is included within the environmental permit, along with information on the total daily discharge of hydraulic fracturing fluid into the ground and the fluid taken off-site for disposal and any other monitoring requirements outlined in the permit. The permit is placed on the public register.

The Environment Agency can take enforcement action to ensure all the information required by the permit is supplied by the operator.

The onshore oil and gas industry under UK Onshore Oil and Gas guidelines has also agreed to publish on its website all chemicals that are used in hydraulic fracturing by composition and concentration.

- *How are such chemicals approved and by whom?*

The Environment Agency (EA) assesses the hazards presented by fracturing fluid additives on a case-by-case basis and will not allow hazardous substances to groundwater to be used.

The EA considers the injection of hydraulic fracturing fluid to be an emission and therefore will disclose information on chemicals substances and their maximum concentration on the public register, along with how much of hydraulic fracturing the operator expects to remain underground.

The environment agencies of UK and Ireland (JAGDAG, Joint Agency Groundwater Directive Advisory Group) work together to peer review these assessments before they submit proposals to public consultation. You can find out more on this and also which substances have been assessed on the JAGDAG website. ?

Allowing the use of a chemical at one site does not automatically mean the Regulator will allow it to be used elsewhere. This is because the environmental risks may be different, for example, due to local geological conditions.

The Environment Agency requires operators to disclose the chemicals they propose to use in hydraulic fracturing, and the maximum concentration of each, when they apply to the Agency for the relevant permits, i.e. before an environmental permit is granted and well in advance of operations commencing.

- *Why can't the HSE be responsible for approving such chemicals? Is this because the UK government will have no power to impose restrictions on the industry which might not apply elsewhere because of the Transatlantic Trade and Investment Partnership?*

As previously stated, The Environment Agency assesses the hazards presented by fracking fluid additives on a case-by-case basis. The HSE are involved in regulating chemicals. This is an area where they jointly regulate although EA take the lead <http://www.hse.gov.uk/coshh/detail/coshh-clp-reach.htm>. The EU has been clear that there will be no compromise on environmental protection as part of the proposed TTIP.

- *According to Frack-free Ryedale, "a recent official US report on the fracking industry (July 2014) identified at least 59 chemicals in the waste water or the air which are dangerous to human health or the environment, including arsenic, benzene, lead and radioactive materials. Many of these are carcinogens and can affect livestock." Is this correct? Are they all "industry-approved"?*

The composition of waste water from hydraulic fracturing will vary on a site by site basis, largely depending upon the local geology. Flowback fluids, which include fracking fluids, are deemed to be a mining waste and require an environmental permit for management on site. Disposal of flowback fluids must be at a regulated waste treatment works, which will also be regulated by the EA.

*Not
James!*

The Environment Agency (EA) assesses the hazards presented by fracking fluid additives or drilling muds on a case-by-case basis and will not permit the use of chemicals hazardous to groundwater where they may enter groundwater and cause pollution.

10. *Frackfree Ryedale have made several comments about waste disposal under the section of their leaflet headed "Fracking is bad for water". Further, a resident attended a recent consultation meeting given by Third Energy in connection with their planning application for fracking at Kirby Misperton. She asked how the waste water would be disposed of, and was told that water would be delivered and taken away through pipes which go to the plant at Knappton, and that there was an agreement with Yorwaste that they would take the waste water from there and they also said that Yorwaste were used to disposing of radio-active materials*

because they did this for hospitals. The resident said she had checked with Yorwaste and was informed that there was no such agreement with Third Energy, and that Third Energy did not dispose of radio active waste for hospitals. Another story I have heard is that waste water from fracking sites has been dumped into the Manchester Ship Canal. So, in addition to addressing the points made by Frackfree Ryedale under the heading: "Fracking is bad for water", could we please have answers to the following questions:

- Are there any places in the UK which are licensed or have planning permission for the disposal of waste water from fracking?*
- Is any licence or planning permission required for the disposal of waste water from fracking? If so, have any sites been licensed and if so, where are they?*

The operator must dispose of the fluid safely. It is categorised as mining waste, so the operator must obtain an environmental permit for its disposal from the relevant environmental regulator and have an agreed waste management plan in place. The method for disposal can be:

- on-site treatment with re-use of water and disposal of remaining liquids and solids to a suitable licensed waste treatment and disposal facility;
- removal off site to a suitable licensed waste treatment and disposal facility;
- disposal to a special sewer with the permission of the relevant waste water utility company.

