

North Yorkshire County Council**Scrutiny of Health Committee****22 April 2016****Covering report to the joint report of the Chairman of the Transport, Economy and Environment Overview and Scrutiny Committee and the Chairman of the Scrutiny of Health Committee****1 Purpose of the Report**

This report asks the Committee to:

- a) Discuss and note the information in the joint report of the Chairman of the Transport, Economy and Environment Overview and Scrutiny Committee and the Chairman of the Scrutiny of Health Committee.
- b) Consider the recommendations to the Executive set out on page 30 of the joint report.

2 Introduction

- 2.1 The Transport, Economy and Environment Overview and Scrutiny Committee and the Scrutiny of Health Committee established a joint sub-committee comprising all members from both committees to inform the Minerals and Waste Joint Plan, with regards to hydraulic fracturing ('fracking'), and to inform the Executive's response to the petition considered by the Ryedale Area Committee on 10 July 2015. The petition called on the County Council "to publicly oppose fracking and all other forms of unconventional fossil fuel extraction in North Yorkshire, and that this anti-fracking position should be reflected in all decisions relating to mineral planning applications in North Yorkshire".
- 2.2 Members of the public provided written notice of questions or statements to the joint sub-committee meeting and a range of national organisations attended to give evidence and to respond to a range of specific "lines of enquiry asked by Members.
- 2.3 Key issues raised and discussed at the meeting included:
 - Environmental risks based around the noise, odours, traffic, leakages, proximity of wells to housing, transportation and congestion
 - The water usage and disposal of contaminated water and other waste material, including Naturally Occurring Radioactive Materials.
 - Climate change, green houses gases, carbon emissions – macro energy policy.
 - The 'what ifs' about the potential cumulative impacts of fracking operations to communities.
 - Giving consideration to the validity and merits of having buffer zones beyond the parameters of National Parks, AONBs and SSSIs.
 - The need for effective regulation.
 - Economic issues.

- Social impacts on local communities.
- Public health risks, with a request from Members on the joint sub-committee for on-going baseline monitoring to be put in place in North Yorkshire so that we can have reference about any anomalies arising if and when shale gas operations go ahead.

2.4 The joint report includes suggestions to inform production of the Minerals and Waste Joint Plan with regards to hydraulic fracturing. It also provides observations to help inform the Executive's considerations regarding the petition considered by the Ryedale Area Committee on 10 June 2015.

2.5 The finalised report is due to be presented to the Executive on 24 May 2016.

3 Financial & Legal Implications

3.1 The review did not undertake any detailed financial assessments or legal implications.

4 Recommendation

4.1 The Scrutiny of Health Committee is recommended to agree the joint report of the Chairman of the Transport, Economy and Environment Overview and Scrutiny Committee and the Chairman of the Scrutiny of Health Committee and its recommendations.

Report compiled by:
Byron Hunter
Scrutiny Team Leader

County Hall, Northallerton

Tel: 01609 780780

E-mail: byron.hunter@northyorks.gov.uk

Date: 5 April 2016

Background documents: None

Annexes: Annex A: Draft joint report of the Chairman of the Transport, Economy and Environment Overview and Scrutiny Committee and the Chairman of the Scrutiny of Health Committee

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North Yorkshire County Council

Scrutiny of Health Committee

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North Yorkshire County Council

Executive

24 May 2016

Joint report of the Chairman of the Transport, Economy and Environment Overview and Scrutiny Committee and the Chairman of the Scrutiny of Health Committee

1 Purpose of Report

- 1.1 The purpose this report is to summarise the joint investigation undertaken by the Transport, Economy and Environment Overview and Scrutiny Committee and the Scrutiny of Health Committee to:
- a) Inform production of the Minerals and Waste Joint Plan for North Yorkshire, York and the North York Moors National Park, with regards to Hydraulic Fracturing ('Fracking').
 - b) Inform the Executive's response to the petition considered by the Ryedale Area Committee on 10 June 2015.

Section 1 – Introduction

2 Background

Petition Considered by the Ryedale Area Committee on 10 June 2015 and Outcome of Executive on 7 July 2015

- 2.1 At its meeting on 10 June 2015 the Ryedale Area Committee considered a petition demanding that: "the North Yorkshire County Council publicly oppose fracking and all other forms of unconventional fossil fuel extraction in North Yorkshire, and that this anti-fracking position should be reflected in all decisions relating to mineral planning applications in North Yorkshire".
- 2.2 The Area Committee resolved to note the petition and to recommend that further investigation on the matter is commissioned by the Executive from the Transport and Environment Overview and Scrutiny Committee and the Health Overview and Scrutiny Committee.
- 2.3 At its meeting on 7 July 2015 the Executive resolved to consider taking the action the petition requested after hearing the views of the two scrutiny committees.

Minerals and Waste Joint Plan for North Yorkshire, York and the North York Moors National Park

- 2.4 Those parts of the area covered by the Minerals and Waste Joint Plan which fall outside the City of York and North York Moors National Park are subject to a two tier system of planning. Within this system the County Council, as Minerals and Waste Planning Authority, has responsibility for both the preparation and adoption of local planning policy for minerals and waste, and also has responsibility for determining planning applications for minerals and waste development. It is a legal requirement that applications are determined in accordance with the development plan unless material (i.e. relevant) considerations indicate otherwise. Applications are determined following a process of consultation and publicity and may be subject to a range of conditions and, in some cases legal agreements that mitigate against the potential adverse impacts of the development and effect how permission can be implemented.
- 2.5 The County Council is currently at the public consultation stage of a 'Preferred Options' draft Minerals and Waste Joint Plan for North Yorkshire, York and the North York Moors National Park. The report on the Minerals and Waste Joint Plan for North Yorkshire, York and the North York Moors National Park - Preferred Options Consultation Stage considered by the Executive on 27 October 2015 is available [here](#)
- 2.6 The Plan, once finalised, will provide the context under which all mineral planning applications, including fracking, will be judged up until 2030.

3. National Context: Fracking

Regulatory Regime

- 3.1 The legislation in place makes it clear that on-shore fracking for shale gas is a key strand of the UK government's energy policy.
- 3.2 There are a number of consents that must be obtained before onshore fracking is allowed to occur. These include:
- consent from the relevant landowner;
 - a petroleum and development licence;
 - planning permission;
 - an environmental permit;
 - an abstraction licence;
 - a well consent; and
 - where relevant, written authorisation from the Coal Authority.
- 3.3 The Infrastructure Act 2015 together with the Onshore Hydraulic Fracturing (Protected Areas) Regulations 2015 set out additional requirements or 'safeguards' that must be satisfied before a well consent can be granted by the Secretary of State. The government has also recently consulted on surface development restrictions aimed at preventing hydraulic fracturing operations from

taking place from new or existing wells that are drilled at the surface in specified protected areas¹.

The 'safeguards' in the Infrastructure Act are:

- That hydraulic fracturing is prohibited from taking place in land at a depth of less than 1000 metres;
- That hydraulic fracturing cannot take place in land at a depth of 1000 metres or more unless the licensee has the Secretary of State's consent for it to take place (a 'hydraulic fracturing consent');
- That the environmental impact of the development which includes the relevant well has been taken into account by the local planning authority; That appropriate arrangements have been made for the independent inspection of the integrity of the relevant well;
- That the level of methane in groundwater has, or will have, been monitored in the period of 12 months before the associated hydraulic fracturing begins;
- That appropriate arrangements have been made for the monitoring of emissions of methane into the air;
- That the associated hydraulic fracturing will not take place within protected groundwater source areas;
- That the associated hydraulic fracturing will not take place within other protected areas;
- That in considering an application for the relevant planning permission, the local planning authority has (where material) taken into account the cumulative effects of – (a) that application, and (b) other applications relating to exploitation of onshore petroleum obtainable by hydraulic fracturing;
- That the substances used, or expected to be used, in associated hydraulic fracturing – (a) are approved, or (b) are subject to approval, by the relevant environmental regulator;
- That in considering an application for the relevant planning permission, the local planning authority has considered whether to impose a restoration condition in relation to that development.

Under the Act the Secretary of State is also required to seek advice from the Committee on Climate Change (CCC) on the likely impact of onshore oil and gas production on meeting our carbon budget obligations and to take action should the CCC advise that shale gas may adversely impact on climate change objectives.

3.4 A number of organisations have specific regulatory duties and powers in relation to protecting the environment/local amenity and monitoring and protecting public health in respect of fracking. The following information is extracted from the

¹ [‘Surface Development Restrictions for Hydraulic Fracturing: consultation on proposed restrictions on surface development through the Petroleum Exploration and Development Licence’ Under the proposed restrictions surface development for the purposes of fracking would not be allowed within National Parks, AONBs, World Heritage Sites, Ground Water Source Protection Zone 1, Sites of Special Scientific Interest, Natura 2000 and Ramsar sites](#) DECC, November 2015

House of Commons Environment Audit Committee report on the Environmental risks of fracking:²

- ❖ DECC has the overall lead on unconventional oil and gas policy, including shale gas, and co-ordinates activities across Government departments. The Department for Environment, Food and Rural Affairs (Defra) has policy responsibility for the environmental aspects of shale gas policy, with the exception of climate change and seismicity issues which are a DECC lead. DCLG is responsible for the planning system including environmental impact assessment. Defra and the Department for Communities and Local Government (DCLG) responsibilities extend to England only, as environmental policy and the operation of respective planning systems are devolved matters.

Operators who wish to explore for shale gas require a number of permissions:

- They must first be granted a Petroleum Exploration Development Licence by DECC [OGA] which will confer exclusive rights to an area.
 - They also require environmental permits from the environmental regulator, access agreement from relevant landowner(s), scrutiny from the Health and Safety Executive and DECC consent before operations can commence.
 - All project activities, such as drilling, hydraulic fracturing, or production, require planning permission from a local Minerals Planning Authority or, on appeal, from the Planning Inspectorate. The Secretary of State for Communities and Local Government also has powers to call-in planning applications for his own determination or, similarly, to recover planning appeals for his own determination.
- ❖ The Environment Agency set out additional requirements:
For a site that is planning to undertake hydraulic fracturing, the following permits and permissions are likely to be required:
 - A permit for the management of extractive waste (also known as 'mining waste') will always be required where a new well is being drilled and waste needs to be managed.
 - A notice under the Water Resources Act to 'construct a boring for the purposes of searching for or extracting minerals'. The notice will set out details of the well design and construction.
 - A permit for a radioactive substances activity to manage Naturally Occurring Radioactive Materials from a well that is producing oil or gas.
 - A permit for a groundwater activity, where there is a risk of an indirect discharge to groundwater from the proposed operations.
 - A permit for an installation under the Industrial Emissions Directive, if operators intend to flare more than 10 tonnes of waste gas per day.
 - A water abstraction licence if the operation abstracts more than 20 cubic metres per day directly from a river or groundwater.

² ['Environmental risks of fracking'](#) House of Commons Environmental Audit Committee, January 2015

❖ Independent Well Examiner

Under the Offshore Installation and Wells (Design and Construction, etc) Regulations 1996, well-operators are required to have arrangements in writing for the examination of wells as an independent check to assure the well operator that the well is designed and constructed properly, and that it is maintained adequately thereafter. The arrangements must be in place before design of a well is commenced.

Section 2 – Information gathering and taking evidence

4. Desk Research/Background Information

4.1 Elected Members on the Transport, Economy and Environment Overview and Scrutiny Committee and the Scrutiny of Health Committee were provided with a range of background information relating to Fracking as follows:

- Minerals and Waste Joint Plan for North Yorkshire, York and the North York Moors National Park - Preferred Options consultation stage and draft revised Minerals and Waste Development Scheme.
- ‘Shale gas extraction in the UK: A review of hydraulic fracturing’, June 2012, Royal Society & Royal Academy of Engineering.
- ‘Potential groundwater impact from exploitation of shale gas in the UK. Groundwater Science Programme Open Report OR/12/001’, 2012, British Geological Survey.
- ‘Review of the Potential Public Health Impacts of Exposures to Chemical and Radioactive Pollutants as a Result of the Shale Gas Extraction Process’, June 2014, Public Health England.
- ‘Environmental Risks of Fracking’, January 2015, House of Commons Environmental Audit Committee.
- ‘Government Response to the Environment Audit Committee’s Inquiry into Environmental Risks of Fracking’, March 2015, Department of Energy and Climate Change.

5. Joint Sub-Committee

5.1 In seeking to carry out the work commissioned by the Executive, the Transport, Economy and Environment Overview and Scrutiny Committee and the Scrutiny of Health Committee established a joint sub-committee comprising all members from both committees. The joint sub-committee met at County Hall on 22 January 2016 and was chaired by County Councillor Andrew Backhouse. The report considered at the meeting, the minutes and the link to the sound recording of the meeting are available [here](#). The minutes of the meeting are also in **Appendix 1**. By way of

follow-up to the meeting, and at the Chairman's request, a number of the invited external organisations also provided written responses. This was in relation to issues that they were not able to address fully at the meeting and additional information that they felt the Committee should be aware of. These can be found in **Appendix 2**.

- 5.2 In order to inform the joint sub-committee's response to the consultation, a key objective of the meeting was to explore the extent to which the Plan adequately addresses relevant issues relating to the potential environmental, economic and public health implications of fracking and the extent to which the Plan is as future proof as practicable should, for instance, there be a proliferation of wells across the area. The objective of the meeting was **not** to examine the merits of individual planning applications.
- 5.3 23 members of the public provided written notice of questions or statements to the meeting. Their questions/statements are [here](#)
- 5.4 A range of national organisations with specific regulatory duties and powers in relation to the risks associated with fracking also attended. The work of the joint sub-committee included exploring to what extent there are any gaps in the regulatory framework and to influence how the Plan could address any problems, for instance, through revisions to draft policies or the publication of supplementary guidance. Supplementary guidance enables local authorities to provide more detailed guidance to applicants on the content of applications and the process involved in their determination, with the objective of helping improve the overall quality of development proposals.

6. Organisations Giving Evidence and Lines of Enquiry

6.1 Representatives from the following organisations attended the joint sub-committee to give evidence and to respond to a range of specific lines of enquiry:

6.2 Friends of the Earth:

- Lines of enquiry:
- Public Health England notes that in the UK shale gas operators will be required, through the planning and environmental permitting processes, to satisfy the relevant regulators that their proposals and operations will minimise the potential for pollution and risks to public health.³ Why therefore is the existing system of regulation including the specific 'safeguards' in the Infrastructure Act 2015 not sufficient to mitigate the environmental and health risks that could occur from hydraulic fracturing?
 - Why does Friends of the Earth believe that the system of licensing and inspection led by the Environment Agency, the Health and Safety

³[Review of the Potential Public Health Impacts of Exposure to Chemical and Radioactive Pollutants as a Result of Shale Gas Extraction](#) Public Health England, June 2014, page iv

Executive and the Oil & Gas Authority (part of DECC) is not sufficiently robust?

6.3 UK Onshore Oil and Gas (UKOOG):

➤ Lines of enquiry:

- How will the industry ensure that:
 - Where multiple drilling wells are proposed in an area, adequate protection can be afforded to the landscape, nature conservation, the historic environment and the established local economy.
 - Leaks from fracking sites will not contaminate surface water.
 - There will not be excessive and/or continuous noise near drilling sites.
 - There will not be risks to air quality.
- The volume of heavy goods vehicle traffic required for fracking will not have a significant traffic impact on local roads, especially in areas where new road building is impractical or environmentally destructive.
- The primary responsibility for identifying, assessing and mitigating well hazards rests with the company operating the well. How confident can we be that the operating practices of fracking companies will be robust in this regard?
- Will there be any mutual funding scheme set up by the operators to cover events such as contamination of land/drinking supplies or where an operator goes into administration?
- What levels of disclosure and transparency are companies required to provide on their operations, including making available operational data e.g. on the fracturing fluid additives used, levels of induced seismicity, volumes and characteristics of waste water used etc.?
- How will restoration and aftercare be ensured in the event that an operator is no longer able to fulfill its obligations and responsibility reverts to the landowner?

6.4 Department of Energy and Climate Change (DECC):

➤ Lines of enquiry:

- What is the UK government's approach to on-shore shale gas extraction and how does this fit in with its wider energy policy, including meeting our climate change targets?
- Large scale high volume hydraulic fracturing is a relatively new activity worldwide but the system of regulation is based on conventional hydrocarbon extraction (oil and non-shale gas), predating shale gas extraction. How can we be certain that there are not regulatory gaps and that the system of regulation including licensing, monitoring and

enforcement is able to deal specifically with shale gas extraction and will not cause confusion over who does what?

- What level of engagement and overview does DECC have with the regulators involved in the planning and monitoring process of hydraulic fracturing operations?
- Some commentators state that research into conventional wells indicates that horizontal wells have a failure rate four times higher than for vertical wells in the same area.⁴ Why is a condition that prevents surface drilling in groundwater protection zones, National parks, SSSIs and AONBs adequate mitigation for these areas in view of the fact that drilling will be able to take place horizontally underneath them?

6.5 Oil and Gas Authority (OGA):

➤ Lines of enquiry:

- OGA's role includes assessing the licence applicant (the proposed well operator) on technical competence, environmental awareness, financial viability and capacity. How does it go about doing this?
- What requirements do DECC/OGA place on operators to monitor seismic activity during hydraulic fracturing?
- The Royal Society and the Royal Academy of Engineering note that attention must be paid to the way in which risks scale up should a future shale gas industry develop nationwide. Regulatory co-ordination and capacity must be maintained.⁵ How will risks relating to the intensity of activities within each licence block be managed if more wells come into operation in the area over time?

6.6 Environment Agency:

➤ Lines of enquiry include:

- What monitoring will be undertaken by the Environment Agency before, during and after shale gas extraction has taken place, to supplement the operator's own monitoring, and what enforcement action will be taken if permitted levels are exceeded e.g. air emissions? Will the Environment Agency be seeking bonds from the fracking industry when granting permits to allow for clean up in the event of contamination?

⁴ ['Groundwater and fracking'](#) Friends of the Earth, December 2014

⁵ ['Shale Gas extraction in the UK: a review of hydraulic fracturing'](#) Royal Society and Royal Academy of Engineering, June 2012

- Does the Environment Agency have any arrangements in place for on-going liaison with other regulatory bodies in relation to regulation of fracking activity?
- The Environment Agency has stated in the past that damage to groundwater may be irreversible.⁶ What, if any, safeguards can be put in place to avoid contaminating ground water supplies and aquifers?
- The Chartered Institution of Water & Environmental Management has said that: “any negligence associated with storage, transportation and operational spills represent the greatest threats to surface water, as well as to groundwater.”⁷ What enforceable safeguards can be put in place to dispose of waste water safely or ensure that it is stored safely above the ground on-site even in the event that heavy rainfall causes the site to flood?

6.7 Public Health England (PHE):

➤ Lines of enquiry:

- How comprehensive and robust is the research and information on the public health impacts of fracking?
- In examining the potential cumulative long-term impacts on health, is there a need to establish a comprehensive health and exposure monitoring programme, to assess the extent and level of the release of pollutants from the fracking process? If so, and acknowledging that in order for the results to be statistically reliable, would it be appropriate for PHE to conduct or co-ordinate this surveillance using North Yorkshire as a pilot area?

6.8 Health and Safety Executive (HSE):

➤ Lines of enquiry:

- What are the safeguards taken around wellbore structural integrity and decommissioning of wells? How sure can we be that well casings will not over time lose their structural integrity causing toxic chemicals to contaminate the land and water supply? Who will be monitoring this once the well has been decommissioned?
- In 2012 the HSE noted a number of commonly observed weaknesses when inspecting well operators' well examination schemes⁸. Some of these related to off-shore wells but what assurances, if any, can the

⁶ 'Groundwater protection: Principles and practice', Environment Agency, August 2013, p20

⁷ CIWEM, Written Submission, House of Commons Environmental Audit Committee: '[Environmental risks of fracking](#)', January 2015

⁸ '[Well examination schemes – commonly observed weaknesses](#)' HSE, March 2012

HSE give on the robustness of well operators' well examination schemes for onshore shale gas extraction wells?

6.9 Yorkshire Water:

➤ Lines of enquiry:

- Hydraulic fracturing requires large amounts of fresh water supplies and the need to process large volumes of wastewater. The Institution of Civil Engineers estimates that 10,000 to 25,000 cubic metres of water would be required for each well.⁹ How confident is Yorkshire Water that our available water supply would be able to support a proliferation of wells in a licence block in North Yorkshire?
- What is our capacity to treat wastewater at licensed wastewater treatment facilities in the county?
- From April 2017, under the requirements of The Water Act 2014, non-household customers mainly or wholly in England will be able to choose their supplier of water and wastewater. What if any impact could there be of this in relation to the capacity and co-ordination of water companies to supply water for shale gas operations and treat the wastewater?

7. **Key Issues Identified**

7.1 Key issues raised and discussed at the meeting included:

- Environmental risks based around the noise, odours, traffic, leakages, proximity of wells to housing, transportation and congestion
- The water usage and disposal of contaminated water and other waste material, including Naturally Occurring Radioactive Materials.
- Climate change, green houses gases, carbon emissions – macro energy policy.
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⁹ ICE, Written Submission, House of Commons Environmental Audit Committee: '[Environmental risks of fracking](#)', January 2015

7.2 Many of the issues listed above are inter-related and, as we acknowledged at the meeting, because of this there needs to be a coherent approach and a plan going forward for shale gas operations in North Yorkshire – it should not be left to a piecemeal approach. Such an approach cannot be fixed in stone though as strategic plans cannot foresee and cater for every eventuality. Indeed it is a requirement of national policy and guidance that the Minerals and Waste Plan is kept flexible and under review.

Section 3 – Results of investigation: conclusions and recommendations

PART A: Contributing to the consultation on the Minerals and Waste Joint Plan

Introduction

Taking into account the extensive background information available on fracking and the results of the joint sub-committee on 22 January 2016 the Transport, Economy and Environment Overview and Scrutiny Committee and the Scrutiny of Health Committee, we recommend that the issues identified below are taken into account in any future drafts of the Minerals and Waste Joint Plan. In particular we hope our work will inform any further development of the following specific policies in the Plan:

Minerals:

- M16 - Overall spatial policy for hydrocarbon development
- M17 - Exploration and appraisal for hydrocarbon resources
- M18 - Production and processing of hydrocarbon resources
- M19 - Carbon and gas storage

Waste:

- W01 - Moving waste up the waste hierarchy
- W02 - Strategic role of the Plan area in the management of waste
- W04 - Meeting waste management capacity requirements – Commercial and Industrial waste (including hazardous C&I waste)
- W07 - Managing low level (non-nuclear) radioactive waste
- W08 - Managing waste water and sewage sludge
- W10 - Overall locational principles for provision of new waste capacity
- W11 - Waste site identification principles

Minerals and waste supporting infrastructure policies:

- I01 - Minerals and waste transport infrastructure
- I02 - Locations for ancillary minerals infrastructure

Development management policies:

- D02 - Local amenity and cumulative impacts
- D03 - Transport of minerals and waste and associated traffic impacts
- D04 - North York Moors National Park and the AONBs
- D05 - Minerals and waste development in the Green Belt
- D06 - Landscape
- D07 - Biodiversity and geodiversity

- D08 - Historic environment
- D09 - Water environment
- D10 - Reclamation and after-use
- D11 - Sustainable design, construction and operation of development
- D12 - Protection of agricultural land and soils

Exploring the issues

1. Buffer zones and minimum separation distances

Buffer zones

A number of people attending our meeting suggested putting in place buffer zones.

We have given consideration to the validity and merits of having buffer zones in the areas surrounding our National Parks and AONBs. This is because it is in these areas where landscape issues are particularly significant.

We can see that the advantages of buffer zones are:

- They provide greater level of protection to important environmental/heritage assets.
- It is a readily understood concept

We can see however that the disadvantages of buffer zones are:

- It is hard to justify objectively in planning terms the chosen size of a buffer zone.
- Large buffer zones leave relatively small residual areas suitable for development.
- They lack flexibility – some suitable locations for development could exist within generalised buffer zones.

Minimum separation distances

The idea of having minimum separation distances between well pads was suggested at the meeting and we saw a photograph of the Jonah Gas Field in Wyoming, United States showing a 'nightmare scenario' of well pads crowding the landscape. We must avoid such a concentration of well pads occurring in North Yorkshire as it would blight our landscape.

Minimum separation distances between well pads imply it is better to spread development out rather than concentrate development in particular areas. We believe this is a reasonable generalisation but such an approach would need to be implemented with a degree of flexibility. Any substantial stand-off distance e.g. one kilometre or more would be likely to prevent development in all but a few localised places (a quick browse over a 1:50,000 scale OS maps of the area soon confirms this) and could steer development towards areas less accessible to the main road network. Also minerals can only be worked where they are found in geologically suitable configurations, relatively free of faulting. This reduces locational flexibility to some extent. More generally though, the Minerals and

Waste Joint Plan should give more explicit consideration to spatial planning factors¹⁰ to guide the location of shale gas operations in the county. We need to ensure that overall the quality of the environment of North Yorkshire is preserved.

Understandably spatial planning for shale gas operations cannot be as detailed at this point in time as it is for other minerals and waste developments, where preferred sites have been identified such as with quarrying. No one yet knows for certain what the commercial scale of the shale gas industry could be in the county or which specific areas may be more favourable for commercial production. Whilst the policies in the draft Plan already address relevant issues to some extent, more detailed spatial policy criteria would help lay down some broad markers relating to the location of shale gas operations. They could relate to proximity to the built environment, the impact of the proposed development on the surrounding landscape and other important environmental constraints, noise levels generated by the development, traffic (including the transportation of water), light pollution and economic impacts.

2. Scale of Potential Cumulative Impact and Review of the Plan

It is apparent from the evidence provided at the joint sub-committee meeting that at this stage there is a lack of clarity on the potential scale of commercial interest in shale gas development in the county. Such clarity is only likely to be available after any initial exploration phase has been undertaken. Only then will we have a clear indication from the industry as to the scale of any commercially viable operations. Multiple drilling is a number of years away and the number of applications that are approved for production-scale fracking will also depend upon whether regulatory approval is obtained or not.

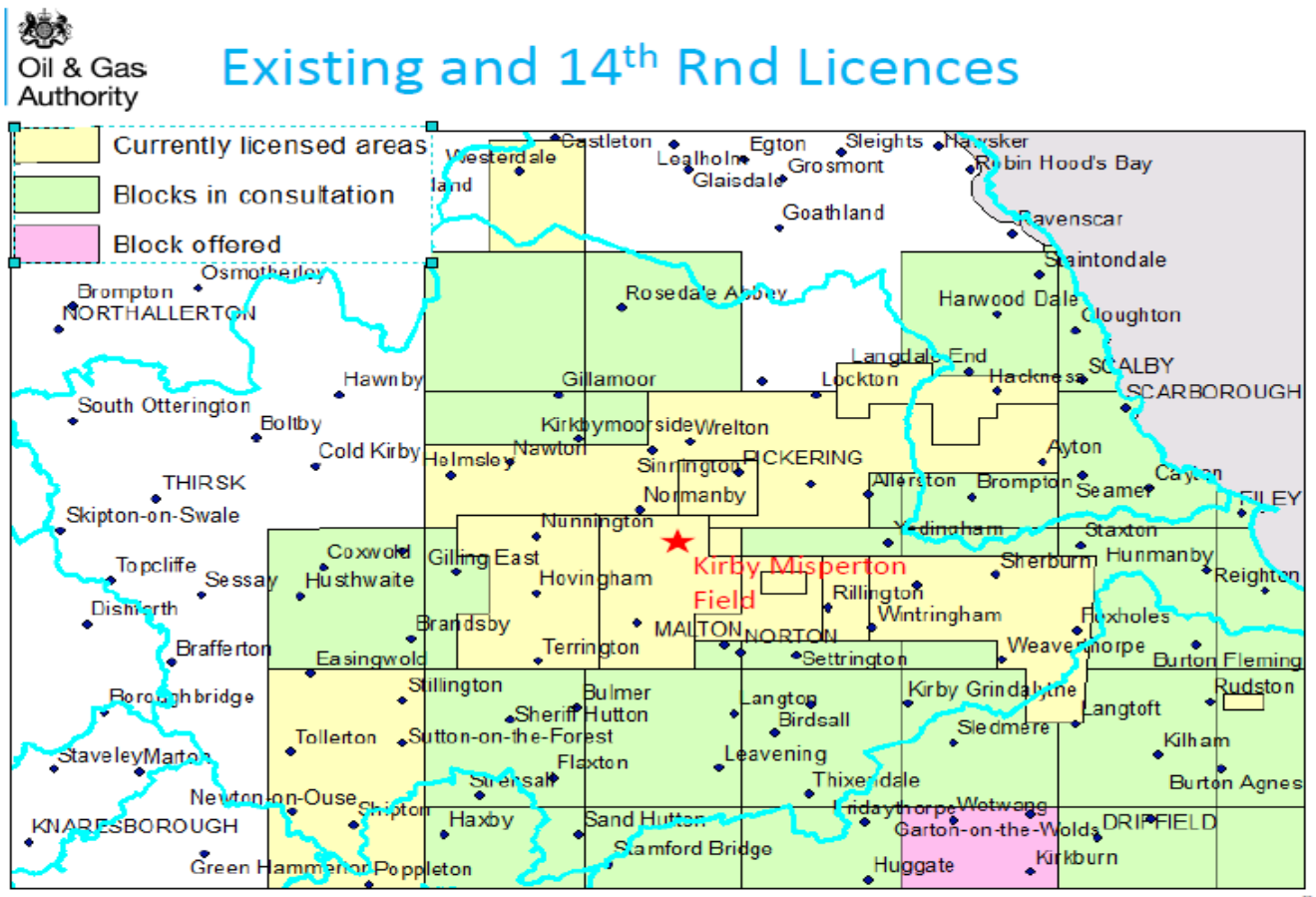
There was some dispute at our meeting between Friends of the Earth versus the UK Onshore Operators Group (UKOOG) and the Department of Energy and Climate Change (DECC) about the extent to which planning applications can consider the cumulative impacts of shale gas operations.

- DECC and UKOOG pointed out that planning guidance and the Infrastructure Act 2015 require the Planning Authority to look at cumulative impacts. They note that it is not just the cumulative impacts of the shale gas industry that need to be taken into account but also the impacts of other industries close by so that they can be added together.
- The representative from Friends of the Earth however put forward the view that there are inconsistencies which are not helpful to us as the Planning Authority. She argued that the online planning guidance states that decision takers should look at the application on its merits whilst in an Environmental Impact Assessment (EIA) the cumulative impacts should be taken into account.

¹⁰ Spatial planning is the management of space and development aimed at responding to the needs of society, the economy and the environment.

We note that where an EIA has been carried out it must be taken into account in determining the planning application, including any assessment relating to cumulative impact. The County Council, as the Mineral Planning Authority, has to consider whether developments such as proposals for onshore oil and gas require an Environmental Impact Assessment, and is guided by the relevant legislation in this regard¹¹.

In August and December 2015, the Oil and Gas Authority released details of new onshore oil and gas licences offered under the 14th round as shown below:



Source: PEDL (Petroleum Exploration and Development Licence) blocks and blocks offered in 14th round licencing, OGA.