Operators must carry out trials including laboratory tests, to identify the best way to dispose of the flowback fluids. All the treatment and disposal facilities that operators use must also hold the appropriate permits from the environmental regulator, who will be notified in advance of any movement of the waste.

Waste fluids from hydraulic fracturing may be classed as a controlled waste and/or identified as containing naturally occurring radioactive material (NORM) and would need to be treated accordingly.

As part of the permitting process the Environment Agency will require the operator to identify the European Waste Classification (EWC) code for all waste produced during operations and treatment of that waste will be carried out at suitably permitted facility able to dispose of a waste with that specified EWC code.

- Is there a system of licensing for carriers of waste water from fracking sites, or can anybody do it?*

Companies that carry controlled waste would need to be registered with the Environment Agency.

- *If there is no licensing system, is this because the Transatlantic Trade and Investment Partnership prohibits or makes it difficult to establish a licensing system?*

As previously mentioned, there will be no compromise on environmental protection as part of the proposed TTIP.

- *If there is a licensing system, what companies in the UK/Yorkshire are authorised to dispose of waste water from fracking, and how exactly do they dispose of it?*

As part of the permitting process the Environment Agency will require the operator to identify the European Waste Classification (EWC) code for all waste produced during operations and treatment of that waste will be carried out at suitably permitted facility able to dispose of a waste with that specified EWC code.

- *Does Yorwaste have an agreement with Third Energy to dispose of their waste water, and if so, where will they dump it?*

This is a question for Third Energy.

- *Are there underground pipes which take water direct from Knapton to the gas well at Kirby Misperton, and other pipes which can take waste water direct from the well at Kirby Misperton to the Knapton plant without passing through the mains water supply and disposal pipes?*

This is a question for Third Energy.

- *Is it a legal requirement for fracking companies to publicly divulge the chemicals they put back in their fluid? If not, why not? (I think currently they only have to divulge them to the Environment Agency – not the public.*

The Government has announced that the Secretary of State for Environment, Food and Rural Affairs will direct the Environment Agency to publish information about chemicals they require operators to disclose.

11. *As regards the methods for drilling and extraction, I have the following concerns:*

12. *As I think DECC confirmed, stainless steel piping cannot be used, because stainless steel is a soft metal and could not withstand the pressures generated by the fracking process. So, water and other chemicals are being pumped into the well, while gas is being taken out of it. Does it not follow that the pipes will inevitably corrode and become rusty? What materials will be used for the well pipes?*

Well casing is mostly made of steel. The well operator must assess the risk associated with both pressure on the casing and corrosion. Where there is a risk

of corrosion other alloys can be used in order to mitigate the risk. If corrosion is identified during well operations measures can be taken to replace or protect the casing identified.

13. It was been stated at the DECC meeting that the pipes will be given extra protection where they go through an aquifer (three casements of steel and concrete instead of one) or a coal seam (two casements of steel and concrete instead of one), and this should prevent any danger of the aquifer becoming contaminated by noxious materials being used in the fracking process. I pointed out that this would mean that there would only be a single casement for the rest of pipe which would go down several thousand feet (I think 10,000 feet was the depth discussed). I suggested that the pipe could fracture at any point below or above the aquifer and noxious chemicals from the pipe could migrate upwards into the aquifer. We were told by the HSE rep that this was "possible but unlikely" because the pipe would be surrounded by concrete and that there was a "shoe". The question arises: "how possible and how unlikely", particularly bearing in mind that fluids have to be pumped down wells under enormous pressures in order to make the process work. This gives rise to the following questions:

- If it is correct that in the USA, 5% of wells fail in the first year of operation, 25% will leak within five years and 50% leak within 15 years, and that eventually all wells fail, allowing contaminated water to escape into the water supply, is it not also reasonable to assume that the same rate of failure is likely to apply to the length of pipe in any well which has only a single casement?