NOTE: The map is now out-of-date as the areas shown as 'Blocks in consultation' are (as of December 2015) now 'Blocks offered'.

Currently, the draft Minerals and Waste Joint Plan seeks to minimise 'cumulative' impact arising from other hydrocarbon development activity in proximity to new proposed development, including any impacts from successive hydrocarbons development taking place over substantial periods of time¹². We agree this criteria-based approach provides a degree of flexibility taking into account the

¹¹ [Schedules 1 and 2 of the Town & Country Planning \(Environmental Impact Assessment\) Regulations 2011, SI No. 1824](#)

¹² Minerals and Waste Joint Plan: Preferred Options Consultation, (City of York Council, North York Moors National Park and North Yorkshire County Council), November 2015, page 88

uncertainty in the scale of the industry referred to above. The County Council will always need to retain a degree of flexibility in its planning policies. Indeed it is unlikely to be appropriate to develop a prescriptive policy due to the fact that there are so many uncertainties about the extent of any future developments and how the industry may seek to operate.

However, notwithstanding the fact that there is very little information on the potential scale of fracking activities that could occur locally, the possible implications of fracking need to be given greater prominence in the Plan. Accommodating (and planning for) a large scale shale gas industry has particular challenges and could give rise to substantial impacts that need addressing. These arise partly as a result of it being a 'new' industry with unfamiliar processes and significant uncertainties about how the industry may develop in terms of scale and location. Consequently Policy M16 should be made more explicit in terms of the criteria that will be applied to assess any cumulative impacts arising from a proliferation of well sites.

3. Infrastructure – Traffic

A key issue for the Minerals and Waste Joint Plan is how the environmental/amenity impacts of transportation associated with a shale gas industry can be planned for and controlled. Also as the Minerals and Waste Joint Plan Preferred Options Consultation document notes: 'Traffic may be a particular consideration for shale gas development due to the need, in some cases, to bring in substantial quantities of water and other materials and to dispose of waste water. The availability of suitable water resources may also need to be considered.'¹³

Improving east west connectivity in the county is one of the Council's strategic transport priorities and it has identified a number of road schemes to realise this aim. However such schemes take many years to come to fruition. They are by their very nature large scale and expensive and are unaffordable from normal County Council transport budgets. Such projects will depend upon government funding and the direction that devolution takes in the county. Also the A64 which cuts through Ryedale district, (where many of the PEDL licence blocks are) is not managed or maintained by the County Council, though we continue to lobby government to create a dual carriageway between York and Malton.

We acknowledge that each year several million tonnes of aggregate materials (sand, gravel and crushed rock) are extracted in North Yorkshire and transported by lorry. However production-scale shale gas extraction would likely take place in a more concentrated geographical area.

We took evidence at the meeting about the amount of traffic that could be generated by shale gas operations, and this was clearly a concern expressed by many members of the public speaking at our meeting. Information about vehicle movements relating to a shale gas operation is set out in the environmental impact

¹³ Minerals and Waste Joint Plan: Preferred Options Consultation, (City of York Council, North York Moors National Park and North Yorkshire County Council), November 2015, page 88

assessment in the noise management plan and the transport management plan that the operator puts forward to the Minerals and Waste Planning Authority.

The representatives from the UK Onshore Operators Group (UKOOG) were asked at the meeting about how and if measures could be put in place to ensure that the volume of heavy goods vehicle traffic required for fracking will not have a significant traffic impact on local roads, especially in areas where new road building is impractical or environmentally destructive.

UKOOG argued that in terms of transport impacts and impacts on the environment, the first phase of development (construction) is no different from any other construction site so the impacts both from the local community and from an environmental assessment point of view are well known. Exploration represents a period - two to three months and peaks occur principally at the start and end of construction where equipment is mobilised and demobilised. However we also wanted to know what the long term traffic movements would be for a typical well. UKOOG explained that at present there is not a typical well but offered to provide data based upon three recent exploration sites following the meeting. This data is contained in UKOOG's submission following the meeting in **Appendix 2**.

The Environment Agency confirmed at the meeting that because of the likely Naturally Occurring Radioactive Materials (NORM) content within the water, it would accept that in terms of recycling, the water might be re-used on-site. This means that the operator might use the same base-water for several fractures. However, ultimately that water would end up at a specialist waste facility to be treated. This is because the waste water generated in fracking operations contains heavy metals (such as cadmium, mercury and lead), alongside NORM and methane. Yorkshire Water confirmed at the meeting that there are two, possibly three sites that the waste water could go to. These are located in West and South Yorkshire. Yorkshire Water has the choice whether to accept or refuse the waste water at its sites. It is normally the case though that industrial waste generally comes to the specialist treatment works via an approved third party provider. The third party providers have to be approved by the Environment Agency. We did not investigate how developed the market is in relation to third party providers.

UKOOG raised the point that in the United States truck movements also include carrying water to the site whereas in the United Kingdom the industry tends to use water from the mains on site. The industry in the UK also has an aspiration for water treatment technology to be introduced on site so that operators no longer have to transport waste water away. However this is going to be some years off. Evidence given to the current Cuadrilla Bowland Ltd. and Cuadrilla Elswick Ltd Public Inquiry^{14 15} suggests that the development and permitting of alternative (more local) specialist treatment facilities will not be achieved quickly in Lancashire. Presumably this will be the case in North Yorkshire because as elsewhere it will largely depend upon market forces, as discussed below.

¹⁴ <http://www.lancashire.gov.uk/council/planning/major-planning-applications/shale-gas-developments-in-lancashire.aspx>

¹⁵ <http://programmeofficers.co.uk/lancashire/>

It is a policy objective in the draft Minerals and Waste Joint Plan to seek to provide capacity in our area to deal with waste arising in the area and conversely to provide some capacity in our area for dealing with waste from outside the county. In practice however it is difficult to realise this as it is largely determined by the operation of market forces including, in the case of the waste arising from shale gas operations, where the specialist waste water treatment sites are located. The draft Minerals and Waste Joint Plan (in particular Policy W02) acknowledges some waste types will need to be dealt with outside the county. Either way, Policy W02 should provide specific reference to how the waste arising from the development of an onshore oil industry will be managed.

4. Light pollution

The Campaign to Protect Rural England states that satellite data shows that light pollution in the Yorkshire and Humber region increased by 28% in the region between 1993 and 2000, a greater increase than the national average. North Yorkshire lost more than a third of its truly dark area¹⁶. Concerns were expressed at our meeting about further light pollution occurring as a result of shale gas operations.

UKOOG told us that ways to mitigate night time light pollution are included in the Environmental Impact Assessment and in the planning consent documents that are approved by the Minerals and Waste Planning Authority (the County Council). Light pollution is at its highest when the site is being constructed and drilling activity takes place. This is because that tends to be when operations run around the clock. UKOOG stated that during the production stage light pollution levels are reduced to “very low levels”. Mitigating measures can take place by angling the lights downwards.

The Minerals and Waste Joint Plan should be more explicit in terms of the criteria that will be applied to assess and minimise impact from light pollution arising from shale gas operations. This is especially important if and when the industry grows in North Yorkshire.

5. Noise pollution

We questioned how the industry will ensure that there will not be excessive and/or continuous noise near drilling sites.

The applicant produces a noise management plan as part of the Environmental Impact Assessment submitted to the Minerals and Waste Planning Authority. In the plan each operator will identify how they are going to mitigate the noise as much as possible. The draft Minerals and Waste Joint Plan states that: ‘Mineral Planning Authorities will ...expect applicants for these forms of development [hydrocarbon extraction] to provide a robust assessment of any potential impacts and to include comprehensive proposals for mitigation and control where necessary’¹⁷.

¹⁶ [‘Night Blight in Yorkshire and the Humber’](#) Campaign to Protect Rural England, 2012

¹⁷ Minerals and Waste Joint Plan: Preferred Options Consultation, (City of York Council, North York Moors National Park and North Yorkshire County Council), November 2015, page 95

It is worth noting here that the County Council is the monitoring and enforcing authority. We have a responsibility to work with our district councils where monitoring/enforcement require their expertise.

Again, the relevant policies in the Minerals and Waste Joint Plan should be more explicit in terms of the criteria that will be applied to assess and minimise noise impact. This is in order to guide the noise management plans submitted by the applicant to the Minerals and Waste Planning Authority.

6. Climate change, green houses gases and carbon emissions: macro-energy policy and baseline monitoring of air quality

We appreciate that comments relating to macro-energy policy and the monitoring and enforcement of emissions and pollutants from shale gas operations, where they fall within the scope of other regulatory regimes, are not aspects that can be addressed in the Minerals and Waste Joint Plan. They are instead detailed regulatory matters. However we considered these issues at our meeting in order to inform the Executive's response to the petition presented to the Ryedale Area committee.

We heard conflicting views at the meeting about the impact of shale gas extraction in tackling climate change. Shale gas is a fossil fuel after all.

- Friends of the Earth pointed out that the target set by the Committee on Climate Change is that average emissions of UK electricity generation by 2030 needs to be 50 grammes CO₂ by kilowatt hour. The average emissions from gas fired power generation is 450 grammes CO₂ by kilowatt hour. The focus therefore should be on renewable energy sources in order to tackle climate change. Friends of the Earth do not believe that shale gas should be part of the energy mix for the UK. Instead they believe that when discussing energy security a distinction needs to be made between 'security of supply' and 'security for the user'. The focus should be on 'security for the user' by reducing the need for energy overall for example through better insulation of buildings and the development of super-energy efficient appliances.
- By contrast the representative from the Department of Energy and Climate Change told us that the government believes that shale gas may provide significant potential in providing a home grown energy source to help improve the UK's energy security. Shale gas could help meet the UK's carbon reduction targets by providing an alternative to more carbon intensive sources such as coal and those with a higher carbon footprint such as imported liquefied gas. Whilst the government wants the UK to successfully transition in the longer term to a low carbon economy, access to safe and secure supplies of natural gas for years will need to come from part of that transition. Gas is an important part of our energy mix and currently provides a third of our total energy supply.
- We heard evidence at the meeting that methane, which is produced during shale gas extraction, is a more harmful greenhouse gas than carbon

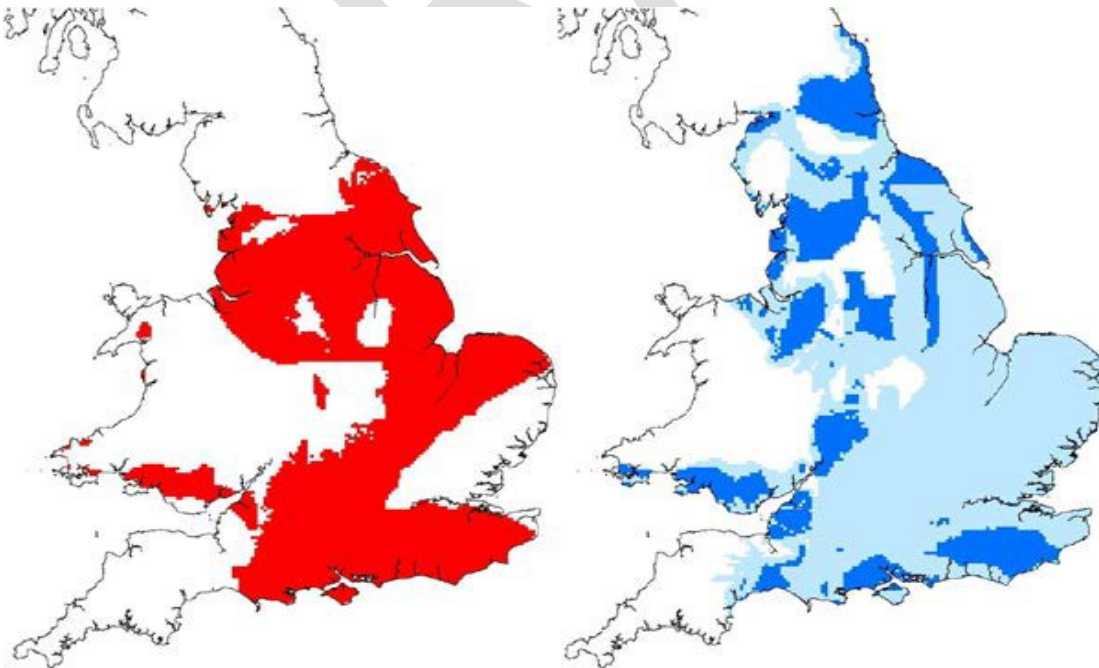
dioxide. The public questions/statements submitted to our meeting raised concerns about methane leaks arising from shale gas operations and that fracking companies in the United States have persistently under-reported to government agencies about leakages of methane. Account has to be taken though of the different regulatory framework in place in the United Kingdom, in particular the role that the Environment Agency, the Oil and Gas Authority and the independent well examiner play. National Planning Policy states that, in determining planning applications, planning authorities should assume that the other regulatory regimes will be applied effectively.

Further information about climate change and macro-energy policy is provided by Friends of the Earth, UKOOG and DECC in **Appendix 2**.

Locally, the British Geological Survey is leading on an independent environmental baseline monitoring study in the Vale of Pickering. This includes amongst other aspects monitoring real-time greenhouse gases and air quality.¹⁸ A concern that we have though is that at present this baseline monitoring will only take place for the first few sites. The representative from DECC present at our meeting confirmed that this would be kept under review to check that the baseline monitoring carried out for the first few sites remains appropriate for the scale and size of the industry as it develops. At the very least this needs to be the case. This is because a comprehensive picture needs to be built up, taking into account different geological factors between site specific areas. Baseline monitoring at all proposed sites would provide the most comprehensive picture.

7. Water supply – long term security and baseline monitoring

- *Risk of Contamination of the water supply*



¹⁸ The monitoring also includes monitoring water quality (groundwater and surface water), seismicity, ground motion, radon and soil gas <http://www.bgs.ac.uk/research/groundwater/shaleGas/monitoring/yorkshire.html>

Left map above: Full extent of potential shale gas/oil source rocks in England and Wales.

Right map above: Full extent of Principal Aquifers in England and Wales (blue), extent of aquifers shallower than 400 m (pale blue).

Source¹⁹

The contamination of groundwater supplies and aquifers is often a concern raised in relation to shale gas operations. There are two main aspects in relation to this. The first is locational policy to help prevent development taking place in higher risk areas – a legitimate planning policy issue for the County Council. The second is well integrity. Well integrity is a matter for other regulators. However the issue was explored to inform the Executive’s response to the petition considered by the Ryedale Area Committee.

The Health and Safety Executive provided us with a detailed response of what safeguards are put in place in terms of well integrity. We queried why structural weaknesses had been identified at the Preese Hall well site in Lancashire and sought assurances that horizontal wells do not have a higher failure rate than for vertical wells. This is because drilling will be able to take place horizontally beneath protected areas – National Parks, SSSIs etc.

As mentioned earlier, the British Geological Survey is leading on an independent environmental baseline monitoring study in the Vale of Pickering. This includes amongst other things monitoring water quality (groundwater and surface water).²⁰ The government has only committed for such baseline monitoring to take place for the first few sites. A far more comprehensive picture needs to be built up, though, taking into account different geological factors between site specific areas above and beyond the safeguard in the Infrastructure Act 2015 banning hydraulic fracturing from taking place in land at a depth of less than 1000 metres.

- *Sustainability of the water supply*

We explored the long term sustainability of our water supplies being able to sustain a fracking industry. Again this is probably less of an issue for the Minerals and Waste Joint Plan and more about informing the Executive’s response to the petition. There are however planning implications as water utility companies are statutory consultees in fracking planning applications and in the development of planning policy.

As the House of Commons Environmental Audit Committee noted: ‘Fracking itself requires considerable quantities of water and could pose localised risks to water supplies if catchments were over-abstracted or water supplies were stressed already. Commercial operators can source water for hydraulic fracturing either directly from surface water or groundwater, or from the local mains water

¹⁹ [‘BGS maps help understand relationship between groundwater and fracking’](#) Environment Agency press release, 3 July 2014

²⁰ <http://www.bgs.ac.uk/research/groundwater/shaleGas/monitoring/yorkshire.html>

supply'²¹. The Chartered Institution of Water and Environmental Management has stated though that whilst the volume of water used in hydraulic fracturing appears to be large when viewed in isolation, when set in the context of national or regional water supply it is comparable with other industries.²²

We asked Yorkshire Water at our meeting if our available water supply would be able to support a proliferation of wells in a licence block in North Yorkshire, bearing in mind the anticipated growth of housing in the county over the next few years, which will inevitably place an additional strain on the system.

The representative from Yorkshire Water confirmed that in terms of our overall ability to supply water there is a countywide 'grid system' in place that can transport water from several different sources such as reservoirs, rivers and groundwater sources. Yorkshire Water has produced calculations based on the absolute maximum number of fracking pads that could be developed in the prospective area. This includes the 'worst case' scenario of 20 mega litres for each frack, with the assumption that the operator will drill every single well within 10 years. Yorkshire Water has concluded that on a daily basis that represents between one and two per cent of its daily production, and states that this is well within its capability to supply.

Yorkshire Water confirmed that what we do potentially face are difficulties locally, in that the local supply system might not be able to supply the amount of water that is required in the timescale that the shale gas operator requires it. In that case Yorkshire Water confirmed that they would enter into negotiations with the company. Water utility providers are obliged to supply any legitimate business with water. However if Yorkshire Water needed to increase its supply capability by laying pipelines and putting in pumping stations it would be for the operator to fund those developments and Yorkshire Water would need to supply them with the water if it was possible. That assumes that all of the water came from the main supply. However the operators are at liberty to try and find other sources of water so they can extract from rivers, they can drill boreholes or they could use someone else's water source. We did not explore further what would happen during drought conditions.

We raised the issue that a substantial number of properties in rural areas are not on mains water and instead have their own boreholes. We sought assurances on what protections exist and by whom for dealing with private water supplies close to shale gas operations. We were informed that the Environment Agency has this responsibility and defines a default 50 metre radius source protection zone around every borehole. The Environment Agency also looks at any impacts on private water supplies from such activity.

- *Dealing with the risk of flooding on site*

Negligence associated with storage, transportation and operational spills represent the greatest threats to surface water, as well as to groundwater from

²¹ House of Commons Environmental Audit Committee, '[Environmental risks of fracking](#)' January 2015, page 22

²² House of Commons Environmental Audit Committee, '[Environmental risks of fracking](#)' January 2015, page 22

fracking operations²³ We were keen to explore with the regulators present at the meeting what enforceable safeguards can be put in place to ensure that the waste water is stored safely above the ground on-site even in the event that heavy rainfall causes the site to flood. We are mindfully aware of the issues in the United States of waste water being stored in lagoons exposed to the open air.

The Environment Agency insists on bunded or double skinned tanks to make sure that any spills or failures of those tanks are contained on the site. The tank sits on top of an impenetrable membrane with a drainage facility around it that will include an interceptor to ensure that there are no spills on the actual site migrating on to unprotected soil and then into the groundwater. Again, there are two aspects in relation to this – locational policy to help minimise risk and suitable safeguards to manage surface water spills on a well site, which is a matter for other regulators.

8. Economy

A member of the public wrote to us stating that: “Yes we do need jobs and we do have to look to the future but it’s not right to bring an industry into the area that then decimates other economies. We cannot have the situation that, for the fracking industry to be successful, peoples’ lives are turned upside down and the countryside spoiled.”

A proliferation of well sites in a concentrated area could impact negatively upon tourism – one of North Yorkshire’s key industries. Our environment is a key asset in encouraging tourism to North Yorkshire. Tourists like residents will also have concerns about contamination of the water supply and other pollutants arising from shale gas operations. Traffic on key routes used by visitors, particularly at peak periods, could also be a relevant factor.

An early draft of an internal document²⁴ for Defra stated amongst other things that:

- fracking may reduce the number of visitors and tourists to the rural area, with an associated reduction in spend in the local economy;
- house prices in close proximity to the drilling operations are likely to fall. However, rents may increase due to additional demand from site workers and supply chain;
- Rural economy businesses that rely on clean air, land, water and/or tranquil environment may suffer losses from this change such as agriculture, tourism, organic farming, hunting, fishing and outdoor recreation.

Defra states however that the document is not analytically robust and was never intended as considered Defra positions or as statements of fact. The paper refers to data from overseas studies which cannot be used to predict impacts in the UK with any degree of reliability.

²³ CIWEM, Written Submission, House of Commons Environmental Audit Committee, [‘Environmental risks of fracking’](#) January 2015

²⁴ [‘Draft Shale Gas Rural Economy Impacts paper’](#) March 2014

The Institute of Directors believes that shale gas could represent a multi-billion pound investment, creating tens of thousands of jobs, reducing imports, generating significant tax revenue and help to support British manufacturing.²⁵

The DECC representative attending our meeting stated that there are economic benefits from a successful shale gas sector in the UK, though acknowledged that the scale of these benefits will depend on the scale of any production sector.

EY (Ernst & Young) has estimated that a thriving shale gas industry could require around £33 billion of investment over the period to 2032 and could mean as many as 64,000 jobs nationally at peak.²⁶

It is unclear to what extent local employment opportunities would arise in North Yorkshire as it would depend upon the skills base of the local population. However some local jobs might be created in supply chain businesses.

A more recent report by the Task Force on Shale Gas²⁷ concluded that the development of a shale gas industry would create a substantial number of jobs for the country but went on to state that it will not be possible to ascertain an accurate estimate of the scale of this opportunity until there is a clearer picture about the amount of recoverable gas. The report also noted the potential for adverse impacts on existing economic interests, including the tourism and recreation sector. The Task Force suggested, however, that the impact on tourism can be mitigated and minimised through the current regulatory system as it can make recommendations regarding vehicle movements and hours of operation.

Communities hosting shale gas development would share in the financial returns that they generate. Operators have committed to make set payments to these communities: £100,000 for each exploration well and in the production stage 1% of revenues. As announced by the Chancellor in the Spending Review in November 2015, the government will commit up to 10% of shale gas tax revenues to a shale wealth fund to local communities and local regions. Local councils will be able to retain 100% of the business rates they collect from productive shale gas developments.

It is in fact difficult if not impossible to predict the economic impacts of shale gas operations in North Yorkshire. This is because it will depend upon how, where and if the industry develops in the county. This is another reason why it is important the Minerals and Waste Joint Plan is more explicit in terms of the criteria that will be applied to assess any cumulative impacts arising from a proliferation of well sites, with the aim of achieving a reasonable balance between protecting the existing economy and supporting new development in appropriate locations, in line with national policy. To this end criteria could be developed in the Plan to seek to help protect aspects of the existing economy in those areas where shale gas operations are being proposed.

²⁵ ['Getting shale gas working'](#) IoD, May 2013

²⁶ ['Getting ready for UK shale gas: Supply chain, skills requirements and opportunities'](#) EY (Ernst & Young), April 2014

²⁷ [Task Force on Shale Gas Final Report on Economic Impacts \(2015\)](#)

9. Public Health: surveillance and monitoring

At the meeting we queried how comprehensive and robust the research and information is on the public health impacts of fracking. A significant point raised at our meeting is that in the United States baseline monitoring was not undertaken prior to shale gas operations commencing. This means that pre-existing levels of methane, water quality, seismicity, air quality, radon and soil gas etc. are not known and so the impacts that fracking has had upon these cannot be measured.

Again, our findings here are intended to inform the Executive's response to the petition submitted to Ryedale Area Committee.

Public Health England's 2014 report on the potential public health impacts from shale gas extraction concluded that there are potential risks but the probability is low if shale gas operations are well regulated and well run. However the report only looked at exposures to chemical and radiological pollutants. The report did not look at the broader public health aspects as that was not part of its remit. Since the report was produced Public Health England told us that it has continued to review the evidence that is available. It remains of the view that the conclusions and recommendations of the 2014 report continue to be supported from the evidence that it has received since.

The Public Health England representatives at our meeting made the point that most of the research on public health impacts relates to countries that have a more developed shale gas industry, notably the United States and Australia. Both these countries have different regulatory frameworks to that in place in the United Kingdom. Therefore the context in which the data is collected has to be taken into account when trying to extrapolate findings to this country. However we hope that Public Health England continues to make a careful assessment of the growing number of peer reviewed health papers, even if they do relate to other countries. There is always merit in doing so.

We welcome the fact that Public Health England is part of the consortium being led by the British Geological Survey monitoring the environmental impacts independently to the monitoring carried out by operators. In particular Public Health England will be looking at radon levels. However as mentioned earlier in this report, this baseline monitoring will only relate to the first few sites. It is not known at this stage if the government will fund further studies to assess future cumulative impacts of fracking if and when a number of operations exist close by.

Public Health England explained to us that in its view there is a unique opportunity in the UK, in advance of the industry developing, to consider appropriate environmental and epidemiological studies to strengthen the existing evidence base. Its view overall though is that the regulatory framework in the UK will ensure that emissions are carefully controlled at source and therefore does not anticipate that shale gas activities will lead to adverse health impacts if the industry is properly run and regulated. However where opportunities arise for Public Health England to undertake studies on the health impacts of shale gas extraction it will do so.

The point was made by Members on the joint sub-committee, though, that scientifically we have not anywhere in this country measured detailed baseline health across every health issue. Therefore we not know when and if changes could occur. Public health impacts might not just relate to physical health effects but also mental health impacts (e.g. stress and anxiety), which may then translate into physical health problems.

We also asked if Public Health England has considered working with North Yorkshire's Public Health team to produce a pilot study with regards to baseline health that could then be rolled out nationally. We are pleased to note that North Yorkshire's Public Health team have begun discussing with colleagues in Public Health England about commissioning an appropriate study. A partner from an academic institution would be required and external founding sourced.

Clearly it will not be a simple exercise in carrying out such baseline monitoring. North Yorkshire's Director of Public Health pointed out that our Public Health team have access to data on causes of death, cancer registrations, GP registers and hospital admissions. The difficulties that those sources of routine data have, is that they do not give the timeliness of response. This means that issues might be picked up sometime after the events have happened. Looking at data just for North Yorkshire also does not generate enough statistical power. Another difficulty in looking at the impacts that shale gas operations may or may not have had upon a person's health, is trying to remove all the other factors that could have impacted upon that individual or population.

We hope that a relevant health-related baseline monitoring study can be commissioned so that reference can be made about any anomalies arising if and when shale gas operations go ahead in North Yorkshire on a significant scale. We appreciate that such a study would need to cover a wider area than North Yorkshire for the reasons cited above. Also the outcome of such a study would not be available to feed into the Minerals and Waste Joint Plan at this stage but would be relevant to any subsequent review once the Plan has been adopted, helping to inform yet further spatial planning considerations.

As with any industry where the use of chemicals is an intrinsic part, there are practical health-related implications to consider from shale gas operations. These include emergency services and GPs being sufficiently well-trained in responding to chemical spills or hydraulic fracturing explosions.

10. Bonds

A point raised at our meeting by both UKOOG and the Environment Agency is that the Minerals and Waste Planning Authority can in some exceptional circumstances require bonds or other appropriate financial provision to pay for any restoration of the site in the event that routine planning controls cannot be used.

We gave consideration as to whether the Minerals and Waste Joint Plan could stipulate the level of financial provision that will be required. However we concluded that this is unlikely to be practicable as it will depend upon the scale and nature of each operation. The objective of any provision though would be to

ensure the eventual restoration of the site is in line with planning requirements in the event of default by the operator/landowner.

Technical Guidance to the NPPF provides examples of exceptional circumstances where it may be reasonable for planning authorities to seek financial guarantees on individual planning applications. Examples given include where a novel approach or technique is to be used. The Minerals and Waste Joint Plan should include guidance on circumstances where financial provision may be required as a contingency in order to secure restoration of sites in the event that this cannot be secured through routine planning control.

Such financial provision would not be able to cover the clean-up costs arising from environmental contamination of a site. UKOOG informed us at the meeting that in the longer term the industry is looking at having in place mutual funds for bonds as the industry grows. There is a strong case to suggest though that the government should require the industry to develop such mutual funds early on in the development of the industry to pay for the clean-up costs of environmental contamination.

The Oil and Gas Authority also informed us about the financial health checks that it carries out to see if the proposed operator company is in sound financial health. This also extends to the other companies that would be involved in supporting the proposed operator. There are also three different types of insurance that operators have to put in place to cover various different types of risk: loss of well control, third party liability and environmental liability.

11. The Regulatory Framework

The 'road map' from the Regulatory Framework can be found [here](#)

The road map highlights the key pieces of legislation and regulation but within the scope of this scrutiny project it has not been possible to establish conclusively whether or not there are any gaps in the framework. As detailed in the minutes of the meeting (**Appendix 1**), we heard contrasting views from Friends of the Earth and the other representatives present about the extent to which the existing regulatory structure is fit for purpose.

The County Council ultimately has to work on the basis that the regulatory aspects that are carried out by the other regulators in respect of shale gas operations will operate effectively. However what is clear is that the regulators will need to be sufficiently well resourced to carry out their job. At our meeting we received assurances from the Environment Agency and the Health and Safety Executive that this is currently the case, and additional funding is being provided by the government. However no-one truly knows yet the scale of the industry in the production stage. Friends of the Earth made the point that the County Council will need to ensure that it has sufficient resources not only at the planning application stage but also to ensure that it can monitor and enforce the planning conditions that it sets should they be breached.

In the Cuadrilla Bowland Ltd. and Cuadrilla Elswick Ltd Public Inquiry^{28 29}, which commenced after our joint sub-committee meeting was held, doubts have been raised about some aspects of the current regulatory framework³⁰. The inquiry closed on Wednesday 16 March 2016. We acknowledge that if the outcome of the review shows that there are gaps in the detailed, technical regulation, there is little the County Council could do other than lobby government to close any regulatory gaps. It would only be if the review has identified the existence of gaps that could be filled by the Minerals and Waste Planning Authority that it could actually help influence content of our Plan. The finalised Minerals and Waste Joint Plan should therefore take into account any relevant issues where they are known in time to inform the content of the Plan. We appreciate that the final outcome of these appeals could be a long way off, taking into account the potential for legal challenge once an initial decision has been reached.

12. Reviewing the Plan

As mentioned earlier in this report, as things stand at present there is a lack of clarity on the potential scale of commercial interest in shale gas development in the area. Such clarity is only likely to be available after any initial exploration phase has been undertaken. When more information becomes available about commercial viability this should then be taken into account in any subsequent review of the Minerals and Waste Joint Plan. We also need to be able to learn the lessons from the on-going surveillance monitoring of the potential environmental and public health impacts of fracking.

In light of the above the Plan needs to be reviewed at timely intervals. The timescale of the review should be determined by the availability of new and useful evidence such as after a phase of exploratory activity has occurred, yielding enough information for us to draw more meaningful conclusions about the likely scale and location of future activity. More detailed policies for these forms of activity could then be developed. Changes to national policy would also warrant a review of the Plan. In the meantime the Plan should be more explicit in strategic (spatial) planning terms regarding the siting of shale gas operations and the criteria that will be applied to assess the cumulative impacts of a proliferation of well sites.

²⁸ <http://www.lancashire.gov.uk/council/planning/major-planning-applications/shale-gas-developments-in-lancashire.aspx>

²⁹ <http://programmeofficers.co.uk/lancashire/>

³⁰ Shale gas sites could be approved without any regulator investigating whether there was available capacity to treat liquid waste. [‘Mind the Gap: Inquiry exposes loophole in fracking waste regulations’](#) Byline, 6 March 2016

Summing Up

Our summing up points and suggestions to inform production of the Minerals and Waste Joint Plan for North Yorkshire, York and the North York Moors National Plan with regards to hydraulic fracturing ('fracking'):

- There are advantages and disadvantages of having buffer zones in the areas surrounding our National Parks and AONBs. Minimum separation distances would need to be implemented with a degree of flexibility if the County Council was to have such an approach. Overall though the Minerals and Waste Joint Plan should give more explicit consideration to spatial planning factors. This is in order to lay down some broad markers relating to the location of shale gas operations. We need to ensure that overall the quality of the environment in North Yorkshire is preserved.
- The scale of commercial interest in shale gas development in the county will only become clearer after the exploration phase has concluded. Consequently multiple production-scale drilling sites are some years off and will also depend upon whether regulatory approval is granted or not. However in advance of this, Policy M16 in the Minerals and Waste Joint Plan should be made more explicit in terms of the criteria that will be applied to assess any cumulative impacts of a proliferation of well sites. This could be in terms of traffic generated, light and noise pollution, long term security of the water supply and economic impacts. Related to this Policy W02 should provide specific reference as to how the waste arising from the development of an onshore oil industry will be managed.
- Environmental baseline monitoring is being led by the British Geological Survey in the Vale of Pickering and Lancashire. It is uncertain at this stage whether such monitoring will continue beyond the first few sites. Baseline monitoring needs to be on-going though in order to build up a comprehensive picture taking into account different geological factors between site specific areas. This in turn would help inform the Minerals and Waste Joint Plan.
- A relevant health-related baseline monitoring study would help identify any anomalies arising if and when shale gas operations go ahead in North Yorkshire on a significant scale. We acknowledge that such a study would need to cover a wider area than North Yorkshire and the outcome of such a study would not be available to feed into the Minerals and Waste Joint Plan at this stage. However such a study would be relevant to any subsequent review once the Plan has been adopted.
- The economic impacts of shale gas operations in North Yorkshire will depend upon how, where and if the industry develops in the county. However criteria could be developed in the Plan to seek to help protect aspects of the existing economy in those areas where shale gas operations are being proposed.

- The County Council, as the Minerals and Waste Planning Authority, can under some circumstances require bonds or other appropriate financial provision from the industry to pay for site restoration. The Minerals and Waste Joint Plan should include guidance on circumstances where financial provision may be required in the event that this cannot be secured through routine planning control. Separate to this, there is a strong case to suggest that the government should require the industry to develop mutual funds for bonds, early on in the development of the industry, to deal with the occurrence of environmental contamination.
- The County Council ultimately has to work on the basis that the regulatory aspects that are carried out by the other regulators in respect of shale gas operations will operate effectively. After our joint sub-committee meeting was held the Cuadrilla Bowland Ltd. and Cuadrilla Elswick Ltd Public Inquiry commenced. Some doubts have been raised about some aspects of the current regulatory framework. The finalised Minerals and Waste Joint Plan should take into account any relevant issues where they are known in time to inform the content of the Plan.
- When more information becomes available about the commercial viability of shale gas extraction in North Yorkshire, this should then be taken into account in any subsequent review of the Minerals and Waste Joint Plan. The timescale of the review should be determined by the availability of new and useful evidence and/or changes in national policy.

PART B – The petition considered by the Ryedale Area Committee

Observations:

The government supports the development of shale gas in the United Kingdom, provided that it is carried out in a safe and sustainable manner.

The County Council's Planning and Regulatory Committee is a quasi-judicial body and so is required by law to look at applications on their own merits taking into account the development plan (including the Minerals and Waste Local Plan once adopted) and other material considerations including national planning policy and guidance.

National Planning Policy sets out a presumption in favour of sustainable development.

In 2015 the government announced that local authorities will have 16 weeks to make a decision on shale gas exploration applications before the Secretary of State may intervene to take the decision on their behalf.

According to a letter sent in July 2015 to Chancellor George Osborne and signed by the Energy Secretary, the DCLG Secretary and the Environment Secretary, there is the possibility that the government will classify shale gas wells as

'nationally significant infrastructure' in the future. This would mean that local authorities would not be able to refuse planning applications for shale gas operations.³¹

Recommendations

That the Report is:

- provided as a consultation response to inform the publication of the Minerals and Waste Joint Plan for North Yorkshire, York and the North York Moors National Park) where it deals with issues relating to Hydraulic Fracturing ('Fracking'); and
- submitted to the Executive to inform the Executive's considerations regarding the petition considered by the Ryedale Area Committee on 10 June 2015.

County Councillors Andrew Backhouse and Jim Clark
5 April 2016

Appendices:

- Appendix 1: Minutes of the Joint Sub-Committee Meeting of the Transport, Economy and Environment Overview and Scrutiny Committee and the Scrutiny of Health Committee held on 22 January 2016.
- Appendix 2: Additional evidence provided by the external organisations following the meeting held on 22 January 2016.

³¹ ['Ministers plot to foil anti-frackers'](#) The Telegraph, 30 January 2016

North Yorkshire County Council

Joint Sub-Committee Meeting of the Transport, Economy and Environment Overview and Scrutiny Committee and the Scrutiny of Health Committee

Minutes of the meeting held at County Hall, Northallerton on 22 January 2016 at 10.00 am.

Present:-

Members:-

County Councillors: Val Arnold, Andrew Backhouse, John Blackburn (sub. for Margaret Atkinson), Robert Baker, Philip Barratt, David Billing, Liz Casling, Jim Clark, John Clark, Margaret-Ann de Courcey-Bayley, John Ennis, Andrew Goss, Michael Heseltine, Robert Heseltine, Peter Horton, David Jeffels, Penny Marsden, Heather Moorhouse, Robert Packham, Chris Pearson, David Simister, Andy Solloway, Cliff Trotter, Richard Welch and Robert Windass.

Co-opted Members:-

District Council Representatives:- Kevin Hardisty (Hambleton), Judith Chilvers (Selby), Bob Gardiner (Ryedale), Jane E Mortimer (Scarborough), Linda Brockbank (Craven), Karin Sedgwick (Richmondshire) and Ian Galloway (Harrogate).

In attendance:-

County Council Officers: Bryon Hunter (Scrutiny) and Jonathan Spencer (Scrutiny)

38 members of the public and press

Present by invitation: Naomi Luhde-Thompson (Friends of the Earth), Ken Cronin (UK Onshore Oil and Gas), Steve Thompsett (UK Onshore Oil and Gas), Dr. Andrew Buroni (RPS Planning & Development), Emily Bourne (Department of Energy and Climate Change), Toni Harvey (Oil and Gas Authority), Martin Christmas (Environment Agency), Ben Hocking (Environment Agency), Greg Hodgson (Public Health England), Simon Padfield (Public Health England), Tony Almond (Health and Safety Executive) and Mark Morton (Yorkshire Water).

Apologies for absence were received from: County Councillors Margaret Atkinson and Shelagh Marshall.

1. Election of Chairman

Bryon Hunter sought nominations for the election of Chairman.

County Councillor Jim Clark nominated County Councillor Andrew Backhouse. This nomination was seconded by County Councillor Bob Packham. There were no further nominations and County Councillor Andrew Backhouse was elected unanimously as Chairman by a show of hands.

Resolved -

That County Councillor Andrew Backhouse be elected Chairman for the duration of the meeting.

2. Chairman's Introduction

The Chairman welcomed County Councillors, external organisations invited to the meeting and members of the public.

He referred to the report and related appendices providing the background to the meeting.

He noted that it was a key meeting in the forward plan of the draft Joint Minerals and Waste Plan, in particular in helping to recommend how the County Council should treat and handle policy and recommendations relating to the process of hydraulic fracking if and when any applications are approved through its Planning and Regulatory Functions Committee. He went on to note that the joint sub-committee is not a planning committee and so its role is not to comment upon or determine individual applications.

He referred to the Ryedale Area Committee meeting held on 10 June 2015 at which it had considered a petition demanding that: "the North Yorkshire County Council publicly oppose fracking and all other forms of unconventional fossil fuel extraction in North Yorkshire, and that this anti-fracking position should be reflected in all decisions relating to mineral planning applications in North Yorkshire". The Area Committee resolved to note the petition and to recommend that further investigation on the matter is commissioned by the Executive from the Transport, Economy and Environment Overview and Scrutiny Committee and the Health Overview and Scrutiny Committee. At its meeting on 7 July 2015 the Executive resolved to consider taking the action the petition requested after hearing the views of the two scrutiny committees. The two scrutiny committees had formed the joint sub-committee to take this work forward.

He said that the Joint Minerals and Waste Plan is currently at the public consultation stage and once finalised will provide the context under which all mineral planning applications including fracking will be judged up to 2030. It is appropriate therefore that the joint sub-committee is involved in that development and advises the Executive as requested.

The key purpose of the meeting is to consider the broad strategic aspects around fracking including considering the extent to which the Plan is 'future proof' should there be a proliferation of wells across the county. The joint sub-committee will also be assessing whether there are any regulatory gaps or ambiguities in the regulatory framework and the general risks associated with fracking activity. This is with a view to then influencing how the Plan could address these problems, for instance, through the publication of supplementary guidance.

He went on to explain the process and procedure of the meeting and noted a sound recording of the meeting would be made.

3. Public Questions or Statements

The Chairman invited members of the public who had given notice to speak to put their questions or statements to Members.

Kevin Hollinrake MP for Thirsk and Malton made the following statement:

It is important to understand the reasons why we consider shale gas explorations in North Yorkshire but first and foremost it is the environmental challenges that we have. Climate change is one of the biggest risks that we have. There was a reduction in global CO2 emissions in 2015 primarily due to the reduction in coal-fired power stations use. In the United States 50% of the reduction in CO2 emissions was directly due to the move from coal to shale gas. We would all like to see a future of renewables, a carbon free future but renewables currently only provide 7% of our energy needs. The World Health Organisation declared our air quality is a public health emergency primarily due to the amount of coal we are burning across the planet.

It also helps to solve some geopolitical risks. Despite the turmoil we see across the Middle East prices of energy are falling in our oil markets, at our petrol pumps, in our domestic home energy costs, and because markets can see that we have domestic solutions to our energy needs in the West.

There are economic opportunities. If we extract just 10% of the predicted shale gas reserves we can meet our UK gas needs for 40 years and in the process create 64,000 jobs.

It was in trying to determine whether shale gas exploration could be done in a discrete and safe way that I went out to Pennsylvania in September last year. It is clear that we need to learn from the early mistakes made in the United States. We need independent supervision of activities and a single regulator. Most importantly we need a 'local plan' for shale gas exploration covering a five and ten year rollout of this industry across our county.

We need detailed solutions within that plan to cover:

- Traffic movements and traffic plans
- Minimum distance from settlements and schools
- Minimum distance between shale gas sites
- The impacts on other important parts of our economy
- The visual impact of our the countryside
- Buffer Zones around our most sensitive parts such as National Parks and Areas of Outstanding Natural Beauty

I do believe we should take a cautious first step but with clear parameters that give the public confidence that we will protect the beauty, tranquility and purity of our countryside.

Jim Tucker made the following statement:

Like Jim Ratcliffe the chairman of INEOS, I too have a degree in Chemical Engineering from the University of Birmingham. Unlike Jim Ratcliffe, the billionaire, who lives in Switzerland to avoid paying taxes in the UK, I live in North Yorkshire and continue to pay all my taxes in this country.

Taking the tax analogy a step further, who in North Yorkshire benefits from any industrial scale development of a fracking industry? It will certainly not be the existing sectors of tourism, agriculture and food production.

It is highly likely that fracking would follow a boom and bust scenario, as is happening today in the USA, by which time the current economic contributors and the county

itself, will have been decimated in order to export profits and taxes to Westminster, Switzerland and the Cayman Islands.

The residents of North Yorkshire deserve a coherent plan for all mineral extraction that covers spatial factors and the overall cumulative impact and not one that relies on treating each application on its merits.

Following his visit to Pennsylvania, our MP thinks fracking should go ahead, but the 10,000 wells drilled in Pennsylvania are in an area 14 times the size of North Yorkshire. The intention of Third Energy is for almost 1000 wells in Ryedale alone, leading to a density per square kilometre 7.5 times greater than that of Pennsylvania.

Adding the ambitions of INEOS and Cuadrilla, plus the associated infrastructure of compressor stations and pipelines across the region, as well as the likelihood of flaring, it becomes evident why a comprehensive plan is essential.

INEOS and all other gas companies have no interest in “energy security”, the only motivation will ever be one of creating profit, for example, INEOS has already invested in vessels to bring gas from the U.S. to Grangemouth.

Unless it was cheaper to extract it in the UK why would any business switch supplies to the UK? And does doing it cheaper also mean doing it better with the gold standard regulations the industry likes to talk about, I'll leave you to form your own judgement.

When gas prices start to rise, North Yorkshire will turn into a repeat of the Klondike, with everybody trying to get rich and a flood of drilling and fracking applications will occur. At that point, assessing each application on its merits will not be an option. A coherent plan that protects the long term interests of the residents in North Yorkshire is required before this happens.

This should not be something that is cooked up behind closed doors in Westminster by a consortium of the gas companies chaired by our MP, we all know where the motivations of the gas exploration companies lie and their interests are not those of North Yorkshire residents.

The best way to predict the future is to create it, that is precisely what the gas companies are trying to do, and so it falls to North Yorkshire CC to have its own plan in place to protect the region, its residents and current industries, one that isn't driven by the profit motives of the oil and gas industry.

John Baxter made the following statement:

I am a professional engineer with 15 years of hands-on experience in oilfield servicing which includes oil well cementing and hydraulic fracture stimulation, gained in North America and the UK.

I know there is a lot of sentiment and negative publicity around the subject in the UK, probably because the public has not been engaged and enlightened by industry and regulators leading to anxiety and distrust, resulting in very vociferous and unfounded protest.

The UK operates within the tightest of regulations in oilfield terms both onshore and offshore.

From my attendance of many meetings in Ryedale I have noticed that the main concern in peoples' minds is that of contamination of aquifers, and confusion in the term 'fracking'.

The regulations around drilling of surface casing in oil wells, that protect aquifers, are very thorough. The protective casing is the foundation on which the remainder of the well rests. Subsequent protective casings function to maintain the well integrity to its total depth, with alternating layers of casing and cement.

Many oil wells have been drilled in the UK without incident. The question is: How many have contaminated aquifers? There are none to my knowledge.

To move away from drilling and on to hydraulic fracture stimulation; the surface casing is not exposed to applied flows and pressures at any time. Intermediate and production casing may be exposed to pressure and flow that fall within the design parameters of the stimulation treatment.

In all the stimulation treatments I have taken part in, at no time has there been casing or tubing failures; neither in North America nor in the UK.

This is a very well regulated industry in the UK, and safety is paramount, as it should be.

I live within 400 metres of a producing gas well in Pickering and can honestly say that I would hardly notice its presence, even when servicing of the well is taking place. The building site near me, just off the A169 has been much more disruptive, and for much longer than any hydraulic fracture stimulation treatment would be, to put things in perspective.

The term 'fracking' has come to be confused with the drilling of an oil well. Hydraulic fracture stimulation is the process that takes place in the completed well. This confusion has led to many condemning hydraulic fracture stimulation on what is perceived to be an incomplete production well. That is NOT the case.

Those in support of an indigenous onshore gas industry have been muted by the more vocal outbursts of those opposing future development.

I speak as one of those who has faith in the hydraulic fracturing process having seen it develop over the years into the highly technical and safe process that it is today, in a well regulated environment.

Lorraine Allanson made the following statement:

I would like to say that I support the purpose and direction of the Minerals and Waste Joint Plan. Anything that is aimed at improving efficiency and reducing bureaucracy has my full support.

25 years ago I experienced the same situation that we find ourselves in today. Knapton Generating Station was proposed and my father had just bought our farm. The opponents terrified us with their scaremongering about the devastation of farming and tourism and how we would be poisoned. It was all very stressful and time has proven them wrong since being built the plant has operated perfectly safely with not one issue. That is why I question every scare story the anti-fracking movement make.

Fast forward to today and this time they have the internet and social media to perpetuate their ever more drastic falsehoods bringing their scare stories into everyone's home from around the world.

In Ryedale we have endured an 18 month high profile propaganda campaign by Frack Free Ryedale and Frack Free North Yorkshire and it may interest you to know that their two main spokespersons both live in London. Well, this is Yorkshire and we do not suffer fools gladly, their scaremongering may work elsewhere but not in Yorkshire. They claim the majority support them, the following statistics reveal the truth:

- o At the last general election in our parliamentary constituency, 83% of the vote went to candidates who said they would support fracking if it was properly regulated.
- o We have a live application to frack an existing well at Kirby Misperton. I checked a few days ago and only 23 residents have so far objected out of a possible 370 villagers.
- o Only nine locals bothered to turn up at their Parish Council meeting to specifically discuss the application.
- o Even a much publicised National petition to "Scrap Fracking UK wide" after six months had only received a paltry 264 signatures from our constituency out of a possible 77,000 people.

In a short while, before the real professionals speak, you are going to be subjected to a group of genuine but largely mis-informed people who will state their objections quoting many dubious peer reviewed papers around health, industrialisation, earthquakes and chemicals based on their internet searches and in some cases even visits to Pennsylvania. When listening to these claims I would ask that you bear in mind their intentions, their credentials and their pre-determined mind sets. We should not mind them having their own opinions but we should object to them making up their own version of the facts.

Joanne White made the following statement:

My name is Jo White and I am a Chartered Surveyor. I have worked both in the public and private sector, and have worked as a construction project manager.

My husband and I travelled to Pennsylvania following Mr Hollinrake's visit. Mr Hollinrake returned with some concerns but overall reassured.

We travelled with an open mind, in the hope that we too would be reassured because that would mean we could stop worrying about fracking and get our lives back. We were not reassured.

As a point of accuracy, which is very important, Mr Hollinrake incorrectly claimed that Pennsylvania is more densely populated. Pennsylvania is about the size of England but England has a population about four times greater.

As a specific example, one of the counties we visited is Susquehanna County. It is rural, roughly 40% larger than Ryedale and about half as densely populated. Around 1,300 wells have been drilled, 40 compressor stations built and more planned. There are 10,000 wells in Pennsylvania and development has only paused because of the oil downturn.

This industry is sprawling and invasive, requiring multiple sites, thousands of wells and heavy supportive infrastructure. Miles and miles of pipes need to be laid. It generates lots of traffic and huge volumes of contaminated waste.

We were invited by the Vice President of a fracking company. It was refreshing to have a very experienced professional answer our questions honestly and directly. He confirmed that you cannot deliver this industry without thousands of wells, noise, disruption and traffic. He told us that it was an entirely different ball game from conventional gas extraction.

Professor Andy Aplin at Durham University said to an all-industry conference that we would need 33,000 wells from 5,000 pads to have meaningful amounts of shale gas. When is our industry going to admit this to the public? Instead they cite Wytch Farm as an example; this is only one site, not hundreds or indeed thousands.

In relation to the health impacts, the industry claim shale gas extraction can be done completely safely. However many uncertainties remain. Examples include:

- Contamination of drinking water caused by documented well-casing failure.
- South West Pennsylvania Environmental Health Project's concerns over emissions from compressor stations. More research is needed.
- A study from Yale (January 2016) concerned about toxins found in fracking fluids and waste water and impact on health. More research is needed.
- The US's Environmental Protection Agency's report has been challenged by its own science panel for claiming that fracking has not led to widespread, systemic impacts on drinking water resources in the United States

For these reasons I oppose fracking.

Having seen first-hand the impact, I consider the Joint Minerals and Waste Plan needs to be extremely robust with mandatory setbacks of at least a mile from all residential settlements and more besides.

I would like to ask each member of the committee how they consider this industry can be controlled and how they can ensure that North Yorkshire can be protected.

David Davis made the following statement:

I am a Chartered Surveyor and a signatory to the Ryedale Area Committee petition.

I started where the committee is probably now at by starting to look at the facts about fracking and what I found was that there are some facts, there are some half-facts and a lot of misinformation.

From the pro-fracking side we hear that the chemicals that the shale gas industry is using are non-hazardous. If you look on the Environment Agency website there is not a definition for what 'non-hazardous'. There is quite a lot of documentation that tells you how to assess what is hazardous but if you look at those chemicals listed as non-hazardous I think most of us would consider a good number of them, in the concentrations likely to be around, to be fairly toxic.

There is a lot of information if you are setting up a new industry available from other countries in the world that have had this industry there and yet we should look and learn from that and I think if we are promised gold standard regulation, hydraulic fracturing the main regulations that we will be using are those from America. All seven are from the American Petroleum Institute so the gold standard regulation needs some work.

Moreover the spatial planning is the aspect that concerns me. It is an area that I know something about. If you work out how many lorries this industry will create you are looking at many millions of lorry movements.

What I would ask the County Council to consider is what spatial control regulations you think will protect North Yorkshire, its landscape and its community.

Bill Rigby made the following statement.

I am the Chair of the Harrogate and District Alliance Against Fracking (HADAAF).

We are local representatives, from churches, community organisations and environmental groups: generally respectful of and indeed representatives of what one may call 'establishment' - teachers, elected councillors, local government officers - retired and in employment, historically willing to trust the authorities' judgements. But the HADAAF group's researches into well documented and authoritative sources have led us seriously to qualify this view in respect of Fracking.

In the interest of simplicity, we would like to recall the old Methodist maxim: "Is it true? Is it kind? Is it necessary?"

In respect of the suggestion that we embark upon a massive programme of mining for oil and gas using unconventional procedures at great depth, is it true that the extraction of oil and gas by these means:

- is not a risk to the health of communities nearby, despite the evidence from expert medical witnesses in the UK, the US and elsewhere;
- will bring economic benefits to local communities in Yorkshire, despite evidence that staff are recruited almost exclusively from itinerant workers, the companies are all foreign, and local authorities will be responsible for clean ups when failed mining operations are discovered years after the frackers have departed;
- will lower the price of oil and gas in the UK – when economic experts deny that this is the case;
- will have no waste materials which cannot be processed locally, despite their massive and unusual toxic content;
- will have no impact on the traffic patterns and road infrastructure in a Region already under strain from road system under-capacity; and
- that regulations are sufficiently robust to ensure safety, when local experience in Lancashire at the Fylde and East Yorkshire at West Newton demonstrate the opposite?

Is it kind to our communities:

- to have the landscape industrialised;
- to the agriculture sector;
- to communities throughout the world threatened by climate change;
- to the tourist trade and local communities as vastly increased traffic thunders down our lanes; and
- to the landscape?

Is it necessary:

- for our energy security that we mine an energy source at twice the price of current global markets;
- that we jeopardise the ability to insure our homes in the light of the impact of mining operations nearby;
- for us to experience catastrophic impacts on the value of our homes because of the proximity of mining operations nearby; and
- for us to threaten the quality of our water supplies, through the inevitable failure of a high proportion of the thousands of wells?

Mrs Thatcher argued that the coal should be left in the ground because there was a cheaper alternative available in abundance on the international markets.

The Coalition government argued that local voices should be heard in opposing wind farm developments, while government now plans to stifle a local voice in decisions on fracking.

HADAAF wishes to make clear that this is a policy in need of immediate reconsideration, and North Yorkshire County Council is in a position to express this wish to Government on our behalf.

Anne Stewart made the following statement:

The government voted in December to allow fracking under Protected Areas, such as National Parks, AONBs, SSSIs and Ramsar sites, if the well-site was situated just outside the boundary of the protected area. However, the impact of multi-well site on the edge of the Howardian Hills AONB, for example, would be profound, resulting in increased traffic, noise from fracking and drilling day and night, light pollution and air pollution – not to mention the possibility of contaminating protected water courses.

Given that these areas have been specifically chosen for their landscape and wildlife value, and many are home to protected and endangered species, how can this unavoidable intrusion on these protected areas be justified? Surely, at the very least, there should be buffer zones around these areas of at least three miles to avoid the impacts listed above?

Helen Jenkins made the following statement:

Members are asked to consider that a fracking well-site will require thousands of HGV journeys for a single commercial frack.

Third Energy and other fracking companies are talking about developing well-pads with ten, twenty or even fifty wells, with Third Energy talking about 19 well pads and up to 950 wells in their PEDL licences alone. These will all require transport by HGV of sand, chemicals and fresh water to the site, and frack waste - solid and liquid - away from the site. Given that almost the whole of North Yorkshire is covered in fracking PEDL licences, and companies such as INEOS are also talking about establishing 200 wells in each licence area, how would this huge increase in traffic impact on the rest of the economy of North Yorkshire, particularly tourism and agriculture?

Brian Appleby made the following statement:

The essential component of this decision making process is to seek unbiased scientific sources of information about fracking.

North Yorkshire County Council's superb quality Climate Change Strategy accepted the unbiased scientific evidence that places all fossil fuels as the major problem. Your own climate strategy firmly commits your Minerals and Waste Plan to the reduction of levels of CO₂ and methane from all sources.

There is now sufficient new unbiased scientific evidence to show that gas from fracking is even worse than coal in contributing to climate change. Fracking will worsen climate change in three ways:

- It locks us into the use of fossil fuels at the very point where we should be disengaging from them.

- The overall processes for production have a high carbon footprint.
- Worst of all leakages of methane occur at roughly 1 in every 15 sites and that methane is more than 80 times worse than CO₂ in its first 15 years. Recently drilled wells in the USA are leaking sometimes as much as 10% of the methane produced.

Unbiased evidence reveals that fracking companies in the United States have persistently under-reported to government agencies about leakages of methane and wellhead and casing cement failures. The cement used bonds very poorly with shale. Even so-called “perfect” cement mix only has a tensile strength of 1 to 2 MPa (megapascals) but the fluid pressures are 10's of MPas. Consequently in the United States at this point in time there are literally tens of thousands of wells leaking gas to the surface.

In the United States, the Environmental Protection Agency depended upon the fracking companies self-regulating but the evidence shows that they were totally let down by the fracking industry. The monitoring was highly ineffective. In the UK our Environment Agency has got neither the staff nor the in-house expertise to continually monitor thousands of fracking sites over a long period of time, and yet self-regulation would be disastrous.

The unbiased scientific evidence of complex geological faulting in the UK is available and for real.

In conclusion, there is a need for an unbiased scientific assessment of the carbon footprint of the Minerals and Waste Joint Plan and in the meantime North Yorkshire County Council should declare a moratorium on fracking whilst all the independent unbiased scientific information is examined in detail. To allow fracking in North Yorkshire would be inconsistent with your climate change strategy.

Paul Andrews made the following statement:

I live one and a half miles from the site at Kirby Misperton and I am Chairman of the adjacent Parish Council. I am concerned about the damage to the landscape.

The problem with fracking is that each borehole has a range because fluid has to be inserted under extreme pressures. For example, at the beginning of this year, Third Energy were saying the maximum range of a single borehole is 2.5 kilometres. This means that, in order to fully exploit the Kirby Misperton gas field, for example, there will have to be a whole grid of borehole pads, each being not less than 5km apart. 5km is less than 3 miles.

When I talk about a borehole pad, I don't mean a single borehole. Each pad will have boreholes radiating out in every direction like the spokes from a wheel – and in the case of Kirby Misperton at five separate levels. So there could be as many as 50 boreholes on each pad.

It takes 100 days to drill a borehole so if a single drilling rig is stationed on a borehole pad, it could be drilling continuously for 15 years, making a lot of noise and lit up like a Christmas tree at night.

[Paul Andrews showed an aerial photograph of the Jonah Gas Field in Wyoming USA at this point.]

Fracking will result in the complete industrialisation of the landscape. The tourist industry will be destroyed, particularly important for a district which hosts major

leisure and tourist attractions like Flamingo Land, Castle Howard, heritage coast and two national parks.

People say this sort of thing could not happen in the UK. Do not believe it. John Dewar told a House of Commons Select Committee that Third Energy plan 19 pads, each with between ten and fifty boreholes, and that is only a start.

The legislation requires gas and oil companies to maximise gas extraction.

Third Energy is now only one of several players in Ryedale, every inch of which is now covered in fracking licences. INEOS Chief Executive Jim Ratcliffe (a billionaire who pays no tax in the UK) was quoted in the Liverpool Echo as follows:

"Under Mr Ratcliffe's plans, a typical six mile, by six mile parcel of land with up to 200 wells on it could generate nearly £400m for land owners and communities over the average 15-20-year lifetime of a production site. He estimates it could be worth a total of £2.5bn in payments."

Finally, I would like members to consider two documents which I now hand in to the clerk.

My question is Chairman: Would the County Council consider policies which would prohibit or restrict fracking in areas of high amenity value such as those areas which form the setting of AONB's, National Parks and SSSI's?

Adam Harper made the following statement:

I am an independent environmental consultant. You will have been passed a copy of my brief which is a review of the recent scientific evidence on fracking in the UK. It specifically relates to the emission of methane from the fracturing process.

To briefly sum up the findings of this research, which is from the last three years or so, studies indicate that methane in the United States has been significantly underestimated by the US government figures and by the US Environmental Protection Agency. One study said that it was in the magnitude of 100 times more methane than the figures suggest.

Methane leaks from fracking are actually higher than conventional gas extraction due to the differing processes used. The papers concluded that methane leakage is an inevitable consequence of fracking and it is very hard to completely eliminate methane.

Across the studies they have found that methane leakage ranged from 0.18% to 17% as a percentage of the overall gas production, which on the higher end is a very significant amount.

Disused and abandoned fracking wells may leak significant quantities of methane. Papers also concluded that methane leakage could pose a safety as well as an air pollution risk. A few studies have also suggested that the high levels of methane leakage may in fact render shale gas production worse in terms of climate change impact than coal.

These studies raise the following questions in terms of fracking in the UK:

- Given the scale of methane leakage in sites in the United States and its potential to exacerbate climate change why does the Department of Energy

and Climate Change still consider hydraulic fracturing to be a low carbon bridging fuel?

- Will the government and/or fracking companies fund independent scientists to monitor their sites for methane leakage into both the air and ground and will this data be publicly accessible?
- How will fracking companies prevent safety and air pollution and hazards related to methane leakage?
- How long are fracking companies responsible for abandoned wells which are no longer in active use to ensure that they are not leaking methane in the long term?

Christopher Pickles made the following statement:

Do you think Ryedale and, by implication, all parts of North Yorkshire in time will retain their unique characteristics that make them so appealing to residents and visitors alike, if fracking on the scale envisioned by the gas industry and the Government goes ahead? We are told that there will need to be thousands of wells in an area the size of Ryedale if the industry is to be successful. Further, what about the compressor stations, gas processing plants and dehydration plants which are so much a part of the American experience?

Stuart Leach made the following statement:

I have four specific questions. The first two are addressed to the County Council, the third to the Oil and Gas Authority and the fourth to Yorkshire Water.