As above – ref. Q6.

- don't know ???

- If any part of the single casement pipe fractures, what is there to prevent fluid from the fracture(s) migrating upwards into the aquifer?

The outer casing of all onshore wells are cemented to the rock strata, which will not allow the migration of fluid up to surface outside the well. !!

- If it is suggested that the fluids will be retained by the concrete surrounding the steel pipe, how effective will that concrete casing be, bearing in mind the nature of concrete to fracture and/or crumble?

The outer casing of all onshore wells are cemented to the rock strata. The cement will be designed on a case by case basis, depending on the geology of the borehole, and will be designed in such a way that the risks of a leak of fluids from the well are properly managed. If there is a risk it could fracture or crumble this must be mitigated against. The design will be subject inspection by an independent well examiner. HSE check that risks to well integrity are properly managed both before construction of the well can start and on an ongoing basis

throughout construction of the well, through and re-drilling activity and throughout the decommissioning or abandonment process.

- *How will the extracting company become aware of fractures? What reporting procedures will be used, and how will they be enforced? Who will enforce such procedures?*

The well will be subject to a number of integrity tests throughout its life. Pressure within the well is monitored by the well operator. Any unplanned release of fluids from the well or unplanned use of blowout prevention equipment must be reported to HSE.

- *How will the Transatlantic Trade and Investment Partnership affect this? Will any requirement to include additional casements for aquifers and coal seams contravene it, if such requirements do not exist in the USA? Will any requirements to monitor and prevent fractures have to be brought down to the level which applies in the USA?*

As previously mentioned, there will be no compromise on environmental protection as part of the proposed TTIP.

- *What (if any) are the requirements in full force and effect in the USA in regard to all such matters as are covered in the above questions (ie on casements in aquifers and coal seams and monitoring and reporting fractures and enforcement)?*

DECC is not in a position to comment on regulatory requirements in the US.

- *What was meant by the "shoe" and how will this work?*

A 'shoe' is a device typically made of steel and cement that is set at the base of a casing in order to ensure that the casing is stable and that fluids cannot flow up outside the casing.

- *How long are companies legally obliged to monitor fracking wells when they have finished fracking?*

In the UK very few instances are known of problems with decommissioned wells, and none of significant pollution caused by decommissioned wells. There is, however, a case for further quality assurance, with some period of monitoring post-decommissioning. We are discussing suitable arrangements with regulators and industry.

- *What happens to an abandoned fracking well when the extracting company goes bust? Who monitors it then, and who would pay for any damage caused by leakages?*

When operations finish, the licensee (and there may be more than one for each licence) is responsible for safe decommissioning of the well(s) and for restoring the well-site to its previous state or a suitable condition for re-use.

Part IIA of the Environmental Protection Act 1990 requires specified classes of people to remedy contamination to land (including water). 'Class A' persons are those who have "caused or knowingly permitted the contamination". This will include not only the operator, but also any other company that caused the pollution or that knowingly failed to prevent it which could, for example, include a group company, or even a lender. Even if an operator cannot be found, liability will always be imposed on other Class A persons first. Liability will only pass to the current owner or occupier of the site if the enforcing authority cannot find any Class A persons.

The environmental regulators do have powers to require upfront financial guarantees to address this risk, in some circumstances. In addition, mineral planning authorities can require a financial guarantee to cover restoration and aftercare costs, although this will normally only be justified in exceptional cases.

This may be more expensive for companies than a group scheme would be, but provides the reassurance that neither taxpayers nor landowners will be left to foot the bill.

As an alternative to upfront bonds, the Department of Energy and Climate Change has been working with the industry's trade body, UK Onshore Oil and Gas, to ensure the development of an industry scheme that would step in and pay for the liabilities in this situation (and any other where the liable company cannot be identified).