1. With the awarding of PEDLs to companies we can expect many applications for drilling and fracking to be submitted in the next few years. With the enormous demand this will place on North Yorkshire County Council's resources how can each application receive the sufficient level of scrutiny that would be demanded by local people? It is critical that local decision making is retained within local authority control.
2. Once the fracking industry is established in Ryedale and other parts of the country, one of the government objectives of obtaining 10% of UK gas needs from shale will start to pressurise other areas sitting above shale resources such as Harrogate, Wetherby and Lower Wharfedale. As these are not protected areas how will the impacts on these areas be addressed?
3. Why have PEDLs in National Parks and AONBs been offered to companies when these are protected areas. PEDL SE69 and SE79, incorporating Bransdale and Rosedale Abbey, are entirely contained within the North Yorks Moors National Park but have been awarded to INEOS on a basis to "drill or drop" one well.
4. Disposal of fracking waste water is a hugely controversial topic in all countries where fracking takes place. This is because it may contain radioactive materials, heavy metals and carcinogenic hydrocarbons such as Benzene Xylene and Toluene that are drawn up from deep underground, as well as the fracking chemicals that were injected down there in the first place. Will Yorkshire Water be given an independent chemical analysis of all flow-back fluid at all fracking sites so that the public water supply can be tested for contamination by these substances arising from an unexpected migration to the source of supply? Will the results be made public?

Nellie Trevelyan made the following statement:

Essential to addressing our worries is clarity about who is responsible for what pollution. I have failed to find that there are assurances about adequate baseline testing. We need to know the state of Ryedale and the state of North Yorkshire as it stands so that when changes are perceived we know that blame can be imputed to the activities possibly of fracking. Without adequate baseline testing over a long enough period and a wide enough area and of a sufficient number of indicators we cannot prove that changes have happened and will be attributable to fracking. It will be in the fracking industry's interests for there to be inadequate baseline testing. What are we going to do to make sure that this wide-ranging baseline testing happens adequately? It will be an onerous procedure; it will create delays; it will be very expensive. Should the County Council and the Environment Agency be responsible and pay for this? I do not think so. The industry will not want to do it to the level that it needs to be done. We need to make sure that liability issues are covered by the industry.

Lynne Blair made the following statement:

My statement concerns energy security and the amount of gas that we will be producing from fracking.

The House of Commons Library Research Service Reports on shale gas says and I quote: 'The consensus seems to be that shale gas will not be a game changer in the UK as it is in the US as there is less available land to drill on. It is too early to say whether domestic production will result in cheaper prices.'

UK Energy Research Centre in their report came to the same conclusions adding that it will not add to the reduction in CO² emissions.

Third Energy have also told me that until they start drilling they have no way of knowing how recoverable the gas is or how much is there.

I also understand that the UK is part of an integrated European energy market and the gas is sold to the highest bidder. Lord Browne, ex-chairman of Quadrilla, said and I quote ' we are part of a well-connected European Gas Market and unless it is a gigantic amount of gas it is not going to have a material impact on price.'

My question to the above is:

In view of the above why are the government the gas companies and the media telling the public that fracking will allow the UK to be self-reliant on energy and that it will be cheaper. It is quite obvious that no one really knows yet they are prepared to take all the risks associated with fracking on a gamble

My second point is:

Sherriff Hutton has just been granted a PEDL licence to INEOS. INEOS is not an energy company but a petro-chemical company and have a pipeline (Teeside to Humberside) running through this part of the world - it is currently used for ethylene supply as opposed to gas.

My question is:

Are INEOS are going to be producing domestic gas or ethylene which will be used in their petro chemical and manufacturing industries? If they are producing ethylene then again this will not be contributing to our energy security but is likely to industrial Ryedale.

Shan Oakes made the following statement:

I would like first to invite our Elected Members to imagine the Gulf oil disaster. No doubt the industry was well-regulated there like many other disaster sites worldwide. Second please imagine drilling perhaps a mile deep under and through our unique land and water systems. We know the best laid plans of mice and men go wrong. Please ask yourself how confident we can be that subterranean rearrangement our water 'pure' to use the local MP's word. My question to Elected Members is who will pay for attempts to clean up our irreplaceable aquifers when wells inevitably fail sooner or later.

The Chairman noted the further written questions or statements submitted from Linda Hurrell, Jane Gibbs, Penny Fiddler and Margaret George who were not in attendance at the meeting to speak. He went on to provide a summary of the key themes coming out of the public questions and statements for further consideration by Members alongside the lines of enquiry set out in the report. These included: immediate environmental risks, climate change risks, public health risks, water usage and disposal, spatial planning issues arising from the cumulative impacts of having a number of shale gas operations within a given area, regulatory issues, economic issues and the social impacts on communities.

4. Informing Production of the Minerals and Waste Joint Plan for North Yorkshire, York and the North York Moors National Park with regards to Hydraulic Fracturing (Fracking)

Considered -

The joint report of the Scrutiny Team Leader and the Corporate Development Officer providing a framework for the joint sub-committee to inform production of the Minerals and Waste Joint Plan for North Yorkshire, York and the North York Moors National Park with regards to Hydraulic Fracturing (Fracking).

Friends of the Earth

The Chairman explained the role of Friends of the Earth, as set out in the report, and introduced Naomi Luhde-Thompson to the meeting. Naomi Luhde-Thompson provided an overview of her role in Friends of the Earth.

A Member asked the following question:

- Public Health England notes that in the UK shale gas operators will be required, through the planning and environmental permitting processes, to satisfy the relevant regulators that their proposals and operations will minimise the potential for pollution and risks to public health. Why is the existing system of regulation including the specific 'safeguards' in the Infrastructure Act 2015 not sufficient to mitigate the environmental and health risks that could occur from hydraulic fracturing?

Naomi Luhde-Thompson replied that in the last few years communities have been contacting Friends of the Earth about shale gas developments in their area. Friends of the Earth have been examining how the regulators have been responding to these developments.

The County Council as the Minerals Planning Authority is the only regulator that is locally and democratically accountable. That is important in terms of public perception and public trust and putting together your plan.

There have been issues relating to enforcement and planning conditions where conditions have been set for example in relation to wintering birds and these conditions have been breached. There needs to be quite a bit of funding in place to ensure the Minerals Planning Authority can do the enforcement on the planning conditions that it sets.

The regulators appear to be learning as the applications come forward because shale gas operations are new. The first well to be high volume hydraulically fracked was at Preese Hall, which caused earth tremors and there was a moratorium because it was a new process. There have been changes since then but it has only been public knowledge since January 2016 where the waste water went from that well. That has now changed because the Environmental Protection Regulations have changed. However that shows that three years after the event we are only just finding out what happened to the waste water.

A precautionary approach should be taken in terms of regulation due to this being new technology. The public sense of this precautionary approach, though, is undermined by government statements such as the leaked letter that George Osborne sent to the Select Committee asking them to do all that is possible to get the shale gas industry moving. That does not sound like a precautionary approach that has taken evidence into consideration, looking carefully at what might be the implications.

There have been several papers published that have assessed whether the regulation relating to the shale gas industry is fit for purpose. Joanne Hawkins's review in the Environmental Law Review looks across the board at the different regulations governing chemicals, the EU directive and Mining Waste Directive and so on. What comes out of the review, and the United Nations Environment Programme has agreed with this, is that there needs to be a specific approach as the shale gas industry has a different set of technology and impacts.

Friends of the Earth have an in principle position that we need to tackle climate change. The Paris agreement has just been signed, and it is very important to understand that shale gas is a fossil fuel - it is not low carbon. The target set by the Committee on Climate Change is that average emissions of UK electricity generation by 2030 needs to be 50 grammes CO² by kilowatt hour. The average emissions from gas fired power generation is 450 grammes CO² by kilowatt hour. That is the difference going from 450 to 50, which is why we need to look at renewables and alternatives in terms of tackling climate change.

The Minerals Planning Authority will be looking at the national planning policy framework and the online planning practice guidance on minerals. However the online planning practice was not published for public consultation and yet it will be very influential in how the Minerals Planning Authority puts together its Minerals and Waste Plan. The first test of that planning guidance will be through the local planning process. The Minerals Planning Authority should therefore look carefully at that because it has not been consulted upon and therefore not properly tested.

In relation to the specific safeguards in the Infrastructure Act 2015, the first one states that '*hydraulic fracturing is prohibited from taking place in land at a depth of less than 1000 metres*'. That is quite an arbitrary depth as it depends upon the geology of the area. Under the Town and Country Planning Act 1990, as the planning authority, you are approving development activity within the land: that is the definition in law. Consequently you need to be careful about an arbitrary depth when

actually there might be site specific geological reasons why that might not be the case.

In relation to the third safeguard listed in the Act, *'that the environmental impact of the development which includes the relevant well has been taken into account by the relevant planning authority'*, why is an Environmental Impact Assessment not mandatory? It should be. With regards to some of the earliest sites in Lancashire, the planning applications put forward were deliberately sized at 0.99 hectare to fall under the threshold of 1 hectare.

In relation to the independent inspection of the well and the other safeguards in the Act requiring the regulators to put in resources to monitor shale gas activities, there has been significant cuts to quite a number of the regulators including to the planning authorities. Yet they – the Health and Safety Executive, the Environment Agency and the Planning Authority - are being asked to resource a new area of work. When you have got a bigger job of monitoring, enforcement and inspection you need the resources to do that properly. If this is not the case your communities, faced with noise breaches and breaches of planning conditions, are the ones calling out as they are facing these on the ground.

In terms of the monitoring one of the points that Friends of the Earth has consistently made is that there needs to be public access to monitoring information. In turn the monitoring needs to be robust and it needs to be seen to be independent. One of the big public health issues is around public perception of fear and risk - and that becomes a public health impact. Public Health England in their report state that they did not look at issues such as water sustainability, noise, traffic apart from vehicle exhaust emissions, odour, visual impact, occupational exposure and other wider public health issues. There is a gap there. It would be helpful if your Director of Public Health makes sure that there is a proper assessment of the health impact and that should feed into your Minerals and Waste Plan.

The ninth safeguard in the Act: *'that in considering an application for the relevant planning permission, the local planning authority has (where material) taken into account the cumulative effects of – (a) that application, and (b) other applications relating to exploitation of onshore petroleum obtainable by hydraulic fracturing'*, is contradictory. This is because the online planning guidance states that you should look at the application on its merits but in an Environmental Impact Assessment you should always look at the cumulative impacts. It is therefore inconsistent and not helpful for you as a Planning Authority. There are different types of cumulative effects: the immediate ones, the secondary indirect ones and the long term. In relation to exploratory applications what we are seeing in terms of planning applications is that there is a lot of talk about the benefits from the production in relation to exploration. However in considering exploration, the Planning Authority has advised against looking at the production impacts even though the production benefits are supposed to be taken into account. This is a confusing situation again because you will not get the production benefits unless you are at that scale. Why therefore are we looking at those benefits when exploratory applications are being examined? It is quite inconsistent in that regard.

A Member asked the following questions:

- Is Friends of the Earth opposed in principle to fracking or do you believe that it may be acceptable if specific changes to regulations included further safeguards?

- Are your concerns related to fracking also more closely related to climate change issues?

Naomi Luhde-Thompson replied that Friends of the Earth is against fracking in principle because of the need to tackle climate change. Friends of the Earth have looked at the research, commissioned research and spoken to a lot of academics. Their view is that shale gas is not compatible with meeting our climate change targets and particularly not in the context of the Paris Agreement to keep global warming below 1.5 C.

Friends of the Earth do not believe that shale gas should be part of the energy mix for the UK. When discussing energy security we need to be define whether we are talking about 'security of supply' or 'security for the user', Professor Andersen says that in terms of the user what you need to know is that when you turn your appliance on it works. However supply is different because you could have a very energy efficient appliance which would mean that you would use a lot less. The best energy security therefore is the energy that you don't need because your home is warm because it is well insulated; that is the best energy security for either an individual, a household or a business. The energy security argument is quite flawed in the sense that it only looks at supply instead of the person requiring the energy.

A Member asked the following question:

- In relation to your point about the need for monitoring to be undertaken of the impacts of fracking, do we have current baseline data available?

Naomi Luhde-Thompson replied that I do not think we have.

UKOOG

The Chairman explained the role of UK Onshore Oil and Gas (UKOOG), as set out in the report, and introduced Ken Cronin, Steve Thompsett and Dr. Andrew Buroni to the meeting. Ken Cronin and Steve Thompsett provided an overview of their roles in UKOOG and Dr. Andrew Buroni provided an overview of his role in RPS Planning & Development.

A Member asked the following question:

- How will the industry ensure that:
 - Where multiple drilling wells are proposed in an area, adequate protection can be afforded to the landscape, nature conservation, the historic environment and the established local economy.
 - Leaks from fracking sites will not contaminate surface water.
 - There will not be excessive and/or continuous noise near drilling sites.
 - There will not be risks to air quality.
 - The volume of heavy goods vehicle traffic required for fracking will not have a significant traffic impact on local roads, especially in areas where new road building is impractical or environmentally destructive.

Ken Cronin replied that it is important first and foremost to be aware of what stage the industry has reached in terms of its development and current activity. The industry is currently carrying out exploration activity, which involves small individual well sites examining the local geology, working out the gas flow rate, the cost economics and so on. This is before we get to the point where we start to think about production facilities. The reality is that we may find that in certain areas of the

country the geological formations do not work and we cannot extract the gas. Multiple drilling is a number of years away.

The industry has committed to undertake Environmental Impact Assessments for all sites that involve hydraulic fracturing, which is over and above the current EU directive. In that Environmental Impact Assessment we will look at all of the issues that are listed in the question above - noise, transport, air impacts, health impacts, landscape and nature conservation etc. The Environmental Impact Assessment is consulted on with local communities and discussed. It also forms part of the planning consent that we will put into the Minerals Planning Authority and it also forms part of the environmental permits consenting process that we have to do with the Environment Agency. We have to apply for up to eight different permits with the Environment Agency that covers 17 EU directives. Those EU directives cover things like water, nature conservation and so on. There is therefore a well-defined regulatory pathway that we have to follow as part of this process. We also have a UKOOG engagement charter and as an industry we will do our utmost to have the most open and transparent debate with local communities prior to planning application going in. Also the environmental permitting process and planning consent process involve public consultation.

In responding to the issues raised earlier about cumulative impacts, both planning guidance and the new Infrastructure Act require the Planning Authority to look at cumulative impacts. Companies will also look at the cumulative impacts when undertaking environmental impact assessments. It is not just the cumulative impacts of our industry that will need to be taken into account but also the impacts of other industries close by so that they can be added together.

Regarding issues relating to leaks from fracking sites, there are a number of issues that we need to consider. Firstly all of the chemicals that we use as an industry in terms of fracking fluid have to be approved by the Environment Agency and they have to be deemed as non-hazardous to groundwater. We also have very strict regulations relating to where we can drill in terms of proximity to water. That is defined in the Infrastructure Act and also the secondary legislation. For example, we are not allowed to drill on or under any area which is deemed as a 'Zone 1' within the Environment Agency, and that is a set of regulations that go across all activities as we are not the only industry working with chemicals.

The most fundamental thing about onshore oil and gas drilling is the integrity of the well. If you get the design and the creation of that well correct from the start then you reduce substantially the potential environmental impacts. As part of that process we are regulated by the Health and Safety Executive who regulate both onshore and offshore drilling. We have to get our design approved by an independent well examiner who then reports to the Health and Safety Executive. That well design is very different from what you see in the United States for example. In the UK wells are constructed from a triple layer of steel and cement. In the United States wells are typically have only two layers. We have a good track record in this country in terms of well integrity. The well examiner has to on weekly basis report to the Health and Safety Executive as the construction of the well is being undertaken and there is a raft of information passed to the Health and Safety Executive. The Health and Safety Executive also audits the independent well examiner scheme that the company sets up.

The other significant environmental issues are how we store the chemicals used in the fracking fluid, how we store the flowback water and how we store rainwater on the site. There are a number of environmental permits that we have to cover in terms of those issues. We have to ensure that we have impermeable membranes on our

sites; that all of the chemicals are banded on special mats. In terms of flowback water, again it is different in the UK to the United States. Flowback water in the United States has typically been stored in open pit lagoons chemicals which has allowed methane and other chemicals to evaporate into the air. In the UK the flowback water is stored on site in double skinned tanks on buns and is then disposed of safely according to the waste plan approved by the Environment Agency.

One of the members of the public talked about baseline monitoring. One of the big problems that we have seen in the United States is that there is no baseline monitoring so we do not know what was there before. We do know that methane is typically part of the atmosphere particularly around areas where there is gas. In recognition of the current situation regarding baseline monitoring, in early 2014 we published best practice guidelines on baseline monitoring. These guidelines tell each operator how to conduct baseline monitoring, what to conduct and when and for how long. Parts of these have been incorporated into Infrastructure Act 2015. We then monitor those sites all the way through the life of their operation and in the post decommissioning phase to ensure that we are not having an impact on those baseline documents.

In terms of noise and transport, again as part of the Environmental Impact Assessment the operator has to produce noise and transport management plans. There are strict rules and regulations around noise within planning guidance during the day and night and we have to adhere to all of those. In terms of the noise management plan each operator will identify how they are going to mitigate the noise as much as possible. That may be in terms of working out who the closest person is to the site and what time of the day to do carry out certain activities. It may be in terms of the types of covering over engines or it may be about using different types of engines or generators to ensure that noise levels are reduced and monitored on a regular basis. This is included in the noise management plan and this goes to the Minerals Planning Authority for approval and discussion.

In terms of transport impacts and impacts on the environment, the first phase of development (construction) will generate traffic. As a construction site it is no different from any other construction site so the impacts both from the local community and from an environmental assessment point of view are very well known. Exploration represents a very short period - two to three months. For production sites the time period will be longer.

- The Chairman asked if UKOOG could give an example of vehicle movements for a typical well.

Ken Cronin replied that he would need to provide that information in writing because at present there is not a typical well but. He would be able to provide an answer based upon two to three recent exploration sites. He noted that information about vehicle movements is set out in the environmental impact assessment in the noise management plan and the transport management plan that the operator puts forward.

A Member asked the following questions:

- Will the nature of the chemicals used be made public to give some reassurance to concerns that have been expressed?
- How will the potential extensive night time pollution during construction of wells be ameliorated?

- Will there be recompense paid to the highways authority in light of the potential impact on the integrity of the road structure caused by vehicle movements to and from shale gas operations?

Ken Cronin replied that in terms of water contamination the most important thing about onshore oil and gas drilling is the integrity of the well. If you can ensure the integrity of the well you minimise the risks to environment substantially and that is the reason why it is so heavily regulated by HSE and why there is an independent well examiner. In addition to that, the Environment Agency has the role of regulating from an environmental impact point of view. The industry is heavily regulated in terms of well integrity and construction. Once the well is operating the Environment Agency is there to ensure that we can monitor what is happening. There is a large suite of regulation that we have to comply with. Of the 2000 wells that the industry has drilled in this country there is a very good track record.

In terms of the disposal of waste water, when the waste water reaches the surface it will be stored in double-skin tanks on buns in accordance with a waste permit obtained from the Environment Agency. Again, the handling of this type of waste is not specifically new to our industry because other industries have to handle waste streams so it is well understood from a regulatory and operational point of view. The waste water then gets taken away to be treated at a waste water treatment facility - that again is approved by the Environment Agency.

In terms of disclosure, the industry published a document in 2013 called 'The Shale Gas Well Guidelines' and that made clear what the industry would disclose in a transparent way. The first point to make is that the baseline monitoring that the industry has to do will be open to the public as well as to the regulators - that is set out in the baseline monitoring document. In terms of other issues the operator will disclose the amount of water that it uses, how it produces the waste water, the fracturing fluids that it will use by chemical and concentration. Again that is something that is very unique to the UK. We will also disclose the volumes and characteristics of the waste water, the emissions, the fracture design size and containment and any induced seismic activity. Therefore there is a very significant amount of disclosure that the industry will do publicly and will also have to provide to the regulators - the Health and Safety Executive, the Oil and Gas Authority and the Environment Agency. The other point to make is that there is also a lot of discussion about independence of monitoring and I was pleased to see the current government announcing last year an independent monitoring scheme led by the British Geological Survey for the first few sites that the industry will undertake in this country. The consortium led by the British Geological Survey is going to be monitoring independently of the monitoring that the industry and the regulators do, to ensure that there is some independence in the first sites.

In terms of night time light pollution, again this is looked at in the environmental impact assessment in terms the current baseline for the sites that we are using and the impacts that the light will have on the surrounding environment and communities. The light issue is at its highest when the site is being constructed and drilling activity takes place. This is because that tends to be when the 24 hour timescales are involved. Once we get into production and we finish drilling those sites, levels go down to very low levels of use in terms of noise, transport etc. and will carry on producing gas for many years without people really noticing it. In terms of what the industry does it will look at ways to mitigate light pollution such as the way lights are angled and in terms of the spatial awareness of the lights. Those mitigating actions are included in the Environmental Impact Assessment and in the planning consent documents that are approved by the Minerals Planning Authority.

In terms of impact on roads there is a construction period involved in this industry as there is with other industries so there will be traffic movements, particularly from Heavy Goods Vehicles, in the early stages. The company carries out a baseline monitoring exercise to establish existing traffic levels and to assess the impact of the potential traffic that the operation will be introducing into the system. Best practice guidance is used including I.S.O. standards. The company includes this information in the traffic management plan to the Minerals Planning Authority for discussion and approval.

- The Chairman noted that the question that had been asked by the Member more specifically related to the impact that multi-vehicle movements to and from shale gas sites would have upon the integrity of the structure of roads and the recompense, if any, that the County Council would receive upon the failing of the fabric of the roads itself.

Ken Cronin replied that the integrity of the road will be included in the Traffic Management Plan. This is nothing new in terms of comparison with house building or building a supermarket. These issues are looked at by the Minerals Planning Authority and discussions are held with the developers about those impacts and how they could be improved.

A Member asked the following questions:

- What is the general lifespan of a well and what restoration and aftercare is carried out when the well is decommissioned to make good the land?
- How do you see the industry evolving within the next 25 years and could it lead to the industry carrying out its operations in a different way?

Ken Cronin replied that in terms of how long sites last for, the reality depends on the geology of the area and a number of other different local factors. However, the assumption at the moment is that these sites will last somewhere between 20 to 25 years. Of the 2000 wells that the industry has drilled in the UK over the last 60 to 70 years, we still have wells that are producing hydrocarbons 30 to 40 years hence.

In terms of making good, there are three aspects to this. Firstly, conditions will be put upon the operator by the Minerals Planning Authority with respect to restoring the landscape. There is then the responsibility of decommissioning that well and that is regulated by the Health and Safety Executive. There is a whole suite of procedures that the operator will have to do to decommission that well and that is signed off by the Health and Safety Executive. Finally there is the environmental impact and the industry will do baseline monitoring from the start all the way through the operations. After the well has been decommissioned the operator is not allowed to hand back the environmental permits to the Environment Agency until the Environment Agency is assured that there is no longer an environmental impact. Again, there will be monitoring done on those sites to ensure that that is the case.

In terms of future developments, I have a personal view which is that I would like to see water treatment technology introduced on site so that operators no longer have to transport waste water out of the facilities. This would in turn reduce HGV movements. We already have a big difference to the United States because the truck movements coming in there tend to be carrying water whereas here the industry tends to use water from the mains on site. I think we will see technology moving forward to reduce the local impacts on communities in the next 10 years.

- A Member asked for a point of clarification in relation to the terminology used to denote 'an operator'. He asked if that was an industry term operator to exclusively mean the owner or shareholder or drilling company. If it is an international company could the responsibility for the well lie abroad? Is operator the correct term to describe ultimate responsibility?

Ken Cronin replied that typically in any operation one or two companies will be involved but one of those companies has to take the lead as the operator. The Oil and Gas Authority has to make sure that that operator has the right operating experience in order to carry out the role. Consequently the lead operator is the one that is included on the license and is responsible. The other companies will have a financial interest and may also contribute experience.

A Member asked the following question:

- In terms of the economics of the concept, does the shale gas industry still feel that there is a major argument that shale gas can be a low cost, low-emitting fuel to take us on until we meet better and less polluting forms of energy? This is in view of the price of oil having reduced, in a relatively short space of time, from 110 dollars a barrel to 20 dollars a barrel at present.

Ken Cronin replied that climate change is a really important issue and he was pleased to see the agreements coming out of the Paris climate conference (COP21).

There is a need to be pragmatic and examine what gas is used for when we discuss climate change. In this country 30% of our electricity is from gas and in fact this week nearly 50% of the supply came from gas. 84% of our homes use gas for heating, 61% of our homes use gas for cooking. Half a million people are employed in this country to take gas and create other productions. There are over 6000 products in this country that contain gas and so it is very important that when we talk about gas it is not just in terms of 'keeping the lights on'.

In terms of gas as a bridging fuel prior to COP21, globally there were over 2000 coal fired stations in the process of being built. If tomorrow we were to replace coal fired power stations with gas-powered power stations there would be a big impact almost immediately on climate change globally. In this country in terms of our gas needs we currently take 50% of our gas from outside the UK. That has changed in the last 15 years from 100% in our own country to 50% outside. In the next 15 years that will rise to nearly 80% and most of that gas will come from outside the UK and will present us with not only an economic climate security issue it will also have an environmental impact of transporting that gas many thousands of miles. Producing gas in this country, which is well regulated, is a much better way of helping the environment than importing gas.

In terms of the current oil and gas price, the next two to three years for the industry are about exploration and so the industry was never going to produce hydrocarbons in a great amount and so was not going to generate large amounts of revenue. We will be able to take a longer term view once we understand the geology, how the gas flows, what the economics are and the prevailing gas price. Until that point we will not know whether it is economic or not.

A Member asked the following questions:

- If all the exploration that you are doing in the next two to three years develops what will this mean in terms of numbers of fracking pads in North Yorkshire, number of wells across Ryedale, or both, or as a percentage of success?

- If the industry can work all those licenses how much will it reduce climate change by?

Ken Cronin replied that in relation to the number of sites, the industry is in an exploration phase at present and needs to work out first how the geology works before getting into production. The industry will have the answers about the number of sites once the exploration is complete. The reality is that part of the answer to the question is about the regulatory process. Operators have to go through four separate regulators in order to get site approval to proceed so a lot of it comes down to whether regulatory approval is obtained or not. In terms of climate change, all of the major groups such as the IEA are showing a major increase in gas over the course of the next 20 to 30 years to replace coal. The future is very much orientated for gas before we get to 2100 where predictions are showing fossil fuels in terms of power generation will have gone completely.

- The Chairman asked Ken Cronin to provide a written answer to the climate change issues raised by the Member. He went on to note that Ken Cronin had mentioned that well structure and integrity is paramount however structural weaknesses had been identified at the Preese Hall well site in Lancashire. The Chairman asked how confident the industry is moving forward about safeguards around well integrity?

Ken Cronin replied that this was chiefly a question to put to the Oil and Gas Authority but wished to reiterate that wells in this country have a triple layer of steel and concrete and each of those layers represented fail-safes. The well at Preese Hall did not fail, what happened was that one of those barriers failed and that is the point of having the barrier. The well and the way it was constructed and designed did its job properly.

The Department of Energy and Climate Change

The Chairman explained the role of the Department of Energy and Climate Change, as set out in the report, and introduced Emily Bourne to the meeting. Emily Bourne provided an overview of her role in the Department of Energy and Climate Change.

A Member asked the following question:

- What is the UK government's approach to on-shore shale gas extraction and how does this fit in with its wider energy policy, including meeting our climate change targets?

Emily Bourne replied that the government supports the development of domestic energy sources including shale gas in a safe and sustainable manner. The government believes that shale gas may provide huge potential in providing a home grown energy source to help improve the UK's energy security, secondly it could provide national and local economic benefits and thirdly it could help us to meet our carbon reduction targets if it substitutes for more carbon intensive sources such as coal.

Looking first at the energy security benefits, the government wants the UK to successfully transition in the longer term to a low carbon economy. Access to safe and secure supplies of natural gas for years to come will be part of that transition. Gas is an important part of our energy mix and currently provides a third of our total energy supply. It is worth bearing in mind what gas is used for in the UK. About 40% is used in the home for heating and cooking, about a third is used in the industrial sector and about a quarter is used for electricity generation. However since 2004 the

UK has been a net importer of gas due to the decline of the production from our North Sea gas reserves. Last year about 45% of our gas supply was imported. Our projections suggest that domestic production will decline and without shale gas net imports could increase to around 75% by 2030. A key rationale for us exploring the potential that we have in the UK is that the more energy sources that we are able to access the greater energy security. There is clearly a strong driver, the government believes to explore the potential of the home grown gas under our feet with the associated benefits that that would bring to the UK if we are able to do so in a safe and sustainable way.

Secondly looking at the climate change impacts of shale gas, the government believes that shale gas is compatible with our goal to cut greenhouse gas emissions and does not detract from our support for renewables. The government remains committed to the development of renewables and of the development of new nuclear and also to improving energy efficiency. One of the greatest and most cost-effective contributions that we can make to emissions reduction in electricity would be to replace coal fired power stations with gas. Gas is the cleanest fossil fuel and provides half the carbon emissions of coal when used for power generation.

Consultation proposals are out to close coal fired power stations by 2025 and to restrict its use from 2023. If we take this step we will be one of the first developed countries to deliver on the commitment to take coal off the system. However government will only proceed with this if we can be confident that the shift to new gas can be achieved within these timescales because of the importance of energy security.

The government commissioned the 2013 report 'Potential Greenhouse Gas Emissions associated with Shale Gas Extraction and Use' by Professor David McKay and Dr. Tim Stone. This report concluded that the carbon footprint of shale gas would likely be significantly less than coal and also less than imported liquified natural gas. This is also supported by the findings by the taskforce's shale gas report on the climate change impacts of shale gas, last year. To make absolutely sure we have included in the Infrastructure Act 2015 a requirement to seek advice from the Committee on Climate Change on the likely impact of onshore oil and gas production on meeting our carbon budget obligations. These are the obligations to reduce our carbon emissions by 80% on 1990 levels by 2050, and these are legally binding targets.

Finally there are the economic benefits from a successful shale gas sector in the UK. The scale of these benefits will of course depend on the scale of any production sector and as has been said we cannot yet know the potential for shale gas extraction in the UK without exploration going forwards. However EY (Ernst & Young) has estimated that a thriving shale gas industry could require around £33 billion of investment over the period to 2032 and could mean as many as 64,000 jobs nationally at peak. Locally that might mean jobs such as local companies, lorry drivers and environmental consultants. The government also believes that communities hosting shale gas development should share in the financial returns that they generate. We welcome the commitment by the operators to make set payments to these communities: £100,000 for each exploration well and in the production stage 1% of revenues which the industry estimates could be worth up to £5 million to £10 million for a typical well site. As announced by the Chancellor in the Spending Review in November 2015, the government will commit up to 10% of shale gas tax revenues to a shale wealth fund which could deliver up to £1 billion of investment depending upon the size of the sector, to local communities and local regions. Finally as with renewables, wider communities will benefit as local councils will be

able to retain 100% of the business rates they collect from productive shale gas developments.

Emily Bourne went on to explain how the Department of Energy and Climate Change fitted into the regulatory structure. She explained that the Department of Energy and Climate Change holds the policy responsibility for shale gas work and works closely with the other government departments involved in various aspects of the policy and also with the regulators.

- A Member said that she hoped the government would provide the funding to undertake baseline monitoring for example in relation to air quality beforehand. This should be paid for by government and not by local taxpayers. She also expressed concerns about the potential damage that would be created to the landscape by shale gas extraction production in the county and the impact of increased traffic.

Emily Bourne said that she agreed with the importance of monitoring and referred to an independent project led by the British Geological Survey which included some funding from government. The study is undertaking baseline monitoring in the two areas where we have planning applications that have been put forward - Lancashire and Yorkshire. That project is looking at baseline measurements regarding water, seismicity, air quality, greenhouse gas emissions, ground motion, soil gases and radon in the air. The project began last year and the first details of the project can be found on the British Geological Survey's website.

A Member asked the following question:

- Some commentators state that research into conventional wells indicates that horizontal wells have a failure rate four times higher than for vertical wells in the same area. Why is a condition that prevents surface drilling in groundwater protection zones, National parks, SSSIs and AONBs adequate mitigation for these areas in view of the fact that drilling will be able to take place horizontally underneath them?

Emily Bourne replied that the Department of Energy and Climate Change does not anticipate that at the depths involved, horizontal drilling in these areas would have any impact on the surface. This was a question though primarily to direct to the Health and Safety Executive as the regulator responsible for well integrity.

Looking particularly at the restrictions on activity in protected areas, protected areas in which hydraulic fracturing will be restricted are set out in the Onshore Hydraulic Fracturing Protected Areas Regulations which were formally in December 2015. These regulations ensure that the process of hydraulic fracturing cannot take place above 1200 metres in National Parks, the Broads, AONBs, World Heritage Sites and areas that are most vulnerable to groundwater pollution.

Rather than enabling activities in these areas these regulations introduced an additional protection by adding the 1200m depth limits and they complement the strong protections that are already in place through the environmental and planning permitting systems. These regulations do not grant any form of permission for fracturing to take place. Applicants still need to go through the same processes of planning approval and permits.

The government has separately committed to ensure that hydraulic fracturing cannot be conducted from wells that are drilled at the surface in the most valuable protected areas. The Department of Energy and Climate Change has concluded consultation

on this and is considering the responses. Whilst the Department continues to believe that protections exist under the planning system and the existing regulatory regime are sufficient, it does recognise that these surface areas are of particular concern to people and therefore is minded to apply the surface restrictions to SSSIs as well as to the areas covered by regulations.

A Member asked the following question:

- How close will a surface operation be to the boundary of a national park and are there any suggested or proposed regulations on that bearing in mind that a well could have an impact on a national park even if it is over four or five miles away?

Emily Bourne replied that there is no restriction in regulation but there is a requirement on the Minerals Planning Authority when considering a planning application to consider the local impacts including the location.

A Member asked the following question:

- Would the results of the baseline monitoring being led by the British Geological Survey have to be accepted by all the relevant companies and could not be contested?

Emily Bourne replied that there is a requirement on the operators to conduct their own monitoring, which they will do including baseline monitoring 12 months in advance of their operations going forward. This data is being conducted separately to the data that the operator will collect and independently by the consortium led by the British Geological Survey. The purpose is to give reassurance that the first few sites will not be purely relying on the operator's data.

- The Chairman sought clarification on the words 'for the first few sites'. He noted that baseline monitoring would be very onerous time wise and potentially financially for any Authority, not just North Yorkshire. He asked if the Department of Energy and Climate Change had only provisioned for baseline monitoring for the first few sites with the rest left to the professionally qualified trust of the operators.

Emily Bourne replied that it is very early days as there are not yet any live shale applications in the UK and there are only a limited number coming forwards for planning approval. That is something that the Department would want to keep under review to check that it remains appropriate for the scale and size of the industry.

A Member asked the following questions:

- What is the efficiency of the process of shale gas to produce electricity?
- What is the difference in carbon cost efficiency between shale gas and conventional gas, adding in all the additional surveys, hazards, transport costs and so on?

Emily Bourne said that she would provide a written answer to those questions.

A Member asked the following questions:

- Does the government recognise that shale gas is still a fossil fuel and that the methane produced from shale gas operations is twenty times more powerful a greenhouse gas than shale gases?
- The government remains committed to renewables, is it true though that renewables have had a big reduction in their subsidies whereas production of fossil fuels including shale gas still keep theirs?
- Does the government recognise the impact on councils like ours which will have to have a very strong regulatory function in relation to planning applications and yet we are facing huge budget cuts?

Emily Bourne replied that the government is clear that gas is a fossil fuel and that the UK does use a lot of gas, about a third of our current energy use, and we are going to need gas for some years to come. The government looks to the McKay and Stone report which compares the carbon intensity of gas and shale gas compared with liquefied natural gas and compared with coal. There is a benefit compared to those two alternatives.

With regards to the commitments to renewables there have been some changes to the subsidies to some renewables. However we do not subsidise shale gas production so it is different from renewables in that respect.

With regards to the impact on councils' workloads there is a fund that the government has opened for councils to apply to which has £1.2 million available to support them in dealing with shale gas applications in particular. This is in recognition that there is a lot of additional work that can come with these types of applications.

Oil and Gas Authority

The Chairman explained the role of the Oil and Gas Authority, as set out in the report, and introduced Toni Harvey to the meeting. Toni Harvey provided an overview of her role in the Oil and Gas Authority.

A Member asked the following question:

- OGA's role includes assessing the licence applicant (the proposed well operator) on technical competence, environmental awareness, financial viability and capacity. How does it go about doing this?

Toni Harvey replied that we, (the Oil and Gas Authority), normally offer new licenses in licensing rounds and this is a competitive process.

On closing day the applicant company submits technical information to be marked against a mark scheme. However there are thresholds that they must meet before we even consider a technical assessment of their competitive applications. We set out clearly in guidance to applicants what information is required and if we do not get this information the applications do not progress any further. In the last onshore licence round there were a number of applications that did not cross this first threshold.

In carrying out the technical assessment of the applications we check a number of things. Firstly that they are technically competent and have organisational capability and environmental competence to enable them to operate to the standards we require. They also have to demonstrate their long term financial viability and adequate funding to meet their proposed work programme.

In looking at their technical competence we ask them for their previous operating experience and specifically supervising or carrying out drilling operations within the last five years. This includes details of the proposed operators' relevant crisis management and public engagement experience and the track record of their sub-contractors that they propose using.

We consider their management structure and strategy carefully to make sure, for example, that there are health and safety executives on the board and that they have technical expertise throughout the organisation on the board.

We look at the summary of their approach to risk assessment and the hierarchy of decision-making on the site and production operations. We look at how they plan to monitor their operations, their crisis management plan and their community engagement plan.

Finally we ask for a summary of their environmental risk management plan and potential impacts and assessment that would have to be managed during the execution of the proposed work. For some of the applicants that are at the very early stage of knowing what their plans would be, this is not very detailed but the detailed plans are looked at when we consider an application to drill. In the licencing round we look carefully at who the people are that the applicant intends to employ and in particular those carrying out the key roles.

The applicant is required to describe which skills are in-house and which will be delivered through contractors. If they do plan to use contractors, we need the names of those contractors and a description of who will be monitoring them including what arrangements are in place to deal with any unexpected incidents. In considering any applications for operatorship we look at the applicant's relevant insurance coverage and this is scrutinised in much greater detail when they have a plan to drill.

Although we are not the environmental regulator we do try to screen out people at an early stage who do not know how to operate here in the UK. To this end the applicant is required to provide a document called an Environmental Awareness Statement.

For each application the applicant has to lay out their understanding of the UK onshore environmental and planning legislation relevant to exploration, development, production and decommissioning. They also have to describe their understanding of the environmental sensitivities in the specific areas that they are applying for and how they plan to address those sensitivities when carrying out their operations.

In the strategic assessment that we conduct on a nationwide basis, before we launch the licence round the applicant has to consider issues that were raised in that strategic environmental assessment and how they are going to address those.

We also check each applicant's past records in the UK and internationally of their compliance with environmental legislative standards and requirements. This includes checks on any criminal or civil actions against them for environmental reasons, convictions for breaches of environmental legislation or pending criminal action for environmental breaches.

We also ask the applicant to provide very detailed and confidential financial records. They have to demonstrate that the company is in sound financial health. This also extends to every company involved because under the licence they are jointly liable. We make sure that each company has the money to pay for their share of the

elements of the proposed work programme. They also need to meet the Department of Energy and Climate Change's Residency Requirements, so we would not allow someone to operate their operations from a non-UK base.

Once the applicant has met this threshold they are assessed against a marks scheme that lays out the marks we will award for different work. Within the marking scheme there are sections for the amount of data that they have provided, the studies that they have used, the prospectivity that they have identified and their plans for further analysis in their work programme. The applicant's work programme is an important part of the licence as it represents the work that they commit to do within the next five years. In the fourteenth licence round for the first time we also awarded marks for companies that had experience specifically for shale gas extraction if they were applying for shale licenses. Detailed information about this is on our website.

A Member asked the following question:

- The Royal Society and the Royal Academy of Engineering note that attention must be paid to the way in which risks scale up should a future shale gas industry develop nationwide. Regulatory co-ordination and capacity must be maintained. Therefore how will risks relating to the intensity of activities within each licence block be managed if more wells come into operation in the area over time, or to put it another way if there are a lot of applications are the regulatory bodies in a position to cope with them?

Toni Harvey said that from Oil and Gas Authority's point of view in terms of consents and approvals, we recognise that things are at a very early stage. The number of applications coming forward will be incremental and we will consider those proposals as they come forward. The intensity of activity within each block is partially driven by the licence commitments. However all operations require local planning permission, successful applications to the Environment Agency, access agreements with the landowners, scrutiny by the Health and Safety Executive and the Oil and Gas Authority consents. There are many steps along the way that these effects will be considered. The Oil and Gas Authority like the other regulators will continue to work together to address these as the issues arise.

Responding for the Department of Energy and Climate Change, Emily Bourne said that with regards to the resourcing of the regulators, the regulators have confirmed that they have sufficient specialist inspectors to deliver the regulatory regime during the current exploratory phase. If there are a large number of wells drilled during the production stage, the Health and Safety Executive and the Environment Agency may then need to increase their resource accordingly and we will continue to review the resources needed on a periodic basis. The government funds the work of the environmental regulators up to the point at which a company applies for a permit. The permit charge that the operator pays then funds the work from then on. Therefore you would expect if you had more applications that would also increase the amount of funds that the Environment Agency would be able to attract. However the Department of Energy and Climate Change will keep this under review, and as has been said it is not something that is going to happen very suddenly, there is a long lead in time to these applications.

- The Chairman sought clarification on the points raised by Emily Bourne with regards to funding. He asked if the permit charge to the operator sits within central government or is there is an acceptance that it should be shared proportionately to the local authorities where the drilling takes place.

Emily Bourne replied that she was referring above to the funding for the Environment Agency. With regard to impact on local authorities at the moment there is a fund available from the Department for Communities and Local Government that can be applied to for help with shale gas applications, and this will be kept under review.

A Member asked the following question:

- Is the money that is paid for licences, ring-fenced to be spent within the industry?

Emily Bourne said that she could provide a written reply but her assumption was that it is not ring-fenced.

A Member asked the following question:

- What requirements does the Oil and Gas Authority place on operators to monitor seismic activity during hydraulic fracturing?

Responding for the Oil and Gas Authority, Toni Harvey said that the micro-seismic events caused by hydraulic fracturing are normally very small - less than zero on the richter scale.

What the Oil and Gas Authority is looking for in its monitoring is an 'abnormal event'. Earthquake magnitude is measured on a logarithmic scale so that a zero event is 10 times smaller than a one event which is then hundred times smaller than a two event. Only when the magnitude is three or four can seismic activity be felt and is equivalent to the ground movement of a passing train. By the time that earthquakes reach a magnitude 5 they can cause damage.

Once hydraulic fracturing commences, real time seismic monitoring is required. A 'traffic light' system is in place so that the operations can be quickly paused and the data reviewed to see if there is any unusual seismic energy created. The traffic light system is part of the hydraulic fracture plan, which is a broader plan of information of what the company proposes to do and has to be agreed with the Oil and Gas Authority.

The traffic light system is there to look for things that we might expect to happen later so for the next few operations the red light is set at 0.5 on the richter scale, which is below human detection. If this figure is exceeded during monitoring the company will stop injecting and listen for 24 hours and look for a 'felt event'. If there is no felt event 24 hours later the company will probably be told that they can go on to the next level and frack higher up. If a felt earthquake is recorded in the 24 hours after a 0.5 seismic event a full technical evaluation of the event would be required before any further hydraulic fracturing could commence.

The British Geological Survey is carrying out independent seismic monitoring as part of the environmental monitoring baseline programme in North Yorkshire and Lancashire. It is the Oil and Gas Authority's intention that for the next few wells at least the British Geological Survey will also be doing their own to check the traffic light system to make sure that it is done properly. The operators will also be required to monitor growth in the frack to allow them to evaluate the effectiveness of their frack but also to ensure that the actual fracture is conforming to its design that it remains contained and far away from the aquifers.

Some responses to our consultation on the traffic light protocol suggested that 0.5 magnitude is overly- cautious in comparison with the other control protocols

established for other industries such as for the construction industry and for quarrying. As our experience in applying this protocol develops it may be that the trigger levels can be adjusted upward or downward without compromising the effectiveness of the controls. For the next few operations the Oil and Gas Authority has promised that it will have an independent observer on site during fracking operations to make sure that the protocols that it has established are followed and to monitor the interpretation of the data. The Oil and Gas Authority hopes to learn as much as it can about the next few fracking sites so that it can fine-tune its plans and put the lessons properly into effect.

There was a break at this point in the meeting for lunch.

Environment Agency

The Chairman explained the role of the Environment Agency, as set out in the report, and introduced Martin Christmas and Ben Hocking to the meeting. Martin Christmas and Ben Hocking provided an overview of their roles in the Environment Agency.

A Member asked the following questions:

- What monitoring will be undertaken by the Environment Agency before, during and after shale gas extraction has taken place, to supplement the operator's own monitoring, and what enforcement action will be taken if permitted levels are exceeded e.g. air emissions?
- Will the Environment Agency be seeking bonds from the fracking industry when granting permits to allow for clean up in the event of contamination?

Martin Christmas responded by noting that the answer to the question does not just relate to the oil and gas industry but also to all the industries that we, (the Environment Agency), regulate. We do not undertake the monitoring. Instead, we expect the operator to arrange for the monitoring to be undertaken by paying for appropriately accredited field staff and chemists to collect and analyse the data. Our role is one of an auditing process whereby we collect the data from the operator to understand what the background levels are. We are also involved in compliance work to check how those samples are being collected. The reason that we rely on the operator to fund the information required for their operation, is that we do not expect the taxpayer to pay for the industry to develop.

In respect of enforcement we carry out regular compliance visits to sites. Our enforcement options go from anything from advice and guidance right through to prosecution. That is largely based on a risk based approach in terms of how the operator has performed previously and that will determine how many visits we might make. Breaches can be anything from the operator not being able to demonstrate that the right paperwork is in place right through to a breach having a significant impact on the environment.

With regards to the question relating to bonds, we do not seek financial provision from the operators. We also do not seek bonds for clean-up costs should there be an environmental accident. Under the Mining Waste Directive there is an opportunity for us to make financial provision as part of that permit. That however is only for operations that are classified as hazardous waste facilities and we do not expect onshore oil and gas to fall into that category.

A Member asked the following question:

- Does the Environment Agency ask operators to set up or pay into a fund to pay for any 'necessary' clean up costs, if there is a problem, or in the event of an operator going into administration?

Martin Christmas replied that the Environment Agency does not require such a fund to be set up by the industry but there are checks that the Oil and Gas Authority makes before operators get a Petroleum, Exploration and Development Licence around their ability to carry out that activity.

Ben Hocking added that the Environment Agency does not have the powers to require such a fund to be set up. However there are opportunities for other authorities to require that, including the Minerals Planning Authority under planning legislation.

- The Chairman noted that this was a point that the joint sub-committee should follow up with North Yorkshire County Council's planning department.

A Member asked the following question:

- Does the Environment Agency have sufficient staff resources to carry out its role in monitoring the industry, especially in light of recent government cutbacks?

Martin Christmas replied that over the last few years the Environment Agency's staff had reduced from about 13,000 to about 10,500. Part of that has been a restructure of the organisation to remove the middle tier regional co-ordination area. The purpose of the restructure is to make sure that funding follows workload and that activities from the different funding streams are not cross-subsidised. To help the Environment Agency with the onshore oil and gas industry, in 2015 it received an additional £3.1m from government to carry out this early stage of the exploration phase. This year we are bidding for £2.5m additional resources to carry out oil and gas work. The Environment Agency in Yorkshire is bidding for 24% of that additional funding. This share is largely based on the number of Petroleum Exploration and Development Licences that sit within the region's geographical boundaries.

A Member asked the following question:

- How frequently and under what sort of stipulations are the operators required to provide monitoring information to the Environment Agency.

Martin Christmas said that it depends upon the requirements defined in the permit and what is required on a case-by-case basis. These requirements determine the scope and nature of our compliance visits. Such visits typically involve checking the records that the operator has in place, including audits of data and data quality. There is an element of self-reporting around issues and we would expect if there are minor or major compliance problems that operators would inform us. We do however routinely collect data and share that.

A Member asked the following the following question:

- Is all the information that is contained in the permits relating to the chemicals to be used included within planning applications, and by default are the permits public documents in the same way that the planning application is?

Martin Christmas replied that the permits are public documents and the chemicals used in that permit are available.

A Member asked the following question:

- The Environment Agency has stated in the past that damage to groundwater may be irreversible. What, if any, safeguards can be put in place to avoid contaminating ground water supplies and aquifers?

Martin Christmas referred to the Health and Safety Executive's role of making sure that the well bore is as safe as possible. He said that the approach of the regulators, including the Environment Agency is about prevention rather than responding reactively, and the well bore integrity is key in this regard.

Some of the other issues that the Environment Agency looks at when considering the groundwater elements of the permit are around source protection zones and the distance between where the aquifer and possible water suppliers are, and where the fracturing would happen. One of the safeguards set out in the Infrastructure Act 2015 bans hydraulic fracturing from taking place above 1200m in depth in groundwater source areas. As part of the determination of the groundwater permit, our geologists take into account not only the advice from the Health and Safety Executive but also their local understanding of the local geology and they make that recommendation as to whether that permit should be issued or not based on their experience and opinion of the risk of a migration of fluids from that fracturing area reaching any aquifer. We do not allow exploration to take place within a source protection Zone 1 - the critical water supply areas in the North Yorkshire area.

A Member asked the following questions:

- The Chartered Institution of Water & Environmental Management has stated that any negligence associated with storage, transportation and operational spills represent the greatest threats to surface water, as well as to groundwater. What other enforceable safeguards, in addition to those already discussed (double-skinned storage tanks and impermeable platforms), can be put in place to dispose of waste water safely or ensure that it is stored safely above the ground on-site even in the event that heavy rainfall causes the site to flood?
- What efforts will the Environment Agency put into the work that the UKOOG representative has suggested at today's meeting with regards to developing new technologies to manage, recycle and cleanse water used in fracking operations?

Martin Christmas said that the Environment Agency has teams that work closely with UKOOG around what future developments are in train for the industry. In turn that helps the Agency shape what its future approach to regulation will be. If the industry wants to come up with a new way of working the Environment Agency will assess that and determine what the suitable safeguards are with that new way of working.

In terms of the here and now, the Environment Agency insists on banded or double skinned tanks to make sure that any spills or failures of those tanks are contained on the site. The tank sits on top of an impenetrable membrane with a drainage facility around it that will include an interceptor to ensure that there is no possibility of spills on the actual site migrating on to unprotected soil and then into the groundwater. We feel that that is a suitable safeguard to manage surface water spills on a well site.

A Member asked the following questions:

- In light of the complex regulatory framework associated with fracking, to what extent does the Environment Agency liaise with the other regulatory authorities?
- Are there any gaps in the current regulatory framework, as suggested by Friends of the Earth?

Martin Christmas replied that since 2013 when the Environment Agency became heavily involved in the oil and gas industry, its relationships with the Health and Safety Executive in particular and the local planning authority had strengthened significantly.

In terms of gaps in the regulatory framework Martin Christmas asked for clarification about the earlier criticism made by Friends of the Earth.

Responding on behalf of Friends of the Earth, Naomi Luhde-Thompson said that the point made by Friends of the Earth is that the unconventional fossil fuel industry is a new industry in the UK and yet the regulation in place has not been designed specifically to deal with unconventional fossil fuels. For instance in terms of waste it cannot go to normal waste water treatment centres because it contains Naturally Occurring Radioactive Materials. Queries are around the reach and classification of chemicals used and whether the Mining Waste Directive, in the way that is implemented in the UK, need to be looked at. There are various regulatory issues that have been raised not just by Friends of the Earth but also by the legal profession.

Martin Christmas replied that with regards to the Environmental Permitting Regulations the Environment Agency uses that across a range of industries. Waste management is intrinsic across a number of industries that it regulates. That regulatory framework is appropriate because it has been tested. There are some elements of the operation of hydraulic fracturing that may be seen as new but in terms of waste management in ensuring that the right waste ends up at the right treatment facility, it is something that the Environment Agency has long experience of as a waste regulator.

Public Health England

The Chairman explained the role of Public Health England, as set out in the report, and introduced Greg Hodgson and Simon Padfield to the meeting. Greg Hodgson and Simon Padfield provided an overview of their roles in Public Health England.

A Member asked the following questions:

- How comprehensive and robust is the research and information on the public health impacts of fracking?
- In examining the potential cumulative long-term impacts on health, is there a need to establish a comprehensive health and exposure monitoring programme, to assess the extent and level of the release of pollutants from the fracking process? If so, and acknowledging that in order for the results to be statistically reliable, would it be appropriate for Public Health England to conduct or co-ordinate this surveillance using North Yorkshire as a pilot area, and what elements could be included in such a study?

In responding to the first question, Greg Hodgson said that Public Health England's 2014 report on the potential public health impacts from shale gas extraction looked at exposures to chemical and radiological pollutants only. The report did not look at the broader public health aspects as that was not its remit. In putting together the report Public Health England reviewed 229 papers and reports up to January 2014.

As with all evolving technologies the evidence grows over-time as the industry develops and this includes evidence from other countries that have a more developed shale gas industry such as in the United States and Australia. The research and information that is available is only as good as the data collected and the methods used. It is also important to consider the context in which the data is collected, the country in which those studies are undertaken including their regulatory framework and nuances of their populations.

Since the report was produced Public Health England has continued to review the evidence that is available. However the conclusion and recommendations of the 2014 report from the evidence that we have reviewed since continues to support these. The majority of the research published so far looks at environmental outcomes. There are few studies that have suggested associations between adverse health impacts and shale gas activities. Authors of studies that have suggested such an association have also highlighted the limitations of their research, adding further weight to Public Health England's recommendation for further work to be carried out.

Public Health England believes that there is a unique opportunity in the UK, in advance of the industry developing, to consider appropriate environmental and epidemiological studies to ensure that we gather evidence and strengthen the evidence base as we move forward. Colleagues have already talked about environmental baseline monitoring programmes that are being led by the British Geological Survey in Lancashire and Yorkshire. Public Health England is a partner in that consortium looking at environmental radion levels and will also be looking at the data that originates from those studies to see how that also forms its view and its risk assessment.

In responding to the second question, Greg Hodgson said that Public Health England's view is that the regulatory framework in the UK will ensure that emissions are carefully controlled at source and therefore does not anticipate that shale gas activities will lead to adverse health impacts if the industry is properly run and regulated. However where opportunities arise for Public Health England to undertake studies on the health impacts of shale gas extraction it will do so.

Specifically in relation to what aspects could be included in a local study, Simon Padfield replied that you can only measure what you are looking for in the first place. The studies that have been done already have tended to pick on important public health outcomes such as birth outcomes. The conclusion of the 2014 Public Health England report is that are potential risks but the probability is low if shale gas operations are well regulated and well run.

A Member asked the following questions:

- Scientifically we have not anywhere in this country measured detailed baseline health, and that is across every health issue, so how do you know when and if changes could occur?
- Has Public Health England considered working with North Yorkshire Public Health to produce a pilot study with regards to baseline health that could then

be rolled out nationally? Have you had discussions with HM Treasury about the amount of funding that would be required to conduct such a study?

Greg Hodgson replied that Public Health England would support and encourage effective baseline monitoring as the industry develops, and he went on to note Public Health England's involvement in the environmental baseline monitoring being led by the British Geological Survey. In terms of assessing impacts on health, Public Health England takes a source and a pathway approach. This means that in order for there to be an effect from a particular pollutant there has to be a pathway to reach a person. The way that environmental regulation is run in the UK is to minimise pollutants getting there. However Public Health England is considering the potential need for and options available, including collaboration with academic partners, for further research on the public health impacts of shale gas extraction. In terms of specific discussions with the Treasury I am not aware of discussions at that level but Public Health England nationally are having discussions about how we might do studies should they be considered appropriate.

- The Member asked for Public Health England to provide a written response with regards to progress made of such discussions.

Dr. Lincoln Sargeant, Director of Public Health for North Yorkshire, said that the Public Health team in North Yorkshire does some monitoring but it is very basic. The Public Health team has access to data on causes of death, cancer registrations, GP registers and hospital admissions. The difficulties that those sources of routine data have, is that they do not give the timeliness of response. This means that issues might be picked up sometime after the events have happened. The other challenge is in relation to local changes. We can pick issues up over a large geography with a large number of people. However, looking at data just for North Yorkshire, for example around the number of births, does not generate enough statistical power. Another difficulty in looking at the impacts that shale gas operations may or may not have had upon a person's health, is trying to remove all the other factors that could have impacted upon that individual or population. For instance where you look at factors such as air pollution you have to then consider the prevalence of smoking in the population. The prevalence of smoking will dominate other factors and you need large populations to be able to tease out those additional other effects. That said the Public Health team have begun discussing with colleagues in Public Health England about commissioning an appropriate study as and when the evidence suggests we need to do so. We would need to partner with academic institutions and any funding for the study would need to come out of a separate pot from the Public Health grant.

- The Chairman said that in noting the comments made, a possible recommendation for the joint sub-committee is for some health-related baselines to be put in place so that reference can be made about any anomalies arising if and when shale gas operations go ahead.

Health and Safety Executive

The Chairman explained the role of the Health and Safety Executive, as set out in the report, and introduced Tony Almond to the meeting. Tony Almond provided an overview of his role in the Health and Safety Executive.

A Member asked the following question:

- What are the safeguards taken around wellbore structural integrity and decommissioning of wells? How sure can we be that well casings will not over time lose their structural integrity causing toxic chemicals to contaminate

the land and water supply? Who will be monitoring this once the well has been decommissioned?

Tony Almond replied that Great Britain is one of the safest places to work in the world. The Health and Safety Executive is proud to have played its part in that over the last forty years. We, (the Health and Safety Executive), have been regulating the oil and gas industry since the mid-1990s both onshore and offshore in the UK. At that stage we introduced specific regulations for oil and gas wells.

Our view is that there is a robust regulatory regime in place and we have that view because there are clear duties on the operator to work in a way that there are no unplanned release of fluids from an oil and gas well throughout its life cycle and that includes post-abandonment. Under health and safety regulations in the UK, the operator – ‘duty holder’ – who creates the risk is responsible for managing it.

The Health and Safety Executive takes a lifecycle approach in our regulatory regime for oil and gas wells, which means we start at the design stage of the well. We scrutinise the plans of the operator for the design of the well and how they would manage the health and safety risks associated with the geology that the well is going to be drilled through.

We help the regulatory bodies to set the standards for oil and gas developments. We look at each well on an individual basis. We get a notification from the well operator which sets out their plans for the design of the well, the equipment that they will have on site and a full programme of work. It is only when we are content that they are managing the risks in the appropriate way that we will give the Oil and Gas Authority notification so that they can give the operator the necessary consent to drill the well.

If and when the work is given the go-ahead we then continue our scrutiny through the construction phase of the well so every week the operator must report into the Health and Safety Executive on what they have done that week and provide the results of any integrity test on the well. Any other activity on the well that could lead to an unplanned release of fluids requires further notification and during that activity we want a further weekly report. We have a range of powers similar to the Environment Agency, so we can instruct the operator to do things if we think they are not operating in a safe way, we can tell them not to do things and if we are concerned that they have broken the regulations we can prosecute. We have powers of entry on demand to any work site in the UK.

In addition to the Health and Safety at Work Act 1974 there are specific regulations for oil and gas sites: Borehole Sites and operations regulations which cover the notification process but they also set out duties on the operator to produce a health and safety plan for the site and emergency planning arrangements. There are also the Offshore Installation and Wells Design and Construction Regulations which apply to offshore and onshore wells. They set out the key requirement for there to be no unplanned release of fluids from the well so far as is reasonably practicable. They also set out the requirement for the operator to abandon the well in such a way that there is no unplanned release of fluids from either the well or from the reservoir associated with it. Under the Reporting of Injuries and Diseases and Dangerous Occurrences Regulations (RIDDOR), the operator must report to the Health and Safety Executive if there is any unplanned release of fluids or if they deploy any safety equipment to prevent an unplanned release.

A Member asked the following question:

- What is the life term integrity of the casings used in the well after it has been decommissioned?

Tony Almond said that he could provide a written answer but in brief the Health and Safety Executive's role ends once the well has been abandoned but we scrutinise the decommissioning process and we help set the standards. Wells must have at least two barriers inside the well as well as the casing between any hydrocarbon bearing zone and the top of the well. Each of these barriers will consist of a steel plate plus 500ft of concrete. If there is any porous zone in the formations it also needs to be either concreted across or a plug placed above it. Therefore we are not talking about the life cycle of just one barrier but several.

- The Chairman said that he would welcome a written response to the question.

A Member asked the following question:

- Who monitors the well after it has been sealed off and closed? If in 20 years' time one of the three seams fails who notices and how soon, and if in another 20 years another seam fails who notices, how and when, and in 100 years who will be monitoring the well?

Tony Almond said that once the well is abandoned the Health and Safety Executive's enquiries finish because it ceases to be a work site. If there is an unplanned release from an abandoned well then we would need to be informed about it as part of the requirements of RIDDOR. There is a study from the University of Durham looking at abandoned wells going back to 1919 to see if there is evidence that the wells leaked. Once the study reports we will have a better indication about how wells that have previously been abandoned have reacted but at the moment we do not see any number of abandoned wells coming on to our reports.

- Chairman said that the long term integrity of the well beyond the decommissioning stage was an important issue to note and there may be some directive that the joint sub-committee wishes to make in its report in this regard.

A Member asked the following question:

- Has the Health and Safety Executive the staffing resources to adequately carry out its responsibilities if and when the shale gas industry expands?

Tony Almond replied that the Health and Safety Executive's wells specialists are funded by the Offshore Industry and so are not subject to government cuts in the same way that some regulators are. The team of inspectors that cover offshore also cover onshore. We have recently recruited additional staff and over the next three years we will be training up new inspectors to concentrate specifically on onshore if the industry develops.

- For a point of clarification the Chairman sought confirmation that the onshore/offshore industry in financing the well inspectors does not employ the well inspectors directly but simply pays money towards the provision of that placement.

Tony Almond replied that the Chairman was correct in making this assumption.

A Member asked the following question:

- Is it too early looking at statistics that you have gathered under RIDDOR to suggest what the accident record is within the onshore oil and gas industry and what if any improvements need to be made?