As part of the petroleum licensing process, and prior to awarding a licence, the Department of Energy and Climate Change assesses whether a company has adequate financial capacity for its planned operations. DECC also checks at the drilling and, where relevant, production stage that the company has sufficient funding and appropriate insurance.

- *Why isn't independent baseline testing of air, water, soil and seismicity before and during fracking a legal requirement? Why has this been left to the companies themselves without any official monitoring? Is this because independent baseline testing is not required in the USA, and so to impose it in the UK would contravene the Transatlantic Trade and Investment Partnership?*

As previously mentioned, there will be no compromise on environmental protection as part of the proposed TTIP.

We support the use of baseline monitoring, which can be valuable in showing local communities ahead of operations what is already in the groundwater, and

helps ensure a more rigorous post-operation assessment. The industry is also in favour in principle. The issue is about the appropriateness of the monitoring period and the requirements involved.

The Government has announced that the Secretary of State for Environment, Food and Rural Affairs will direct the Environment Agency to require operators to undertake at least three months baseline monitoring of methane in groundwater before hydraulic fracturing can commence. This is a minimum of three months so, in practice, the Environment Agency may require a longer period of monitoring where it is appropriate to do so.

For other indicators, such as surface water and biodiversity, the degree to which these will be relevant and the time required to monitor will vary so much between sites that any fixed requirement would be inappropriate.

It was announced in the Autumn Statement that the Government will set up independent monitoring of a number of shale sites. The monitoring will be additional to that required of operators by environmental permitting, and will be completely independent of industry. This monitoring will provide open and transparent scientific evidence concerning the safety of shale exploration.

14. Another point arises from my own experience in another capacity when dealing with building contract claims. Many years ago in the 1970's when the health service was expanding, I worked for the hospital board at Liverpool. A new hospital was being built, and its foundations were being secured by piling through soft ground. A pile passed through a pocket of sand, which was water-bearing, and the concrete dissolved. The new piles were tested with a hydraulic hammer, and some of the piles collapsed. The point I am making is that rock and sediments are not always neatly stratified. Pockets of sand can exist within bands of clay, and even impervious stratified rock can have fractures and fissures through which water can pass. We may not have earthquakes in the UK, but slight tremors do occur, and these can affect the subsoil geology. So the following questions arise:

- *What kind of concrete will be used to secure the steel pipes?*

The cement used to encase the casing will be designed on a site by site basis, depending on the geology and geochemistry of the area, as evaluated from previous drilling in the area, the borehole log recorded during drilling and logging of the core. The risk of movement within the rock strata must be assessed by the operator and suitable casing and cement employed to mitigate any risk identified. HSE would check this as part of the well notification before work starts on the well. Any unplanned release of fluids from the well or unplanned use of blowout prevention equipment must be reported to HSE.

- *How will the well be tested to ensure that there is concrete surrounding the pipes continuously from the bottom to the top of each well?*

This is carried out by using geophysical equipment, such as cement bond logs and sonic surveys. These ensure there are no voids in the cement or areas of poor cementing.

- *How will this be checked and monitored?*

This is checked during the construction of the well via the reports sent to HSE each week and can also be checked at a site visit. Any unplanned release of fluids from the well or unplanned use of blowout prevention equipment must be reported to HSE. The Independent Well Examiner will also monitor well integrity tests.

- *What government agency will enforce compliance?*

The HSE.

- *Does the Transatlantic Trade and Investment Partnership prevent the UK from having more stringent requirements in regard to testing, monitoring and enforcement than those which apply in the USA?*

As previously mentioned, there will be no compromise on environmental protection as part of the proposed TTIP.

15. The Infrastructure Bill is proposing to allow fracking companies to leave "any substance" in wells underground. How is this going to make fracking safer?

This does not replace the other regulatory steps.

The right to put substances into or through deep-level land only applies in relation to the use of the land for the purposes of exploiting petroleum or deep geothermal energy. So this does not for example allow for nuclear waste.

Flowback fluids, which include fracking fluids, are deemed to be a mining waste and require an environmental permit for management on site. Disposal of flowback fluids must be at a regulated waste treatment works, which will also be regulated by the EA.