Tony Almond said that the Health and Safety Executive's inspectors would tell you that the onshore industry has got a good safety record in UK. We work in a very similar way to the Environment Agency in that a lot of our work is aimed at preventing accidents taking place.

A Member asked the following question:

- In light of the Health and Safety Executive noting in 2012 a number of commonly observed weaknesses when inspecting well operators' well examination schemes, what assurances if any can you give on the robustness of well operators' well examination schemes for onshore shale gas extraction wells?

Tony Almond said that this report provided a good example of how the Health and Safety Executive regulates the industry.

The independent well examiner is not a regulator. The Health and Safety Executive is the regulator and so we scrutinise the well design. The independent well examiner's role is about quality control for the industry and the operator. It is set out in the regulations mentioned earlier and it is an important role because it is an independent check on the activity on the site to ensure that the relevant standards are being applied and the regulations are being complied with. Our own inspectors carry out an audit of each operator's well operators examination scheme. That includes an interview with the well examiner to establish that they have the right level of competence that we require from the regulations. If we find deficiencies we publish those so that other operators can also look at their well examination scheme.

- The Chairman sought clarification that with regards to the 2012 report, the actions identified by the Health and Safety Executive had been acted upon.

Tony Almond confirmed that they had.

A Member asked the following questions:

- To what extent have the regulations caught up with the onshore shale gas developments in view of the fact that they predate the industry and were originally developed for offshore oil and gas extraction?
- The 2014 Public Health England report, mentioned chemicals using fracking fluid should be exposed. Is there not a requirement for this to be the case under health and safety law?

Tony Almond said that the view of the Health and Safety Executive is that the regulation is goal-setting, so that it continues to be relevant no matter how industry develops and the key part of the regulation is around there being no unplanned release from the well and this covers this risk completely. We do feel that the regulations are still relevant and up to date. With regards to the disclosure of the chemicals use, the regulation of chemicals is one of the areas where we jointly

regulate with the Environment Agency. Any chemicals used on the site will be disclosed.

A Member asked the following question:

- In view of the offshore and onshore regulations being melded together to also apply to onshore wells is there a requirement for a safety case relevant in the offshore industry as required in the offshore industry?

Tony Almond replied that there is not. The system is similar to the safety case system but it is not exactly the same. The rationale is that the risks from offshore drilling and the safety case regime includes the installation itself, we do not have installation like an oil rig on shore.

A Member asked the following question:

- Why is a condition that prevents surface drilling in groundwater protection zones, National parks, SSSIs and AONBs adequate mitigation for these areas in view of the fact that drilling will be able to take place horizontally underneath them?

Tony Almond said that there had been a lot of horizontal drilling in the UK both onshore and offshore and the Health and Safety Executive has not received reports of well integrity issues because of horizontal drilling.

Yorkshire Water

The Chairman explained the role of Yorkshire Water, as set out in the report, and introduced Mark Morton to the meeting. Mark Morton provided an overview of his role in Yorkshire Water.

A Member asked the following question:

- What is our capacity to treat wastewater at licensed wastewater treatment facilities in the county?

Mark Morton replied that some assessment has been made in terms of the size of treatment works that can deal with waste water from shale gas production. The requirement is that the treatment facility must be at least a 50,000 population equivalent, so big sewage works.

From our (Yorkshire Water's) point of view it is unlikely that we would receive the waste water directly it is most likely to come through a third party although we have not had confirmation of that at present from any of the companies that are looking at shale gas in Yorkshire. Any third party that does discharge to our sewage works will have to comply with any consents that they already have from us so that will make sure that whatever they do discharge will not damage the sewage works and the effluent quality that we maintain. If they wish to discharge something that is outside of their consent there is a negotiation process and we have the capacity to refuse that discharge if it is going to damage the works.

A Member asked the following question:

- A Member asked what happens if Yorkshire Water refuses to treat the waste water?

Mark Morton said that if the waste water could not be treated by Yorkshire Water because it would harm its sewage works or harm the environment that it discharges into, the operator would have to find some other means of doing it. The shale gas companies are looking at various forms of on-site treatments to improve the quality of water before it is discharged. There are companies that offer specialist management services who could deal with the waste water pre-treated before it is discharged either directly to the environment or to one of our sewage works and as I understand it, it would most likely go via a third party who would pre-treat the waste before it is discharged to a sewage works.

Ben Hocking from the Environment Agency added that the waste water produced through shale gas activities would need to comply with the duty of care regulations. The Environment Agency would have overview of what was happening to that waste water and we make sure that it was taken to be treated at a suitably licensed facility before it was discharged back into the environment.

Mark Morton confirmed that the waste water arising from shale gas operations would not be sent to small treatment works. He said that in Yorkshire there are two, possibly three, sites that the waste water could go to. These are Knostrop Waste Water Treatment Works in Leeds, Blackburn Meadows Waste Water Treatment Plant in Sheffield and possibly Esholt Waste Water Treatment Works near Bradford.

Ben Hocking said that from the Environment Agency's perspective because of the likely NORM content within the water we would accept that in terms of recycling, the water might be re-used on-site. This means that the operator might use the same basewater for several fractures but ultimately that water would almost certainly end up at a specialist waste facility to be pre-treated before it would go to a Yorkshire Water facility.

A Member asked the following question:

- In view of the water utility company not having the responsibility for disposing of the waste water, which organisation does?

Mark Morton answered that the regulation of waste is the responsibility of the Environment Agency. We, (Yorkshire Water) are responsible for treating waste that is discharged to our sewers but with industrial waste a company cannot simply discharge anything that they want into the sewer.

We are very conscious that we do not want hazardous waste discharged to our sewers. We do deal with industrial waste but it generally comes via a third party and they have a consent to discharge to our sewage works. If they can meet their consent it has already been determined that the waste water is not going to affect the sewage works or the quality of the effluent that we discharge back to the environment. Although we are not necessarily bound to accept the waste, any waste that we do accept has to be assessed by us first. We need to be confident that we can dispose of that waste properly before accepting it.

A Member asked the following question:

- How closely does Yorkshire Water work with the Environment Agency and the operators to ensure that our water supply remains clean?

Mark Horton replied that our, (Yorkshire Water's), responsibility is to make sure its customers receive good quality drinking water. It is not our responsibility to manage the raw water quality. Our responsibility is to take that raw water at the best quality

that we can find it, treat it and then provide it to our customers at good quality. The responsibility for managing the raw water quality lies with the Environment Agency. However as a company we have a wider vision of not just taking care of our customers but the environment as a whole.

We work closely with the Environment Agency colleagues on a whole range of issues. We have very good links with other regulators as well to make sure that we understand shale gas developments in North Yorkshire.

We have encouraged the operators to speak to us and have had meetings with Third Energy and with one of the other shale gas operators recently. This enables us and the operators to build an understanding of each other's positions and understanding what the risks are. Ultimately our duty is to protect our customers' water treatment supplies and ensure that we can treat the waste water supplies effectively.

A Member asked the following question:

- What is the 'Plan B' for the industry if the water utility companies and the regulatory authority refuse to allow the waste water from shale gas operations to be treated?

Responding on behalf of UKOOG, Steve Thompsett said that the industry, like any other, considers water as a resource. Whilst water is regulated in various different ways, we have companies that extract water and companies that manage waste.

In managing that resource we buy the water either from a water company or obtain an extraction licence through the Environment Agency or buy it from a landowner by using a borehole on their land.

The waste water does not necessarily have to just go to a waste handler. In the production stage the water might be able to be treated on site or recycled and used in a well. Many conventional wells recycle huge quantities of water on a daily basis. If the water can be treated on-site it could be used for agriculture, or if treated sufficiently well, it might be able to be released into the environment. That leaves you with less waste to remove and that is an aspiration for production but for exploration we are dealing with much smaller quantities and generally it would go to the water treatment works or be treated first.

A Member asked the following question:

- A Member asked if in the event contaminated water flowed into the aquifer, at what stage would Yorkshire Water know if there was a problem - before or after it had got into circulation?

Mark Morton said that in most cases it would be before the contaminated water got into the supply. We have online monitoring for our water sources but we would almost certainly see increased acidity and that would trigger the works to shut down before it got into the water supply.

A Member asked the following question:

- Hydraulic fracturing requires large amounts of fresh water supplies and the need to process large volumes of wastewater. The Institution of Civil Engineers estimates that 10,000 to 25,000 cubic metres of water would be required for each well. How confident is Yorkshire Water that our available water supply would be able to support a proliferation of wells in a licence

block in North Yorkshire bearing in mind also the anticipated growth of thousands of new homes in the county over the next few years, which will place an additional strain on the system?

Mark Morton replied that in terms of our overall ability to supply water there is a countywide 'grid system' in place that can transport water from many different sources such as reservoirs, rivers and groundwater sources. We produce about 1.3 billion litres of water a day. Yorkshire Water has produced calculations based on the absolute maximum number of fracking pads that could be developed in the prospective area for Yorkshire. This calculation is based upon the fracking pads being only about 1.5 kilometres apart and the worst case scenario of 20 mega litres for each frack, with the assumption that the operator will drill every single well within 10 years. On a daily basis that is between one to two per cent of our daily production, which is well within our capability to supply.

What we do potentially face are difficulties locally, in that the local supply system might not be able to supply that amount of water that is required in the timescale that the company requires it. In that case we would enter into negotiations with the company. We are obliged to supply any legitimate business with water, so we cannot turn them away. However if we needed to increase our supply capability by laying pipelines and putting in pumping stations it would be for the operator to fund those developments and we would need to supply them with the water if it was possible. That assumes that all of the water came from the main supply. However the operators are at liberty to try and find other sources of water so they can extract from rivers, they can drill boreholes or they could use someone else's water source. In that respect we are pretty confident that we could supply the water if we were asked to.

A Member asked the following question:

- Has Yorkshire Water any plans to develop any more reservoirs?

Mark Morton replied that this was not the case.

A Member asked the following question:

- In view of a substantial number of properties in rural areas not being on mains water and instead having their own boreholes, what protection will exist and by whom for dealing with private water supplies close to shale gas operations?

Mark Horton replied that the regulation and protection of private water supplies is the responsibility of the Environment Agency. The Environment Agency defines a default 50 metre radius source protection zone around every borehole. The Environment Agency would also look at any impacts on private water supplies from such activity.

A Member asked the following question:

- What if any impact could there from the requirements of the Water Act 2014 of non-household customers mainly or wholly in England being able to choose their supplier of water and wastewater, in relation to the capacity and co-ordination of water companies to supply water for shale gas operations and treat the wastewater?

Mark Horton said that as he understood it Yorkshire Water would still produce water that the vast majority of customers in Yorkshire use but the customer would have the option of paying someone else to do the billing and negotiate a rate with Yorkshire Water for supplying water to that customer. This is akin to how it works in other utilities. Due to the fact that water is heavy and is difficult to transport and there are not good interconnection links between different water companies, the capacity to move water between water companies is limited. In terms of the waste water, there is less of a requirement for co-ordination between water companies. The key issue as now will be whether the sewage works could accommodate waste water from fracking.

The Chairman invited additional comments and questions from Members and additional comments from the external organisations invited to the meeting.

Ken Cronin (UKOOG) referred to the questions raised earlier about operators' financial arrangements. He explained that the operators have to have an insurance scheme in place over and above the checks that are done by the Oil and Gas Authority. Three different types of insurance have to be in place to cover various different types of risk: loss of well control, third party liability and environmental liability. The insurance needs to be taken out throughout their operations and after decommissioning. The environmental permit that the operator gets from the Environment Agency also lasts after decommissioning.

In the longer term the industry is looking at having in place mutual funds for bonds as the industry grows. However the amount of financial information that the Oil and Gas Authority has at present in terms of parental guarantees and the insurance requirements is adequate for the industry for now.

He went on to note the questions raised about the regulation not being up to speed as it predated onshore shale gas extraction. He said that he would like to reiterate what a number of the other speakers have said that there is no difference between an onshore well and an offshore well apart from the size of the well and where it is located. The actual physical mechanisms of a well are very similar wherever they are and that is the reason why it is covered by the same regulation.

5. Chairman's concluding remarks

The Chairman thanked the members of the public present at the meeting and the representatives from the external organisations for attending.

He said that it was clear from today's meeting that there has been a vast range of views captured from the public questions and duplicated to a certain degree by the questions raised by Members to the external organisations. In turn the representatives from the external organisations have confirmed or clarified some of the key issues raised.

Key themes raised and discussed at the meeting had included:

- Environmental risks based around the noise, odours, traffic, leakages, proximity of wells to housing, transportation and congestion
- The water usage and disposal of contaminated water and other waste material, including Naturally Occurring Radioactive Materials.

- Climate change, green houses gases, carbon emissions – macro energy policy.
- The ‘what ifs’ about the potential cumulative impacts of fracking operations to communities.
- Giving consideration to the validity and merits of having buffer zones beyond the parameters of National Parks, AONBs and SSSIs.
- The need for effective regulation, and we have had some clarification on this at the meeting.
- Economic issues.
- Social impacts on local communities.
- Public health risks, and we have had the request from Members for some baselines to be put in place in North Yorkshire so that we can have reference about any anomalies arising if and when shale gas operations go ahead.

The Chairman noted that many of these issues are inter-related and that there is a need to ensure a coherent approach and a plan going forward for shale gas operations in North Yorkshire rather than treating it in a piecemeal fashion. The joint sub-committee needs to be mindful not to rush this piece of work simply because there is an application going through process. Instead the findings and recommendations of the joint sub-committee have to be fit for purpose and ‘future proof’.

He went on to remind each of the external organisations to produce a small written report about any additional information they would like to submit and to respond to the questions that Members had raised where the external organisations did not have sufficient evidence to respond fully at the meeting.

The Chairman then referred to the recommendations in the report and commended them for approval by the Joint Sub-Committee.

Resolved –

- a) That taking into account the outcome of discussions during the meeting, the Chairman of the Transport, Economy and Environment Overview and Scrutiny Committee and the Chairman of the Scrutiny of Health Committee, in consultation with the group spokespersons for these committees, be authorised to produce a joint report for approval by both committees on the implications of Hydraulic Fracturing with a view to informing the consultation currently taking place on the Minerals and Waste Joint Plan for North Yorkshire, York and the North York Moors National Park.
- b) That subject to the approval of the Transport, Economy and Environment Overview and Scrutiny Committee and the Scrutiny of Health Committee, the joint report be submitted to the Executive with a view to informing the consultation currently taking place on the Minerals and Waste Joint Plan for North Yorkshire, York and the North York Moors National Park and also the Executive’s consideration of the petition submitted to the Ryedale Area Committee on 10 June 2015.

The Chairman noted that the next steps would be for the Group spokespersons to work through the findings and produce a joint draft report for submission to the two committees in April 2016. Subject to the committees' approval the report would then be submitted to the Executive in May 2016.

Record of Thanks

Members commended the work that Bryon Hunter and Jonathan Spencer had done for the meeting and the Chairman was thanked for chairing the meeting.

The meeting concluded at 3.10pm

JS

Appendix 2

Follow-up additional responses: invited external organisations

(February 2016)

- Friends of the Earth
- UK Onshore Operators Group (UKOOG)
- Department of Energy and Climate Change (DECC)
- Environment Agency
- Public Health England
- Health and Safety Executive (HSE)

North Yorkshire Scrutiny Committee

Friends of the Earth Note

3rd February 2016

This note briefly sets out further detailed points on issues raised during the Scrutiny Committee.

1. Scope of decision-making
 - 1.1 Development is defined in the TCPA 1990 55(1) as “*Subject to the following provisions of this section, in this Act, except where the context otherwise requires, “development,” means the carrying out of building, engineering, mining or other operations in, on, over or under land, or the making of any material change in the use of any buildings or other land.*”
 - 1.2 Therefore when making planning decisions, the whole of the activity must be considered. In terms of issues of overlap, the planning authority is directed as follows by online planning practice guidance (paragraph 112) “*before granting planning permission [they] will need to be satisfied that these issues can or will be adequately addressed by taking the advice from the relevant regulatory body*”.
2. Waste capacity
 - 2.1 The local minerals and waste plan is the first point of call for decision-making on applications that have waste implications. Friends of the Earth notes that there are also a number of national policies contained within the National Planning Policy Framework on water supply and waste water that are also relevant. These are detailed as follows.
 - 2.2 Planning should help to “*minimise waste and pollution*” as part of the environmental dimension of sustainable development in paragraph 7 of the NPPF. That planning should “*contribute to conserving and enhancing the natural environment and reducing pollution*” is also identified as one of twelve core planning principles in paragraph 17 of the NPPF. A general pollution policy is in paragraph 109, introducing section 11 on Conserving and enhancing the natural environment. This refers to preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability.

- 2.3 In terms of plan preparation, minimising pollution effects on the local and natural environment is also stated as an objective of plan preparation in paragraph 110 of the NPPF. There is also reference in paragraph 143 of the NPPF to ensuring that there are no unacceptable “impacts on the flow and quantity of surface and groundwater and migration of contamination from the site”.
- 2.4 In addition, on the matter of waste treatment capacity for flowback fluid that contains NORMs (naturally occurring radioactive materials), the Environment Agency has stated in response to a query that: *“We are aware that there are currently a limited number of sites permitted to accept this type of waste and that they have the capacity to accept the anticipated volumes of waste produced by the permitted activities.”* The Council should seek clarification urgently from the Environment Agency as to the capacity within its area for this specific waste treatment required as a consequence of high volume hydraulic fracturing.
3. Cumulative impacts
- 3.1 In the NPPF, there is specific mention of the need to consider cumulative impacts under paragraph 143 in relation to plan-preparation, which is repeated under paragraph 144: *“the cumulative effects of multiple impacts from individual sites and/or a number of sites in a locality”*.
- 3.2 Online planning practice guidance for minerals reiterates the need to look at cumulative effects and further reference paragraph 120 and 122 of the NPPF: *“taking account of the effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution.”*
- 3.3 However planning practice guidance (paragraph 120) picks out the need to look at each application individually: *“Individual applications for the exploratory phase should be considered on their own merits. They should not take account of hypothetical future activities for which consent has not yet been sought, since the further appraisal and production phases will be the subject of separate planning applications and assessments.”* Our concern is that the need case made by developers on individual applications often rely on purported economic benefits of shale gas production. There

can be no consideration of this 'benefit' without its attendant cumulative 'disbenefits' in our view.

4. Precautionary approach

4.1 From the experiences at Preese Hall, it is clear that the developers were not necessarily expecting their activities to cause seismic activity, and the disposal of the flow back fluid from that activity at the Davyhulme treatment works is now prevented by changes in permitting regulations. Our point is that the regulation changed *after* mistakes were found to have been made.

4.2 The Environment Agency was not going to require Cuadrilla to obtain any permits for its activities at Balcombe until Friends of the Earth raised the need for such permits - Cuadrilla were then required to obtain Mining Waste and Radioactive Waste permitsⁱ.

4.3 The application of the precautionary principle in our view – for example to decision-making where groundwater is affected – means that unless it can be proven that there will be no groundwater contamination then a development should not go ahead. The precautionary principle must also apply to an application for an unconventional activity where the full impacts are unknown, but where the risks can be clearly identified.

4.4 The European Parliament on 2nd February 2016 voted to endorse a report on a European biodiversity strategy which urged member states not to authorise new fracking operations partly on the basis of the precautionary principleⁱⁱ:

"Urges the Member States – on the basis of the precautionary principle and the principle that preventive action should be taken, and taking into account the risks and the negative climate, environmental and biodiversity impacts involved in hydraulic fracturing for the extraction of unconventional hydrocarbons, and the gaps identified in the EU regulatory regime for shale gas activities – not to authorise any new hydraulic fracturing operations in the EU".

4.5 The NPPF in its preamble lists the five principles of sustainable development as set out in the UK 2005 strategy – including using "sound science responsibly" which was further explained at the time of its publication to mean: "*Ensuring policy is developed and implemented on the basis of strong scientific evidence, whilst taking into account scientific uncertainty (through the precautionary principle) as well as public attitudes and values*".

- 4.6 The 1992 Rio Declaration on Environment and Development states that, “*where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation*”. The Interdepartmental Liaison Group on Risk Assessment (ILGRA), in its 2002 paper ‘The Precautionary Principle: Policy and Application’, made a number of important points including noting that the precautionary principle should be invoked when:
- there is good reason to believe that harmful effects may occur to human, animal or plant health, or to the environment; and
 - the level of scientific uncertainty about the consequences or likelihood of the risk is such that best available scientific advice cannot assess the risk with sufficient confidence to inform decision-making.
- 4.7 The precautionary principle is also one of the grounding principles of EU environmental law, which is directly relevant in this case given applications should be screened as EIA development. Planning practice guidance (paragraph 023) references the precautionary principle in relation to Environmental Impact Assessment: “*the local planning authority must have regard to the amount of information available, the precautionary principle and the degree of uncertainty in relation to the environmental impact*”.
- 4.8 There is evidence that shale gas extraction carries with it significant risks of groundwater contamination as for instance covered by the British Geological Society’s report Potential groundwater impact from exploitation of shale gas in the UK (Stuart et al, 2012). This report concludes that “*Groundwater may be potentially contaminated by extraction of shale gas both from the constituents of shale gas itself, from the formulation and deep injection of water containing a cocktail of additives used for hydraulic fracturing and from flowback water which may have a high content of saline formation water*” (page 19). The BGS report further states that “*There are examples of surface water contamination from releases of fracturing water or flowback water*”. In addition the report for Friends of the Earth by BrightAnalysis indicates that higher well failure rates are more likely with hydraulic fracturing for shale gas.

5. Enforcement

5.1 Conditions were applied to Cuadrilla's planning permission for its Beconsall site in Lancashire that it could only drill for 90 days and must stop drilling by 30th September 2011 in order to protect wintering birds at a nearby protected area. However, according to the Head of Planning at Lancashire County Council, Cuadrilla ignored these conditions and drilled for longer than 90 days and past the date stipulatedⁱⁱⁱ. No enforcement action was taken by the council and further planning permission was granted in September 2014 to carry out "pressure monitoring" at the site. Beconsall is significant as it is located just over 600 metres from an internationally recognised wetland area – the Ribble Estuary – which is designated for a number of bird species. This is also a SPA (protected under EU law) and a SSSI (protected under UK law).

5.2 Cuadrilla is alleged to have breached planning conditions several times at its site in Balcombe, Sussex in 2013. The breaches included exceeding maximum noise levels, and working beyond permitted hours. Villagers also reported that HGV traffic passed the village school at drop-off and pick-up times contrary to assurances given by the firm. West Sussex CC admitted to villagers that it did not have the staff or equipment to undertake noise monitoring.

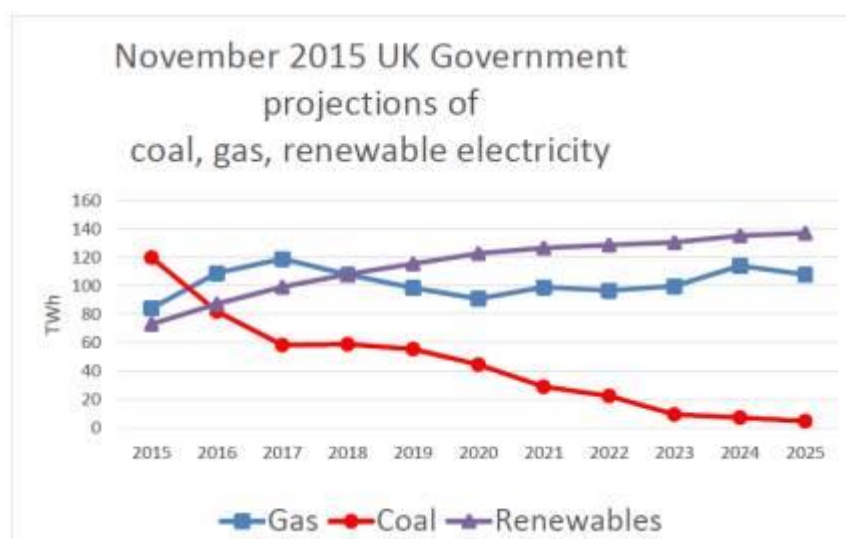
6. Climate change

6.1 The recent Paris Agreement has further focussed the requirements for planning authorities to ensure climate change is properly considered in both plan-making (Section 19 of the PCPA 2004 as amended by the Planning Act 2008) and decision-taking. NPPF paragraph 94 on planning's role in 'radical reductions' of carbon emissions is also key to these undertakings.

6.2 The Committee on Climate Change (CCC) has demonstrated how, in order to meet our legally-binding climate change targets, the average emissions of all of the UK electricity generation need to be in the region of 50-100 grammes of CO₂ per kilowatt hour (gCO₂/kWh) by 2030. Emissions from gas-fired power generation are around roughly 450gCO₂/kWh. This could be reduced, for example through the use of Carbon Capture and Storage (CCS), but the Government has abandoned funding for CCS demonstration projects in the UK. Friends of the Earth has done some analysis on the coal phase out (briefing enclosed).

6.3 Energy Secretary Amber Rudd has announced a consultation into the phase out of coal-fired power stations in the UK. The proposal is that their use should be restricted from 2023 and ended in 2025. This phase out is very welcome, but Ms Rudd's condition - that coal-fired power stations will only be closed if they are replaced by gas-fired capacity – is misguided.

6.4 The latest Government projections show that, with current policies, coal use in power stations will fall by 63% on 2015 levels by 2020, 92% by 2023 and 96% by 2025. And, as the chart below shows, the majority of the decline in coal use is covered by renewables not gas.



7. Local economy

7.1 Paragraph 28 of the NPPF is clear that there is a need to support tourism. We draw your attention to the some of the risks identified in the draft DEFRA report on 'Shale Gas: Rural Economy Impacts'^{iv} which identified transport congestion, impacts on house prices, and impacts on services as possible social impacts. It also picks out tourism as an area likely to be affected by shale gas activity.

References (enclosed)

BrightAnalysis for Friends of the Earth 'Drilling without fail?'

J Hawkins, Environmental Law Review 'Fracking: Minding the gaps'

UK coal power phase out: no need for a new dash for gas, Friends of the Earth

ⁱ Daily Telegraph June 21st 2013 'Drilling set back, regulator caught out, as fracking opponents draw first blood'
<http://blogs.telegraph.co.uk/news/geoffreylean/100222841/drilling-set-back-regulator-caught-out-as-fracking-opponents-draw-first-blood/>

ⁱⁱ <http://www.europarl.europa.eu/sides/getDoc.do?type=REPORT&mode=XML&reference=A8-2016-0003&language=EN#title1> para 88

ⁱⁱⁱ The Guardian 10th September 2012 'Cuadrilla breached fracking conditions, court told'
<http://www.theguardian.com/environment/2012/sep/10/cuadrilla-breach-fracking-lancashire>

^{iv} www.gov.uk Unredacted DEFRA Shale gas rural economy report, July 2015

North Yorks County Council – Scrutiny Committee

Response by United Kingdom Onshore Oil and Gas (UKOOG)

Following the Committee's meeting on January 22nd, UKOOG is delighted to respond formally to the questions put by the committee in writing and on the day. We have also responded to four areas that were examined that we believe overlap both regulation and industry, these are land use, regulation, health and climate change.

Land Use

A number of questions at the committee were around long term plans for the industry. At this stage the industry is in a period of exploration. Exploration answers a number of questions around geology, flow rates of gas and also cost, enabling operators to make better decisions for a commercial production phase.

The exploration phase normally involves a number of activities including geophysical surveys of the underlying rock, vertical exploration wells and some flow testing. All of this is of short duration, small scale and temporary in nature. In terms of recent 14th round licence announcements each operator has put forward their plans for the next five years which can be viewed on the Oil and Gas Authority website.

Once exploration activities have taken place, operators will be able to put forward their plans for production, or not, as the case may be.

Regulation

We have given considerable thought to the comments and questions posed and subsequent replies given at the Scrutiny Committee's meeting on regulation.

The committee heard how each regulator operates, how they communicate with the general public, how they work together and how they meet the comprehensive list of UK and European regulations. The committee also heard how the operators apply the regulation and how the regulators govern.

However it became clear that many of the questions required answers from a number of different regulators which was not possible because of the way the meeting was structured.

A number of questions were designed not to look at individual regulator roles and responsibilities but to look at different receptors or pathways which required input from several regulators.

For example, there were a number of questions around water and who regulates the use of the water in terms of volumes, time of day etc; who regulates the potential contamination issues; and who regulates the waste water produced.

Whilst UKOOG strongly believes that each regulator covered more than adequately their particular role, the way the questions were asked needed someone to draw together each particular strand to ensure the fullest possible understanding. Appendix 1 seeks to do this. It is not intended for this to be fully prescriptive as each regulator has already made clear their roles and responsibilities. The intention is to show the interplays of regulators and operators and to give some comfort that all the regulations and regulators are both sound and joined up.

Health

There is a significant body of evidence that has been collated and interpreted by authoritative independent experts in the appropriate European and UK context.

Setting the evidence base into the appropriate context is critical, the strengths and limitations of the various studies outside the UK and Europe need to be considered alongside what can credibly be applied to UK practice, scale, geology, hydrogeology, social context and the regulatory regime. A failure to do so can often result in incorrectly applying the evidence base, and inferring a risk for practice that simply is not permitted in, or relevant to the UK.

This point is best encapsulated in Public Health England's (PHE) review of the Shale Gas extraction process, which states: *'Caution is required when extrapolating experiences in other countries to the UK since the mode of operation, underlying geology and regulatory environment are likely to be different'*.¹

This point is further reinforced by the European Academies Science Advisory Council (EASAC)² representing the collective voice of European science to advise European policy-makers; the Royal Society, the Royal Academy of Engineering³, the UK Chartered Institution of Water and Environmental Management (CIWEM)⁴, and the Scottish Government's Independent Expert Scientific Panel⁵. We would recommend that the committee consider these authoritative independent expert reviews, as they provide a comprehensive review of the robust scientific evidence base put into an appropriate European and UK context.

In terms of establishing a comprehensive health and exposure monitoring programme this in part overlaps with the statement above about experience elsewhere and what can credibly be applied in the UK. It is clear for example in the US there is criticism that inadequate baseline data was performed for some projects, which has made it difficult to ascertain if there has been an impact attributable to a project or not during monitoring. While we appreciate the concern, this is not transferable to the UK, where robust environmental baseline and monitoring programmes are a formal requirement of UK practice, as defined in the UKOOG baseline monitoring guidelines⁶. Key environmental pathways and receptors that may be affected by onshore oil and gas operations are monitored including soils, surface and groundwater, ground gases, air, ecology, naturally occurring radioactive material and seismicity. These measurements are contained within a site conceptual model and are used to benchmark measurements during and after operations

On this basis all potential environmental hazard pathways are already accounted for in the UK as part of the regulatory assessment and permitting process, including appropriate environmental baseline data and clear environmental monitoring programmes.

In regards to "health and exposure monitoring", it is important to firstly consider the difference between the two.

Health monitoring, as the name suggests, can include the monitoring of a range of demographic, health, lifestyle and hospital admissions data, and will significantly vary in scale, focus and duration depending on the purpose of the monitoring programme, be it the routine collection of data to establish and monitor the health of a nation, and to inform national, regional and local strategies; or the more specific investigation of a single health disorder.

The difficulty with health surveys is the range of confounding factors to account for (genetic predisposition, socio-economic, socio-cultural and ethnicity, age, sex, risk taking behaviour and lifestyle, occupational hazards, environmental hazards, health promotion and care, migration, lag

periods etc) but also the fluid nature of health itself, and how burdens of health can change naturally in time and in response to changes in societal values and priorities. This makes it very difficult to attribute burdens of poor health to a specific activity or project.

In contrast, “exposure monitoring”, provides a more focussed approach to ascertaining any potential hazard pathway directly attributable to a proposed project by monitoring precursors to any health disorder. As an example, air pollutants can in certain circumstance, present a potential risk to respiratory and cardiovascular health. Monitoring of these emissions from a robust baseline provides an effective means to not only attribute the potential impact from a specific activity and project to the environment, but should they come close to breaching the objectives set to protect health, then it is possible to intervene before there are any health impacts. This not only removes all of the confounding factors associated with health monitoring, and provides a robust, proactive approach to protecting health, but it is the basis to the regulatory assessment and permitting processes, where all credible environmental health pathways have monitoring programmes in place set to preclude any manifest health disorder (air quality, hydrology, hydrogeology, induced seismicity etc).

While it may be the case that additional health monitoring beyond what is already routinely collected may be of some value to PHE, caution is recommended, as establishing new programmes can nullify the value of any existing trend data (as the methodology will change), and can artificially influence health indicators. As an example, new breast screening programmes can artificially increase prevalence rates. This is not an actual increase in prevalence, but an increase in identification due to increased surveillance. Any additional health monitoring programme that is trialled in the area must clearly establish and communicate the confounding factors, and what can be correctly interpreted, or there will be a risk of increased perception of risk.

The industry however, will continue to focus monitoring on hazard exposure, set to protect the environment and health, and will work with all regulators to feedback results to local communities and key stakeholders.

Climate Change

If we go back 50 years, the UK consumed about the same amount of energy as it does today. However, the sources of energy were very different. In 1965, we got 60% from coal, 38% from oil that was mainly imported, and a small amount of hydro and nuclear⁷. Not long afterwards, North Sea oil and gas production began in earnest. By 2000, coal had fallen from 60% to just 16% of our energy consumption, with gas rising from almost zero to nearly 40% of the energy mix⁸. Carbon Dioxide emissions went down in the 90s by some 50m tonnes per year or an overall annual decrease of 8.5%. Annual Methane emissions in the same period went down by nearly 30%.

The North Sea was the best engine for meeting the energy trilemma of energy security, economic and environmental concerns we have seen – it resulted in secure energy supplies at low cost, and with gas replacing coal led to lower carbon emissions and far less air pollution.

The reality is we will need all forms of energy be it gas, nuclear or renewables to meet the next stage of the energy trilemma.

Even if we had a completely renewable electricity system, we would still need large amounts of gas to supply the 84% of homes that use it for heating, 61% that use it for cooking and the near 6000 products using gas as a feedstock that sustain over 500,000 jobs in the UK. That's why the Department of Energy and Climate Change are forecasting we will be using roughly the same amount of gas in 2035 as we do today.⁹

Gas is also crucial to a more sustainable economy; It provides back-up electricity on demand for when the wind isn't blowing and the sun isn't shining; It's used as a raw material to manufacture renewable energy hardware such as solar panels where the cells for example are bonded together using ethylene vinyl acetate and it's needed to generate heat for the furnaces used to recycle materials such as glass.

At a global level, gas is part of the solution to climate change. The coal-to-gas switch that we have seen in Britain can be replicated in other countries. In the International Energy Agency's 450 parts per million scenario, global emissions are kept at a level that gives us a decent chance of avoiding more than 2 degrees warming. And in that scenario, global gas use is higher in 2035 than it is today.¹⁰ This scenario is backed up by the UK's committee on climate change which says gas plays a key role through to 2050.

The UK is increasingly dependent on imports. Just 12 years ago, Britain was a net exporter of gas, but imports now make up more than half of our consumption.¹¹ These imports come mainly from Norway, from Continental Europe where the gas may well originate from Russia, and by ship from Qatar.¹² Imported gas costs around £18 million a day – money that is not generating jobs or tax revenues in this country.¹³

However there is also an environmental impact of these imports. As Professors McKay and Stone have recently concluded, lifecycle greenhouse gas emissions from UK-produced shale are lower than for gas imported by LNG or long-distance pipeline.¹⁴ And this conclusion isn't surprising. Imported gas can come from parts of the world that lack the environmental safeguards we have in this country, and it takes a lot of energy at multiple stages with associated emissions to freeze/liquefy gas, to then transport it on a ship and then re-gasify it at a British terminal.

This scenario raises a serious question – are we happy as a country to benefit from using gas, but only so long as it is produced somewhere else? As the GMB union has pointed out, we need to honestly consider the moral and environmental issues about transporting gas across oceans and continents and being increasingly dependent on gas from countries with regulatory and environmental and human rights standards lower than ours.¹⁵

So should we try to replace gas altogether? Some would argue that it's time we moved on from gas and developed exclusively low carbon sources of energy. To put this into context, last year renewables and nuclear accounted for nearly 40% of our electricity and 15% of our energy overall.¹⁶

Peak electricity demand is around 50 GW. But demand for heating can reach 300 GW in winter.¹⁷ Even accounting for heat-pump efficiencies, we would probably need to triple our electricity generating capacity – and this extra capacity would largely lie idle in the summer.

Then there are transmission costs. To accommodate this extra electrical capacity, we would need to build a much larger electricity grid to replace our existing gas grid. But the capital cost of electricity infrastructure is at least 6 times that of equivalent gas infrastructure.¹⁸

And then you have consumer bills. Electricity is around three times more expensive per kilowatt hour than gas.¹⁹ This is why households with electric heating are far more likely to be in fuel poverty.²⁰

So replacing gas in the medium term is not realistic – and that’s why the DECC and National Grid forecasts see gas demand continuing at roughly today’s level for some time to come²¹, and why it is environmentally, ethically and economically sound to explore for gas in the UK, with the most stringent regulations anywhere to protect the environment and health.

Shale gas is no threat to renewables. They perform different functions in the energy system, with renewables providing electricity and gas providing heat, back-up electricity on demand and manufacturing feedstock. In the US, we have seen wind and solar generation and shale gas production grow quickly. Texas is the state with the highest shale gas production, and the most wind generation.²² Between 2005 and 2013 electricity generation from wind increased by 678% in the 18 shale gas producing states, making up almost 60% of the total wind generation in the US.²³ Gas and renewables can work together to replace coal and to lower emissions.

UKOOG Specific Questions

- 1. How will the industry ensure that where multiple drilling wells are proposed in an area, adequate protection can be afforded to the landscape, nature conservation, the historic environment and the established local economy?**

The onshore oil and gas industry has committed voluntarily to prepare Environmental Impact Assessments for all operations that involve hydraulic fracturing. The scope of these EIAs will be discussed with individual planning authorities in line with planning guidance and will include all of the above aspects. This is over and above current EU legislative requirements and is in addition to an early stage Environmental Risk Assessment that is required by the Oil and Gas Authority and will be discussed with local communities.

Operators through the UKOOG Community Engagement Charter have agreed to early engagement ahead of planning applications with communities to ensure that applications are informed and refined prior to formal applications.

The material within the EIA will then be subject to the planning consent process, which involves a public consultation period and will also be used as part of the comprehensive Environmental permitting regime run by the Environment Agency, which is also subject to public consultation.

In addition, UKOOG has further issued health in EIA Best Practice Guidance, to improve transparency and to more effectively investigate and address community health concerns. The best practice guidance, goes beyond current regulatory requirements, and reinforces the role of Directors of Public Health as key stakeholders defining the scope and focus of the work.

In line with the infrastructure Act 2015, cumulative impacts will form part of these documents and will be subject for review by the planning authorities. The Onshore Hydraulic Fracturing (Protected Areas) Regulations 2015, also provide specific protection for areas of the highest landscape and natural value.

Planning guidance states that the planning authority should always have regard to the possible cumulative effects arising from any existing or approved phases of hydrocarbon extraction. ²⁴

The guidance also states that “it is unlikely that cumulative impact will be an issue at the exploration phase of development, regardless of how close individual well pads are to each other.”

It is important to note that whilst a shale gas production site is not unlike a construction site during the drilling and hydraulic fracturing stage – with a drilling rig on site and truck movements to and from the site – this phase typically lasts for no more than 2 years depending on the size of the site (for an exploration site this could be as short as 3 months). This would not be a period of continuous traffic as there will be certain peaks followed by much lower levels of traffic. Once the wells are drilled and completed the drilling and associated equipment is removed and the site can carry on producing gas into the grid for potentially several decades. A producing shale gas site will not be seen or heard and generates very little traffic.

2. How will the industry ensure that leaks from fracking sites will not contaminate surface water?

There are two potential hazard pathways to contamination of water (both at the surface and in the subsurface). Firstly through loss of well integrity and secondly through the surface spillage of chemicals or flowback water that may be stored on site.

The principle mechanism to protect water supplies from each pathway is through the use of chemicals that are non-hazardous to ground water. This removes/reduces the hazard source. From below ground activities, location is important as is staying away from potable water sources and ensuring proper well integrity.

The Onshore Hydraulic Fracturing (Protected Areas) Regulations 2015, also provide specific protection for groundwater. The regulations do not allow hydraulic fracturing at depths of less than 1,200 metres beneath any land which at the surface is within 50 metres where water is abstracted from underground strata and is used to supply water for domestic or food production purposes. In addition hydraulic fracturing is not allowed within or above a zone defined by a 50-day travel time for groundwater to reach a groundwater abstraction point that is used to supply water for domestic or food production purposes.

From a surface activity perspective, we have appropriate vehicles (specifically designed and rated for the safe movement of the industry approved chemicals to be used), impermeable membranes and bunding through to all manner of environment health safety measures similar to other industries.

In terms of well integrity. The Health and Safety Executive (HSE) regulates onshore oil and gas operations for well integrity and occupational health and safety through two separate pieces of legislation - The Borehole Site and Operations Regulations 1995 (BSOR) and the Offshore Installations and Wells (Design and Construction, etc) Regulations 1996 (DCR).

Prior to any drilling activity, the operator must send its proposed well design to an independent well examiner. Once the design has been satisfactorily assessed by the examiner, the operator must then notify the HSE of the well design and operational plans. The HSE carries out its own review of these plans, taking into account any comments or recommendations made by the independent well examiner. An application will not be permitted to operate without HSE approval of well integrity.

The design and construction of the well is key to subsurface environmental protection. Through the use of multiple physical barriers of casing and cement (i.e. a triple redundancy set to protect the environment and health), as well as utilising natural impermeable geology layers as protection, the well will protect any migration of hydrocarbons or well fluids into the surrounding rock formation.

Before hydraulic fracturing commences, the well will be tested for integrity and suitability for fracturing.

During drilling operations a weekly report is sent to the HSE showing progress with the well construction, including the results of integrity testing that is completed as part of the drill plan. The HSE visit well sites on both an announced and unannounced basis to review operations as it deems necessary.

Well examiners will examine certain well integrity and fracturing operations in real time, especially during the early stages of a development, to provide a further level of independent assurance. Such periodic site visits will be made at the discretion of the examiner, in addition to assessing documentary evidence of well integrity, to observe and verify that such operations have been executed satisfactorily in accordance with the approved programme.

The risk from surface activities (i.e. spillages on surface) are well known, understood and are addressed principally through site design and operations to break the hazard source receptor pathway, and regulated by the EA to ensure that this remains the case. The EA undertakes site inspections and where not compliant with regulation and best practise the operations can be shut down.

The Environment Agency (EA), which regulates shale extraction, has investigated the likelihood of groundwater contamination in detail and judged that the environmental risks at each individual stage of exploratory shale gas operation, after proper management and regulation, are “low”²⁵. The EA will not permit activities if they are close to drinking water sources, such as groundwater from aquifers.

According to a joint Royal Society and the Royal Academy of Engineering report the risk of water contamination is very low provided that shale gas extraction takes place at depths of many hundreds of metres or several kilometres – which would be the case in the UK²⁶.

It is worth noting that in the US some 25,000 shale wells have been drilled every year since 2010. That’s about 1.25 million wells. Each of those wells has had multiple hydraulic fracturing stages, so multiple millions of fractures. Between 2000 and 2013 approximately 9.5 million US residents lived within one mile of a hydraulically fractured well and almost 7,000 sources of drinking water for public water systems were located within one mile of at least one hydraulically fractured well. Those drinking water sources served more than 8.6 million people year around.

Notwithstanding this activity and proximity of fracking to both residential dwellings and drinking water sources there is not one case of a household on US public water supply having its water supply contaminated, disrupted or impacted by fracking. The US Environment Protection Agency recently completed a study of 38,000 wells in the US and found no evidence that hydraulic fracturing has “led to widespread, systemic impacts on drinking water resources in the United States.”

In the UK reliance on private water supplies is very rare as 99% of the UK population are supplied with water by a public Utility company. The US is quite different, there are many people who aren’t connected to a public water supply. About 43 million people (14% of the US population) rely on private sources for drinking water, often wells drilled on their own properties pumping water from a shallow aquifer underneath. Methane is very commonly found in groundwater both here in the UK and in the US. So the infamous and much viewed YouTube clip of an American homeowner lighting water from the kitchen tap has been proven to have nothing whatsoever to do with fracking and everything to do with the poor condition of their private drinking water well

The Chartered Institution of Water and Environmental Management (CIWEM) also agree that risks to groundwater quality are generally considered to be low in the UK where the shale rock in question often exists at considerable depths below aquifers and gas would be required to migrate many hundreds of metres between source rock and sensitive groundwater²⁷.

The management of surface water on a site must comply with permitting arrangements established with the Environment Agency and with any conditions imposed by the minerals planning authority through planning consents. Operations must be designed to avoid any discharge of surface water into the local environment through appropriately designed bunding and near/sub-surface barriers. Localised spills must be contained within the site, such that they do not pose a danger to the local environment. A site must be designed such that any natural occurring surface water (rain/run-off) is captured and contained within the site, where it can be suitably treated or taken away to a designated waste treatment facility.

If operators want to carry out works in, over, under or near a main river, flood defence or a sea defence, they will need to apply to the EA for consent. To carry out work on other watercourses, they will need to apply to the Authority responsible for the particular water course²⁸, which may be the local Drainage Board (Internal Drainage Board – IDB) or from the Local Planning Authority on ordinary water courses or in the context of surface water flooding.

In an area at risk of flooding the Planning Authority must consult the EA as a statutory duty. The EA might require a flood risk assessment if it believes that the development could contribute to or be at risk from flooding.

Flowback fluid from hydraulic fracturing operations has been assessed by the Environment Agency as a non-hazardous waste stream and can be controlled by operators at the surface with storage capacity that complies with local permitting.

Specific control measures are described in detail as part of an approved Waste Management Plan by the Environment Agency in accordance with the Environmental Permitting Regulations 2010 (as amended).

Disposal of fluids derived from Oil and Gas activities has been an accepted activity where treatment and disposal in the UK has taken place for many years. The industry is fully committed to storing of flowback fluids in sealed tanks as stated in UKOOGs Shale Gas Well Guidelines²⁹.

3. How will the industry ensure that there will not be excessive and/or continuous noise near drilling sites?

As with any project with elements of construction, there is the potential for noise. The industry however, has sought to develop and apply best practice which exceeds any other industry in the UK. This is shown by the industry voluntarily preparing both Environmental Impact Assessments (EIA) for sites that involve hydraulic fracturing and Noise Management Plans.

The EIA will be scoped and discussed with the appropriate planning authority. Thereby enabling the design, scheduling and mitigation to be bespoke to local circumstance, sensitivities and concerns. This will include ongoing consultation to ensure that communities are aware of activities with the greatest potential for noise generation, and to respond to complaints rapidly.

The EIA document will include baseline noise monitoring and will determine the significance of the impact of each phase of activity using relevant standards for example the Planning Practice Guidance on minerals extraction / British Standard BS5228 (Noise) against the nearest receptors.

This will be completed against each phase of the activity including; construction, installation of monitoring works, drilling, hydraulic fracturing, flow testing, decommissioning and restoration, changes in traffic and plant associated with buildings and facilities. Where there are significant impacts, mitigation will be proposed and discussed.

Under current planning guidance, applications to drill are subject to a maximum noise level of 55dB during the daytime, which is lower than 'a normal conversation [which] is the equivalent of 60-65dB at about 3 feet away'.¹

Local authorities, which grant planning permission, lower this noise limit at night to 42dBA. This is because noise during the night-time needs to be at a lower level in order to prevent sleep disturbance.

Operators regardless of the significance of the impact will always seek to lower the impact where possible by using the best practice means of working – this may include:

- Ensuring all plant meets relevant standards and requirements
- Careful planning to ensure that receptors are taken into account around timing of noisier activities
- High specification exhaust silencers are fitted where possible
- Vehicles and plant are maintained properly
- All pumps, compressors, generators and other plant will be low noise models or will incorporate engineering noise control measures (e.g. acoustic enclosures, cladding, silencers, screens etc.) to reduce noise to a minimum
- All machines are turned off when not in use and where possible screened for directional noise

The noisiest activities are most likely to occur in the first phases including drilling and hydraulic fracturing. For well control purposes some of these activities will need to take place over a 24 hour time period. However hydraulic pump operations can be mitigated by engineering noise control or by not using them at night for example.

Noise can always be managed and designed out, but it has trade-offs. The greater the noise mitigation, the greater the visual impact. All operators will investigate, assess and address potentially significant noise impacts bespoke to the project, environment and communities, and the noise management plan will be agreed with regulatory authorities through the planning process

Drilling techniques and rigs used will be the same as the rigs and techniques used in drilling for the oil and gas in many quiet rural areas of the UK for a number of decades now. The drilling aspect is nothing special or new and there is extensive knowledge and experience to draw upon to ensure that future drilling will not result in significant impacts.

With respect to hydraulic fracturing pumps, there are many oil gathering stations operating in rural areas close to residential receptors which utilise high pressure water pumps without significant impacts. Indeed, water injection pumps run through the night at some of these locations without any significant impacts, such as at the Humbly Grove oil gathering station in Hampshire.

Lastly, as a measure of assurance, it is possible to utilise noise monitoring in order to ensure that noise levels stay within specified limits.

4. How will the industry ensure that there will not be risks to air quality?

Air Quality issues are subject to review in the Environmental Impact Assessment and are regulated by the Environment Agency through environmental permits.

Methane capture is the primary purpose for the entire project, inherent to every design feature, process and activity.

Shale gas is almost all methane which can be more harmful to the environment, if released, than CO₂. Therefore, to ensure any effect on the environment is minimised, it is very important that as much of the natural gas extracted from the shale as possible is used and that as little methane as possible escapes into the atmosphere. The government's Department of Energy and Climate Change (DECC) insists that methane must be captured and "flared" to reduce its global warming emissions' during the exploration and testing phases.⁹ Flaring of gas would only happen whilst testing the flow rate of gas during the exploration phase, before a connection into the gas grid has been made. Beyond exploration, wells will be connected into the gas grid (which is very extensive in the UK) and operators will have a commercial incentive not to flare gas, as the gas could otherwise be sold.

Flaring unwanted gas will only happen for a relatively short duration of about 60 days per exploration well. The flares used in the UK will be low level, and with an enclosed flame so as to minimise light and noise pollution. The gas is burned at temperatures exceeding 800 degC, leading to at least a 98% methane destruction efficiency and giving rise to water and carbon dioxide emissions.

In terms of exploration activities where waste gases, including methane, are produced these will be disposed of by a flare with a capacity of below 10 tonnes per day, and will be managed through an extractive waste permit administered by the Environment Agency. National objectives and limits are defined by robust scientific evidence set to be protective of the environment and health. This is a continual process and this, as with any industry will comply with all regulatory standards

Where a flare has a capacity rated above 10 tonnes a day this would also require a permit under the Industrial Emissions Directive (IED).

To comply with any extractive waste permit or IED, ongoing independent compliance monitoring of air quality is required. Results of compliance monitoring are then compared with the baseline to ensure that there is no overall significant impact of air quality.

For production sites the shale gas industry in the UK is developing "green completion" based on industry best practice, to reduce the emissions of gases into the air, and this is emphasised in UKOOG's "UK Onshore Shale Gas Well Guidelines"¹⁰. This involves using specialist equipment to collect and separate the initial flow of water, sand and gas, so the gas can be prevented from escaping. According to Professor David MacKay, (DECC's Chief Scientific Advisor), and Dr Timothy Stone (the Senior Advisor to the Secretary of State), "green completions" should be adopted at all stages following exploration.¹¹ According to the Government's Department of Energy and Climate Change "Green completions and flaring can reduce methane emissions by as much as 95% versus venting straight into the atmosphere."¹²

It is worth noting that this gas is the same as the gas burned on stoves in kitchens throughout the country only that takes place indoors with no process controls and substantially less ventilation.

In addition, emissions from the drilling rig engines are modelled as part of the EIA to ensure compliance with air quality guidelines.

5. How will the industry ensure that the volume of heavy goods vehicle traffic required for fracking will not have a significant traffic impact on local roads, especially in areas where new road building is impractical or environmentally destructive.

The potential risk from traffic is not novel to this industry, and is inherently addressed through the regulatory planning process, the industry will all do a voluntary EIA for sites involving hydraulic fracturing, to investigate and address this with statutory consultees and local communities to remove and manage potential risks, and minimise potential disruption. This includes cumulative impacts from current and consented projects.

The industry, as with any industry, is defined and governed by a wide raft of national policies and standards set to protect the environment and community health. In this context, the National Planning Policy Framework (NPPF, March 2012) sets out the government's planning policies for England and states that "all developments that generate significant amounts of movement should be supported by a Transport Statement or transport Assessment."

Paragraph 32 of the NPPF states that "Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe."

Part of the process of developing onshore oil and gas sites is equivalent in terms of vehicle type, magnitude and movements to that of a typical housing or industrial construction site.

This would comprise the movement of material, equipment and other commodities. By its very nature this will happen more in the early days of the development, and presents no greater risk to the environment or community health to that of the construction of a building, or wind farm.

In the first instance, operators will conduct detailed traffic assessments to establish the baseline traffic volumes. These examine existing site conditions along all potential routes to / from the site and the 'A' road network.

Operators will then identify a number of preferred routes, and examine in more detail the impact of the development on these routes in terms of highway geometry, road safety and congestion.

Operators will conduct consultation with local communities ahead of the submission of the planning application and will modify their plans where necessary.

The assessment and the application both assume a "worst case" scenario in terms of traffic generation.

Operators will explore various ways to reduce the volume of required HGVs by for example sourcing any water they require locally either via a pipe or extraction or by using returned water or a combination of all methods. As transporting water is a fairly significant element of traffic generated, this could have a material impact on total vehicles required.

Professor David MacKay, former chief scientific adviser to the UK Department of Energy and Climate Change, has compared truck movements for shale gas, wind farms and solar parks, and said that "all three energy facilities require it." He added that, if water is piped on site "the shale gas pad might require the fewest truck movements." In the UK given the extensive water pipeline network it is considered unlikely that water would need to be trucked into shale sites. However each site will be assessed on a case by case basis.

Once sites are operational (i.e. after the wells have been drilled and completed) a shale gas site would have very little traffic (2 to 3 HGVs per week), there is typically more HGV movements from petrol stations, through to biomass facilities, your average Tesco or a typical bus stop.

At the Committee meeting UKOOG were asked to provide some examples of site traffic which are shown in appendix 2.

6. The primary responsibility for identifying, assessing and mitigating well hazards rests with the company operating the well. How confident can we be that the operating practices of fracking companies will be robust in this regard?

There is no one with greater vested interest in ensuring all operations meet highest standards than the industry itself.

There is a considerable amount of regulatory oversight for this industry.

Where hydraulic fracturing is planned, DECC requires an environmental risk assessment (ERA) to be carried out. This is an early stage assessment that assesses environmental risks over the full cycle of the proposed operations with the participation of stakeholders, including local communities.

Companies in the UK will undertake detailed Environmental Impact Assessments (EIA) before any drilling can take place. These assessments make sure that environmental issues are raised when a project or plan is first discussed and that all concerns are addressed as it progresses through to implementation. The industry has further issued health in EIA Best Practice Guidance, to improve transparency and to more effectively investigate and address community health concerns. The best practice guidance, goes beyond current regulatory requirements, and reinforces the role of Directors of Public Health as key stakeholders defining the scope and focus of the work.

The design and construction of the well is key to subsurface environmental protection (with a triple redundancy). Through the use of multiple physical barriers of casing and cement, as well as utilising natural impermeable geology layers as protection, the well will protect any migration of hydrocarbons or well fluids into the surrounding rock formation. Before hydraulic fracturing commences, the well will be tested for integrity and suitability for fracturing.

The Operator is required to set up a well examination scheme and appoint a well examiner. The well examination scheme and involvement of the well examiner is for the complete lifecycle of the well, from design through to abandonment. The well examiner is an independent competent person who reviews the proposed and actual well operations to confirm they meet the Operator's policies and procedures, comply with the Offshore Installations and Wells (Design and Construction, etc.) Regulations 1996 and follow good industry practice.

The well examination scheme requires the Operator to send the following documents to the well examiner:

- The well construction programme and any material changes to it
- Regular reports on how the well is being constructed
- Reports on how the well is being monitored
- At the end of the well's life, a plan for how it will be abandoned.

Once the design has been satisfactorily assessed by the examiner, the operator must then notify the HSE of the well design and operation plans. The HSE carries out its own detailed review of these

plans, taking into account any comments or recommendations made by the independent well examiner and can make its own recommendations to the operator.

A weekly report is sent to the HSE showing progress with the well construction including the results of integrity testing that is completed as part of the drill plan. The HSE visit well sites on both an announced and unannounced basis to review operations as it deems necessary.

Shale gas well operators will ask their well examiners to examine certain well integrity and fracturing operations in real time, especially during the early stages of a development, to provide a further level of independent assurance. Such periodic site visits will be made at the discretion of the examiner, in addition to assessing documentary evidence of well integrity, to observe and verify that such operations have been executed satisfactorily in accordance with the approved programme.

Environmental Regulation requires the following:

- A notice to be served on the Regulator under section 199 of the Water Resources Act 1991 to 'construct a boring for the purposes of searching for or extracting minerals'
- Environmental permits for:
 - groundwater activity – where the regulator considers that the risk of inputs to groundwater requires this
 - mining waste management – likely to apply in most circumstances
 - Industrial Emissions Directive – when the intention is to flare more than 10 tonnes of natural gas per day (generally applies to exploration phase only)
 - radioactive substances activity – likely to apply where low level Naturally Occurring Radioactive Material (NORM) is contained in the rock cuttings or fluid returned to the surface from the well
 - a water discharge activity – if surface water run-off from the site becomes polluted, for example, due to a spill of diesel
- A groundwater investigation consent – to cover drilling and test pumping where there's the potential to abstract more than 20 cubic metres per day (m³/day) of water
- A water abstraction licence – if the plan is to abstract more than 20m³/day for own use rather than purchasing water from a public water supply utility company
- A flood defence consent – if the proposed site is near a main river or a flood defence.

The Environment Agency has published draft technical guidance for onshore oil and gas exploratory operations, conventional and unconventional.

The Environmental regulator is also a statutory consultee during the planning application conducted by the MPA and also in the assessment of the Environmental Impact Assessment if this is required.

Both the EA and HSE will perform unannounced visits.

DECC will only allow operations to proceed once the HSE has assessed the drill programme, all relevant environment permits have been granted and planning permission is satisfied.

I am also pleased that the Government has announced funding for a further level of independent monitoring to be undertaken by the British Geological Survey for the first few shale gas sites.

On the above basis, it is clear that there is significant and overlapping regulation and environmental protection to not only address every credible environmental and health hazard associated with

unconventional gas exploration, but also significant best practice and voluntary initiatives to improve transparency and address community concerns, more than any other industry in the UK.

7. Will there be any mutual funding scheme set up by the operators to cover events such as contamination of land/drinking supplies or where an operator goes into administration?

There are a number of measures in place to ensure that operators have adequate financial capacity.

DECC's guidance on operatorship states that the following assurances will be considered in applications for onshore operatorship: *"In considering any request for operatorship, DECC will look at the competence of the company – more specifically the following factors: technical experience and capability to supervise, manage and undertake the proposed operation, their risk-assessment and hierarchy of decision-making, plans for public engagement and scope of relevant insurance coverage for operations and well abandonment activity. In some cases, DECC may request independent verification."*³⁰

The Environmental Regulator (EA in England, SEPA in Scotland and NRW in Wales) has the power to enforce the conditions in the environmental permits for a well or wells until the point in time that it accepts a surrender of those permits – the operator is not simply at liberty to hand back the permit. For England and Wales, the permit surrender process is agreed with the Environmental Regulator, and for wells that are hydraulically fractured this is likely to include the need for a period of aftercare and monitoring of any potential residual environmental impacts. The regulator may require the operator to supply a financial bond or other form of security for performance of its permit obligations.

Operators will also have appropriate insurance in place which will provide cover with respect to loss of well control, third party liability and environmental liability both during operations and in the longer term.

Operators will also have in place where required letters of credit, bonds and parental or partner guarantees. The industry is discussing with government the longer term needs of the industry as it grows and is investigating mutual funds that may take the place of some insurance policies. This is a longer term objective as the plans in place at present are more than adequate.

8. What levels of disclosure and transparency are companies required to provide on their operations, including making available operational data e.g. on the fracturing fluid additives used, levels of induced seismicity, volumes and characteristics of waste water used etc.?

It is clear that transparency, in terms of the availability of information, and in a form that is easily accessible and understood is paramount. This principle underlies the founding purpose of UKOOG, and all of its documentation and guidance.

Disclosure is covered in the Industry's Shale gas well guidelines.

Operators need to explain openly and honestly their drilling, fracturing design and operational practices including environmental, safety, and health risks and how they are addressed. Good data, measurement and transparency are vital to public confidence. Public disclosure of the water and chemicals used in the hydraulic fracturing process and the volumes, constituents, concentrations

involved will, in addition to providing sufficient information to regulators, assist the public in understanding the processes involved.

For hydraulic fracturing, operators should measure and disclose operational data on:

- Water use.
- Produced water disposal methods.
- Fracturing fluid additives (constituents), concentrations and volumes.
- The volumes and characteristics of waste water.
- Emissions.
- Fracture design and containment.
- Any induced seismicity.

Such transparency is critical to addressing incorrect and unsupported information that can result in significant community concern.

It is vital to recognise that fears propagated about a range of hazardous chemicals being used are just unfounded in the UK. In the UK, operators have to seek permission from the Environment Regulator (EA in England, SEPA in Scotland) before they can introduce any fluids or chemicals into the ground under rules designed to protect groundwater resources. This is part of a suite of up to eight environmental permits operators have to apply for, connected to 17 separate EU directives. The Environment Regulator is the statutory body that controls what chemicals can be used. In the UK, chemicals used must by law, be non-hazardous to groundwater, and wells located and designed such that they do not present a significant risk to the environment and human health.