Operators must demonstrate that where any chemicals are left in the waste frack fluid this will not lead to pollution of groundwater. The Environment Agency (EA) assesses the hazards presented by fracking fluid additives or drilling muds on a case-by-case basis and will not permit the use of chemicals hazardous to groundwater where they may enter groundwater and cause pollution.

Construction standards in the UK are robust and regulators have the tools to ensure that our groundwater supplies are accorded a high degree of protection. The Health and Safety Executive (HSE) scrutinises well design, and monitors its progress to

appointed by whom?

ensure the operator manages risks effectively throughout the life cycle of the well. The well design is reviewed by an independent examiner and HSE assesses all well notifications before construction and monitors well operations based on weekly reports to its well specialists. Any significant changes to well construction are subject to the same scrutiny.

16. Given that the latest reports on climate change say that we will need to leave 80% of fossil fuel reserves in the ground to avert disastrous climate change, why is government promoting fracking, particularly given all the environmental risks involved?

Britain will still need significant oil and gas supplies over the next few decades. Gas is the cleanest fossil fuel and is likely to continue to be a major part of our energy mix for years to come.

We are committed to reducing carbon emissions from 1990 levels by 80% by 2050 and any emission from use of oil or gas will have to be included in our binding carbon budgets. Shale gas has a role to play in helping us meet this target.

It is no secret that the UK will be making a significant move away from coal in the coming years, as power stations reach end of life and to meet the Industrial Emissions Directive.

We will have to replace unabated coal generation capacity with lower carbon sources of electricity including gas generation. The most important part of this will be to manage this transition in the most cost-effective way – consumers will not support the move to low carbon if it is needlessly more expensive than is necessary.

Gas could act as a bridge, while we develop renewables, improve energy efficiency and build new nuclear. Globally, increased use of gas, shale or otherwise if produced and processed in a well regulated regime, could help reduce emissions in the short term by directly displacing the global demand for coal, as we have seen in the US.

Whilst we have invested record amounts into renewable energy we see shale gas as being a bridging fuel to a greener future. For example, we need gas powered generation to replace coal generated electricity while we continue to develop low carbon generation. Similarly many people use gas for domestic heating while we develop and deploy renewable heat sources.

17. According to a peer-reviewed paper from Cornell University, when released gas from well leaks and truck movements are taken into account, shale gas is much more polluting than even coal. Is this accepted?

Studies have shown that the carbon footprint of electricity from UK produced shale gas would likely be significantly less than coal and also lower than imported Liquefied Natural Gas.

Please refer to the report: Potential greenhouse gas emissions associated with shale gas extraction and use: A study by Professor David J C MacKay FRS and Dr. Timothy J Stone CBE <https://www.gov.uk/government/publications/potential-greenhouse-gas-emissions-associated-with-shale-gas-production-and-use>.

18. *What is the impact on house prices? Frack Free Ryedale say that property prices in other parts of the UK where fracking is planned have fallen by 70%. I have heard that in the part of East Yorkshire where fracking is planned, proposals for fracking have killed the market and it is impossible for residents to sell their houses. Are these reports correct? What compensation is available for planning blight in these circumstances?*

There is no reason to expect that the current phase of exploration activities should have any adverse effect on property values in the vicinity of the activities.

We have put in place stringent regulations, safety and planning regimes to encourage the responsible development of shale gas in line with our environmental objectives.

In over half a century of oil and gas exploration in the UK there is no evidence that it has affected property values. We see no reason why this would change for shale gas and oil exploration or, in time, development.

As with any construction, there may be some element of disruption, but shale exploration and development will also bring direct and indirect local economic benefits. Europe's biggest onshore oil field is at Wytch Farm, Poole Harbour, in the heart of an Area of Outstanding Natural Beauty, where it has been in operation since the 1970s. Some of the UK's most valuable property is in this area.

not a fracking well

As part of a policy statement on Shale Gas published in April 2014, The Royal Institute of Chartered Surveyors (RICS) stated: "Any commentary on any possible effects on property value therefore would be very premature, including the attempt to draw any parallels with other nations."