UK operators, in applying for the separate permits they need to manage waste from what are considered 'mining operations', also have to declare the composition of any drilling muds and fracturing fluids they plan to use, along with the expected composition and quantity of any wastes. They also have to set out their arrangements for managing the same, and it is all a matter of public record – in fact, the public are even invited to consult on the permit applications. None of this is the case in the US, and the UK continues to define global best practice.

The UK shale gas industry has committed to the full public disclosure of fracture fluid. UKOOG's Shale Gas Well Guidelines, which are mandatory for UKOOG members, state: *“Operators will disclose on the UKOOG website, www.ukoog.org.uk, the chemical additives of fracturing fluids on a well-by-well basis. Information for fluid disclosure should include: any EA/SEPA authorisations for fluids and their status as hazardous/non-hazardous substances; Material Safety Data Sheets information; volumes of fracturing fluid, including proppant, base carrier fluid and chemical additives; the trade name of each additive and its general purpose in the fracturing process; maximum concentrations in percent by mass of each chemical additive.”*

The industry believes through the establishment of a scientific based and transparent Environmental Baseline Assessment, the embedded control measures can demonstrate that the protection of the natural environment and potential disruption to local communities is minimised during hydraulic fracturing operations. UKOOG has worked with the industry to develop a set of guidelines for the establishment of environmental baselines; such guidelines enable a 'site condition schedule' to be established against which permits can be granted and monitored for compliance by the regulators.

This guidance has been scientifically reviewed by an independent group provided by the Society for the Environment and is now backed by the Infrastructure Act.

The results of these baselines will also be made public.

9. How will restoration and aftercare be ensured in the event that an operator is no longer able to fulfill its obligations and responsibility reverts to the landowner?

There are a number of measures in place to ensure that operators have adequate financial capacity.

The first set of these measures is at the licence approval stage. DECC's guidance on operatorship states that the following assurances will be considered in applications for onshore operatorship: *"In considering any request for operatorship, DECC will look at the competence of the company – more specifically the following factors: technical experience and capability to supervise, manage and undertake the proposed operation, their risk-assessment and hierarchy of decision-making, plans for public engagement and scope of relevant insurance coverage for operations and well abandonment activity. In some cases, DECC may request independent verification."*³¹

The second set of assurances is at the well consent stage. DECC's "UK Petroleum Licensing: Financial Guidance" document states: *"DECC's policy requirement is to ensure that no well consents are issued unless we are satisfied that the licensee(s) has (have) access to sufficient funds to meet its (their) share of the actual drilling costs, the plugging and abandonment of the well if it is proven to be 'dry' or otherwise non-viable and a minimum contingency of 50% of the drilling costs."*³²

There are a number of measures with respect to environmental liabilities that are worth highlighting.

The Environmental Regulator (EA in England, SEPA in Scotland and NRW in Wales) has the power to enforce the conditions in the environmental permits for a well or wells until the point in time that it accepts a surrender of those permits – the operator is not simply at liberty to hand back the permit. For England and Wales, the permit surrender process is agreed with the Environmental Regulator, and for wells that are hydraulically fractured this is likely to include the need for a period of aftercare and monitoring of any potential residual environmental impacts. The regulator may require the operator to supply a financial bond or other form of security for performance of its permit obligations.

With respect to the Minerals Planning Authority, planning consent for the site may also include planning conditions (which are legally binding) designed to ensure that the site is restored to its original surface condition at the end of operations.

DECC's consent is required under the terms of the operator's petroleum licence before a well can be decommissioned. The decommissioning process must be done in accordance with a specification agreed with the HSE, with reference to the Oil & Gas UK best practice on well abandonment and with the oversight of the HSE and an appointed Well Examiner.

If a well is not decommissioned in line with the approved plan, the licence holder or well-operator at the time of decommissioning can be prosecuted by the HSE for non-compliance with HSE regulations, and this could be pursued even after the petroleum licence and environmental permits have ceased to exist.

Taken together, if a company causes damage, harm or pollution to the environment, they can be required under these regimes to remediate the effects and prevent further damage or pollution. This is the same approach that applies to other industries. Environmental regulators and planning

authorities have the power to require upfront financial bonds to address these risks. The industry does not wish to leave this to the taxpayer or the landowner.

Operators will also have in place where required letters of credit, bonds, insurance and parental or partner guarantees. The industry is looking at the longer term needs of the industry as it grows and are investigating mutual funds that may take the place of some insurance policies. This is a longer term objective as the plans in place at present are more than adequate.

Appendix 1 – Regulation by Topic

Baseline monitoring and differences in regulation.

Most UK based studies have warned about extrapolating data or experiences from other countries to the UK. This is wholly down to better regulations, stricter adherence to them and more comprehensive industry best practise in the UK compared to the other countries.

There are numerous examples of this.

Firstly, in the UK, the industry undertakes baseline monitoring of the key environmental pathways and receptors that may be affected by onshore oil and gas operations. These include soils, surface and groundwater, ground gases, air, ecology, naturally occurring radioactive material and seismicity. The baseline condition is presented in a site 'conceptual model' and is used to as a benchmark by the environmental regulator to measure permit compliance during and after operations. Much of the US data suffers from having little or no baseline data for comparison.

Secondly, in the UK there are strict requirements to store waste in double skinned tanks on bunded ground and transported in specialist vehicles using approved suppliers and methodologies to fully permitted waste facilities. In the US the practise has been in the past to store fluid waste in open evaporation lagoons. This has the negative impact of allowing methane and potentially pollutants to evaporate into the atmosphere and also the potential for livestock to enter the facility. This practice is not permitted in the UK.

Questions by topic

Who regulates the use and disposal of water?

The operator can get the water from three sources:

1. Directly from or near the wellsite by using a borehole. This method is regulated by the environment agency through an environmental permit and an abstraction licence.
2. Buying the water from a local water company, which comes to site via a pipe from the mains connection. This is a commercial transaction between the two organisations.
3. Buying the water from a local water company which arrives at site via tanker. Likewise, this is a commercial transaction between the two organisations.

All water abstraction is assessed as part of the Environment Agencies CAMS (Catchment Abstraction Management Strategy) process, which is used to assess the amount of water available for further abstraction licensing, taking into account what the environment needs. This ensures that water is never over abstracted and prioritised for environmental and human need.

UKOOG, British Water and Water UK have signed memorandums of understanding to ensure that the appropriate protocols exist around water use and the protection of consumers. Onshore oil and gas companies will engage with water companies as early as possible to ensure their needs can be met without reducing the security of supply to existing customers. In addition water companies are also statutory consultees to the planning process.

Operators will seek to reduce the number of tankers on the road, primarily by piping the water to site if possible, and a traffic management plan is produced and authorised by the local mineral planning authority as part of the planning process.

Once the operations have taken place, the waste fluids (which contain water, sand, methane, chemicals used in the fracking process, naturally occurring salts and potentially naturally occurring

radioactive material) that come up from the well are stored on site in double skinned tanks and are regulated under an environmental permit from the Environment Agency.

The waste can be treated on site and reused to avoid using mains water which again is regulated under an environmental permit, this allows any clean water to be put to beneficial reuse, thereby minimising additional water requirements, waste generation and associated transport movements.

Once the operation is completed, any remaining waste must be transported to an approved (licensed by the Environment Agency) waste facility, treated to the point where it can be safely discharged into the environment. The discharge must be agreed by the Environment Agency and the body that is accepting it – normally the water company. The water company having accepted the discharge would treat the fluid as they would in a normal course of business and are themselves regulated to ensure water is supplied to their customers under their own permitting process.

Who regulates air quality?

Air emissions are principally regulated by the Environment Agency through mining waste permits and cover flaring and venting, maintenance of equipment and other infrastructure and storage. Limits and measuring procedures are outlined in the environmental permit.

The Health and Safety Executive through the independent well examiner ensure the integrity of the well and work on the basis of no emissions to air.

Typically, local mineral authorities will look at air quality as part of the environmental impact assessment process, in particular traffic emissions and dust. In their environmental statement, operators will address both of these concerns and agree limits either through a traffic management plan or through planning conditions.

This is one of many examples of how the regulatory process overlaps at various stages to manage known hazards to protect the environment and health planning conditions.

Who ensures water protection (Surface and groundwater)?

The Health and Safety Executive through the independent well examiner ensure the integrity of the well and work on the basis of no leaks to surrounding groundwater.

The Environment Agency requires a hydrogeological risk assessment clearly listing any credible sources of potential contamination from emissions from the site, identifying potential pathways for the migration of contamination and listing all of the potential groundwater and surface water receptors. This will enable any potential impacts to be identified and appropriate mitigation measures to be proposed.

The Environment Agency assesses the hazards presented by chemicals on a case-by-case basis. They will not permit the use of 'hazardous substances', as defined in, and determined for the purposes of, the EU Water Framework and Groundwater Directives, for any activity, including hydraulic fracturing where they would or might enter groundwater and cause pollution.

The Environment Agency also regulates the storage of chemicals on site through environmental permits and the Health and Safety Executive regulates the safety of employees through the Safety at Work act.

The Environment Agency regulates the management of extractive waste generated under the Environmental Permitting (England and Wales) Regulations 2010. These implement the Extractive Waste Directive (2006/21/EC), more commonly referred to as the Mining Waste Directive (MWD).

They require that wastes are managed in a way that minimises risk of harm to human health and the impact on the environment. Waste management under these regulations has a wide meaning and also includes the prevention and minimisation of waste in addition to how actual waste arisings are managed in line with Best Available Techniques (BAT)

Earth Tremors

As part of gaining consent to hydraulically fracture an operator must get approval for its hydraulic fracturing plan. This plan will include arrangements for measuring seismicity and fracture growth alongside management arrangements to ensure seismicity remains within known tolerances, by operating a real-time traffic light system set to preclude any environmental or health impact.

Noise

Within the Environment Agency permits there will be a noise management condition. The operator is required to produce and implement a noise management plan, which may include carrying out a noise survey of potential sources of noise including: pumps, diesel generators, pneumatic controllers, flares and vents and gas leaks.

Under current planning guidance, applications to drill are subject to a maximum noise level of 55dB during the daytime, which is lower than 'a normal conversation [which] is the equivalent of 60-65dB at about 3 feet away'. A noise management plan has to be submitted to the Mineral Planning Authority as part of the Environmental Statement.

Decommissioning and Restoration

The process of decommissioning is regulated by the Health and Safety Executive and they have to ensure that the well has been properly decommissioned.

The Environment Agency continues to hold in place the environmental permits until such time that they are satisfied there is no longer any risk to the environment. Until that point the operator has to continue to monitor the site in accordance with the permit.

Typically local minerals planning authorities will have planning conditions in place to ensure that the site is restored back to its original landscape position.

The Oil and Gas Authority, as part of the licencing process, ensure that each operator has the financial capacity to complete its scheduled work programme including decommissioning.

Checks

The Environment agency and the Health and Safety Executive have powers to visit sites and audit procedures on both an announced and an unannounced basis. The Health and Safety Executive also audit the independent well examiner scheme that operators implement.

The Oil and Gas Authority have to give a consent to drill prior to any drilling taking place. The Authority will independently discuss with the Environment Agency and the Health and Safety Executive before this happens.

Separately the Oil and Gas Authority have to provide the Secretary of State with certain evidence prior to the Minister giving a company a hydraulic fracturing licence. This will include seeking information from the Environment Agency, The Health and Safety Executive and the Mineral Planning Authority and will also include the approval of fracturing plan by the Authority itself. This is governed by the Infrastructure Act 2015.

Appendix 2**UKOOG Vehicle Survey****Operator: Egdon Resources U.K. Limited****Site: Wressle (PEDL180 – North Lincolnshire)**

1. Baseline transport numbers (prior to activity) – Daily numbers

Time	Vehicle Count	HGV	HGV (%)
Total Daily only (B1208)	1223	120	9.8

2. Operational Numbers – per well, 2 way average daily vehicle movements

	Duration	Light Vehicles	Heavy Vehicles	Total
Construction	60 days	8	6	14
Drilling	35 days	12	5	17
Stimulation	12 days	4	6	10
Flow Testing	Up to 180 days	4	3	7
Decommissioning	60 days	8	6	14

Operator: Cuadrilla**Site: Preston New Road**

1. Baseline transport numbers (prior to activity) – Daily numbers

Time	Vehicle Count	HGV	HGV (%)
AM Peak (9am to 10am)	729	35	4.8%
PM Peak (5pm to 6pm)	1,437	7	0.5%
12 hr (7am-7pm)	10,735	233	2.2%

2. Operational Numbers – per well, 2 way average daily vehicle movements

	Duration	Light Vehicles	Heavy Vehicles	Total
Construction	2 months	12	22	34
Drilling	3 months	32	17	49
Hydraulic Fracturing	1-2 months	25	10	35
Initial Flow Testing	3-4 months	18	5	23
Extended Flow Testing	2 years	6	1	7
Decommissioning	2 months	12	22	34

Operator: Third Energy UK Gas Limited

Site: Kirby Misperton A Wellsite (KM8 HFS)

1. Baseline transport numbers (prior to activity) – Daily numbers
Includes both westbound and eastbound baseline traffic numbers on a seven (7) day average

Time	Vehicle Count	LGV	HGV	HGV (%)
12 hr	410	19	9	2
18 hr	471	21	10	2
24 hr	483	21	10	2

2. Operational Numbers – per well, 2 way average daily vehicle movements

	Duration	Light Vehicles	Heavy Vehicles	Total
Construction	36 days	6	20	26
Drilling	84 days	10	8	18
Hydraulic Fracturing	42 days	10	30	40
Flow Testing	14 days	6	7	13
Decommissioning	36 days	6	20	26

Notes

- The site information is based on real sites. Some information is forecasted either where the site has yet to be constructed (as in the case of Cuadrilla) or where the activity has yet to take place such as decommissioning (all).
- Numbers vary depending on the geology, which dictates the type of equipment and the amount of sand and chemicals required
- The numbers above are averaged over each phase of operation and there will therefore be peaks and troughs. Peaks occur principally at the start and end of construction where equipment is mobilised and demobilised.

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- ¹³ UKOOG calculations based on data from: Department of Energy and Climate Change, Oil and gas production and demand projections, 2015 <https://www.gov.uk/guidance/oil-and-gas-uk-field-data>; DECC, Fossil Fuel Price Projections, September 2014 (NB: In order to be conservative, low gas price scenario used) https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/360598/DECC_2014_fossil_fuel_price_projections.pdf; BP conversion factors <http://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy/using-the-statistical-review/conversion-factors.html>
- ¹⁴ Professor David MacKay and Dr Timothy Stone, Potential Greenhouse Gas Emissions Associated with Shale Gas Extraction and Use, Department of Energy and Climate Change, September 2013 <https://www.gov.uk/government/publications/potential-greenhouse-gas-emissions-associated-with-shale-gas-production-and-use>
- ¹⁵ UKOOG and GMB reach landmark agreement on shale gas, 8 June 2015 <http://www.ukoog.org.uk/about-ukoog/press-releases/149-ukoog-and-gmb-reach-landmark-agreement-on-shale-gas>
- ¹⁶ BP, Statistical Review of World Energy, 2015 <http://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html>
- ¹⁷ Department of Energy and Climate Change, The Future of Heating: A strategic framework for low carbon heat in the UK, March 2012, Chart 2 <https://www.gov.uk/government/publications/the-future-of-heating-a-strategic-framework-for-low-carbon-heat>
- ¹⁸ Data provided by Northern Gas Networks, based on costs of recent electricity and gas transmission lines, and on Ofgem data for electricity and gas transmission charges on bills
- ¹⁹ Department of Energy and Climate Change, Quarterly Energy Prices, September 2015, Tables 2.2.3, 2.3.3 and 3.4.1 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/463046/QEP_Sept_2015_Tables.pdf

²⁰ In England, approximately 14 per cent of those off the gas network are fuel poor, compared to 10 per cent of those on it. Department of Energy and Climate Change, Annual Fuel Poverty Statistics Report, 2015, Chart 3.6

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/468011/Fuel_Poverty_Report_2015.pdf. In Scotland, half of all people living in houses off the gas grid are fuel poor, compared with an overall fuel poverty rate of 39%. Scottish Parliament Information Centre, Financial Scrutiny Unit Briefing: Fuel Poverty in Scotland, March 2015

http://www.scottish.parliament.uk/ResearchBriefingsAndFactsheets/S4/SB_15-13_Fuel_Poverty_in_Scotland.pdf. In Wales, 44% of off-gas households were fuel poor in 2008, compared with 22% of on-gas households. Around 60% of households with “standard electricity” were fuel poor, compared with around 40% of those with “off peak” electricity. BRE, Living in Wales 2008 – Fuel Poverty Statistics, November 2010, Figure 6 <http://gov.wales/docs/caecd/research/110321fuel.pdf>

²¹ Department of Energy and Climate Change, Updated Energy and Emissions Projections – September 2014, Annex E

<https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2014> - none of these scenarios envisage gas demand falling by more than 7.5% between 2014 and 2035; National Grid, Future Energy Scenarios, 2015 <http://fes.nationalgrid.com/> - one scenario envisages gas demand falling by 38% between 2014 and 2035; the other three scenarios envisage gas demand changing by between -12% and +2% over the same time period.

²² US Energy Information Administration, Shale gas production data http://www.eia.gov/dnav/ng/ng_prod_shalegas_s1_a.htm; US Energy Information Administration, Electricity data browser – Wind

<http://www.eia.gov/electricity/data/browser/#/topic/0?agg=1,0,2&fuel=008&geo=vvvvvvvvvvo&sec=o3g&linechart=ELEC.GEN.WND-US-99.A~ELEC.GEN.WND-IA-99.A~ELEC.GEN.WND-TX-99.A&columnchart=ELEC.GEN.WND-US-99.A~ELEC.GEN.WND-IA-99.A~ELEC.GEN.WND-TX-99.A&map=ELEC.GEN.WND-US-99.A&freq=A&ctype=linechart&itype=pin&rtype=s&pin=&rse=0&mptype=0>

²³ US Energy Information Administration, Electricity net generation by state by type of producer by energy source, 1990-2013

<http://www.eia.gov/electricity/data.cfm#generation>

²⁴ Department for Communities and Local Government, Planning practice guidance for onshore oil and gas, July 2013

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/224238/Planning_practice_guidance_for_onshore_oil_and_gas.pdf

²⁵ See https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/296949/LIT_8474_fbb1d4.pdf

²⁶ See <https://royalsociety.org/~media/policy/projects/shale-gas-extraction/2012-06-28-shale-gas.pdf>

²⁷ See <http://www.ciwem.org/media/1023221/Shale%20Gas%20and%20Water%20WEB.pdf>

²⁸ See <https://www.gov.uk/government/consultations/onshore-oil-and-gas-sector-guidance-consultation>

²⁹ See <http://www.ukoog.org.uk/images/ukoog/pdfs/ShaleGasWellGuidelines.pdf>

³⁰ See <https://www.gov.uk/oil-and-gas-operatorship>

³¹ See <https://www.gov.uk/oil-and-gas-operatorship>

³² See https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/322319/FinancialGuidance.pdf

Report for North Yorkshire County Council Scrutiny Session

Responses from the Department of Energy and Climate Change

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Responses to Questions Prepared by North Yorkshire County Council

1. What is the UK government's approach to on-shore shale gas extraction and how does this fit in with its wider energy policy, including meeting our climate change targets?

The Government supports the development of domestic energy sources, including shale gas, in a safe and sustainable manner. We believe shale gas may hold huge potential in providing a new home-grown energy source, which would help to improve our energy security; secondly it could provide significant national and local economic benefits; and third it could help us to meet our carbon targets if it substitutes for more carbon intensive sources such as coal.

Energy Security

- The Government wants the UK to successfully transition in the longer term to a low-carbon economy. Access to safe and secure supplies of natural gas for years to come is part of that transition.
- Gas is a very important part of our energy mix, currently providing around a third of our total energy supply. Forty percent of this is used in the home for heating and cooking purposes; a third is used in the industrial sector, not just for power or heating but also as a feedstock for the chemicals industry and in manufacturing processes; and a quarter of gas is used in electricity generation. Gas increased its share of electricity generation in 2014 compared to the previous year as coal use declined.¹
- However, since 2004, the UK has been a net importer of gas due to the rapid decline of production from our North Sea reserves.²
- Last year around 45% of UK gas supply was imported. Our projections show that domestic production will continue to decline and, without any contribution from shale gas, net imports could increase to around 75% of the gas we consume by 2030.²
- A key rationale for exploring our domestic shale gas potential is that the more energy sources we are able to access, the greater our energy security. There is clearly a strong driver for us to explore the potential of the home grown gas underneath our feet, with the associated economic benefits for the UK, if we are able to do so in a safe and sustainable way.

Climate change

- The Government believes that shale gas development is compatible with our goal to cut greenhouse gas emissions and does not detract from our support for renewables. The Government remains committed to the development of renewable energy technologies and the development of new nuclear, and to improving energy efficiency.
- One of the greatest and most cost-effective contributions we can make to emission reductions in electricity is by replacing coal fired power stations with gas. Gas is the cleanest fossil fuel and produces half the carbon emissions of coal when used for power generation.³
- The 2013 report "Potential Greenhouse Gas Emissions Associated with Shale Gas Extraction and Use" by Prof David Mackay and Dr Tim Stone concluded that the carbon footprint of

¹ [Digest of UK Energy Statistics 2015](#), Department of Energy and Climate Change

² [DECC Oil and Gas: field data, production projections](#), Department of Energy and Climate Change

³ International Panel on Climate Change, [Mitigation of Climate Change](#), Chapter 7: Energy Systems

shale gas extraction and use is likely to be in the range 200–253 g CO₂e per kWh of chemical energy, which makes shale gas’s overall carbon footprint comparable to gas extracted from conventional sources (199–207g CO₂e/kWh(th)), and lower than the carbon footprint of imported Liquefied Natural Gas (233-270g CO₂e/kWh(th)). When shale gas is used for electricity generation, its carbon footprint is likely to be in the range 423–535g CO₂e/kWh(e), which is significantly lower than the carbon footprint of coal, 837–1130g CO₂e/kWh(e).⁴ These findings are also supported by the findings from the Task Force on Shale Gas’ report on the climate change impact of shale gas.⁵

- The UK’s Committee on Climate Change (CCC) said last year, the UK will “continue to use considerable, albeit declining, amounts of gas well into the 2030s” and “if anything, using well-regulated UK shale gas... could lead to lower overall greenhouse gas emissions than continuing to import gas”.⁶
- To make absolutely sure, we have included in the Infrastructure Act a requirement to seek advice from the Committee on Climate Change on the likely impact of onshore oil and gas production on meeting our carbon budget obligations.

Economy and community benefits

- Finally, the Government sees significant potential economic benefits from a successful shale sector in the UK.
- Ernst and Young has estimated a thriving shale industry could mean as many as 64,500 jobs nationally. Locally that might mean, for example, cementing contracts, new facilities; and jobs for local companies, lorry drivers and environmental consultants.⁷
- The Task Force on Shale Gas also concluded that the development of a shale gas industry would provide substantial employment in the UK, while noting that it will not be possible to ascertain an accurate estimate of the scale of this opportunity until we have a clearer idea of the amount of recoverable gas. For this reason it makes sense for exploratory drilling to begin so that a clearer decision can be made.⁸
- The Government believes that communities hosting shale gas developments should share in the financial returns they generate. The Government welcomes the shale gas companies’ commitment to make set payments to these communities, £100k for each exploration well, and in the production stage 1% of revenues, which could be worth £5-10m for a typical 10-well site.
- As announced by the Chancellor in the spending review in November, the Government will commit up to 10% of shale gas tax revenues to a Shale Wealth fund, which could deliver up to £1 billion of investment in local communities hosting shale gas developments, in the north of England and other shale producing regions.
- As with renewables, wider communities will benefit too as local councils will also be able to retain 100% of the business rates they collect from productive shale gas developments.

⁴ [Potential greenhouse gas emissions associated with shale gas extraction and use](#), Professor David MacKay and Dr. Timothy Stone, Sept 2013

⁵ [Assessing the impact of shale gas on climate change](#), Task Force on Shale Gas, Sept 2015

⁶ [A role for shale gas in a low-carbon economy?](#) Dr David Joffe, Head of Modelling at CCC

⁷ [Getting ready for UK shale gas](#), Ernst and Young, April 2014.

⁸ [The Economic Impacts of a UK Shale Gas Industry](#), Task Force on Shale Gas, Dec 2015

2. Large scale high volume hydraulic fracturing is a relatively new activity worldwide but the system of regulation is based on conventional hydrocarbon extraction (oil and non-shale gas), predating shale gas extraction. How can we be certain that there are not regulatory gaps and that the system of regulation including licensing, monitoring and enforcement is able to deal specifically with shale gas extraction and will not cause confusion over who does what?

- In the UK, we have been successfully regulating for gas and oil drilling, both onshore and offshore, for over 50 years and have tough regulations in place to ensure on-site safety, prevent water contamination, mitigate seismic activity and air pollution.
- More widely, the UK has one of the best track records in the world when it comes to protecting our environment while also developing our industries – and we’ve brought that experience to bear on the shale gas regulations. Independent expert regulators examine companies’ proposals and will not allow hazardous operations.
- The UK Government’s position draws on independent reviews by the Royal Society and Royal Academy of Engineering⁹, and Public Health England¹⁰. These reports have considered a wide range of evidence and looked at the UK regulatory system. The Royal Society and Royal Academy of Engineering concluded: “the risks can be managed effectively in the UK, if operational best practices are implemented and enforced through regulation.”
- As this implies, ensuring a robust regulatory framework is crucial. Our regulatory system uses existing regulators with long-standing experience of regulating across different sectors in their area of specialisation. Because each regulator specialises in the aspect that they oversee, such as health and safety or the environment, they can bring to bear extensive knowledge gained from their work in other sectors.

Roles of regulators:

- The decision about whether exploration for oil and gas can take place at a particular location involves collaborative working between a number of public bodies, who have clearly defined roles and areas of expertise. Before shale operations can begin, the operators require:
 - A licence for onshore oil and gas exploration is required from the Oil and Gas Authority (OGA). The licence grants the licence-holder with exclusivity for hydrocarbon operations in relation to the area covered by the licence. It should be noted that exclusivity does not permit any hydrocarbon operations (conventional or unconventional) in and of itself. Where unconventional activities, such as shale gas operations, are intended, the operator will also be required by the OGA to conduct an Environmental Risk Assessment in relation to hydraulic fracturing, to submit a Hydraulic Fracturing Plan and to acquire hydraulic fracturing consent.
 - Planning permission is required from the local Minerals Planning Authority.
 - Environmental permits to operate a site are required from the Environment Agency. The Environment Agency assesses the risk to the environment and will not issue permits if the level of risk is unacceptable. They also give members of the public the

⁹ [Shale gas extraction in the UK: a review of hydraulic fracturing](#), Royal Society and Royal Academy of Engineering, June 2012.

¹⁰ [Review of potential public health impacts from shale gas extraction](#), Public Health England, June 2014.

opportunity to raise any issues they think they should consider through an open consultation.

- Safety on a drilling site and standards of well construction are regulated by the Health and Safety Executive (HSE). The operator is required to submit a notification of operations to the HSE which will be scrutinised by the regulator. The HSE and EA will conduct an on-site inspection before any hydraulic fracturing can take place.

Public Health England also work with the regulators to ensure potential health impacts of operations are properly risk assessed as part of the planning and permitting process

- Where fracking specific regulation is required, this has been developed; an example of this is the traffic-light system to halt operations if seismic activity takes place above a pre-defined level. Further details are provided by the Oil and Gas Authority.
- The Government believes that there are many lessons to learn from other countries' experience. Allowance of course has to be made for the many differences in regulatory practice and requirements between the UK and other countries.
- For instance DECC officials have visited Washington, Houston and Pennsylvania to learn at first hand from regulators, industry and other interest groups and have sent a member of the Office of Unconventional Gas and Oil on secondment to the Alberta Energy Regulator in Canada to learn about how they regulate oil and gas in the province.
- While we are confident that we have a robust regulatory regime in place, with each regulator drawing on their extensive experience within their regulatory specialism, it is important to acknowledge that the shale gas industry is still at a very early exploration stage. Within DECC, we will continue to review the regulatory regime as the industry develops.

3. What level of engagement and overview does DECC have with the regulators involved in the planning and monitoring process of hydraulic fracturing operations?

- The Office for Unconventional Gas and Oil (OUGO) within DECC is responsible for encouraging and overseeing the development of unconventional gas and oil resources in the UK. We work with other Government Departments and regulators to provide a single point of contact for stakeholders and ensure regulatory arrangements are fit for purpose and streamlined where possible, whilst remaining robust to ensure the safety of people and the environment.
- It is important that regulators maintain their independence in regulating the oil and gas industry, and that they are free to carry out their regulatory roles. OUGO is not involved in the licensing, planning or permitting processes for specific projects. We do however have a strong interest in ensuring that the system as a whole works well and identifying if there are any improvements needed.
- With that in mind, we frequently meet with other Governmental Departments and regulators at both senior official and working level.

4. Some commentators state that research into conventional wells indicates that horizontal wells have a failure rate four times higher than for vertical wells in the same area. Why is a condition that prevents surface drilling in groundwater protection zones, National parks, SSSIs and AONBs adequate mitigation for these areas in view of the fact that drilling will be able to take place horizontally underneath them?

- It is important to note that the research referenced above is from Canada and not from the UK, where we have an entirely different regulatory regime. The UK has over 50 years' experience in regulating onshore oil and gas, and we are confident that the regulatory system will continue to provide robust protection for the environment.
- Horizontal drilling is not new in the UK in either the offshore or onshore environment. The Health and Safety Executive have a team of specialist well inspectors who have considerable experience of regulating drilling activity including horizontal drilling.
- HSE are aware that there can be specific hazards associated with horizontal well sections; however, they have not received reports of an unplanned release of fluids as a result of failures within the horizontal sections of oil and gas wells.
- UK standards ensure that there are multiple barriers in place within oil and gas wells to prevent fluids from escaping from the well.

On restrictions on activity in protected areas:

- The protected areas in which hydraulic fracturing will be prohibited have been set out through the Onshore Hydraulic Fracturing (Protected Areas) Regulations, which were formally approved by both Houses of Parliament in December 2015. These regulations ensure that the process of hydraulic fracturing cannot take place above 1,200 metres in National Parks, the Broads, Areas of Outstanding Natural Beauty (AONBs), World Heritage Sites and areas that are most vulnerable to groundwater pollution.
- Rather than enabling operations in protected areas, these regulations introduce an additional protection to our most sensitive areas and complement the strong protections already provided by the regulatory and planning system.
- Moreover, it is worth emphasising that the regulations do not in themselves grant any form of permission for "associated hydraulic fracturing" to take place under any of these sites. They simply establish the principle that hydraulic fracturing should be prohibited by legislation in the specified areas and down to the specified depth. A company looking to develop shale will still need to obtain all the necessary permissions, like planning and environmental permits - and any proposals will necessarily be subject to further detailed consideration and scrutiny under our legal and regulatory regimes.
- Separately, the Government has also committed to ensure that hydraulic fracturing cannot be conducted from wells that are drilled at the surface of our most valuable areas.
- While the Government continues to believe that protections under the existing planning and regulatory regime are sufficient, we recognise that surface activities are of greatest public concern and are minded to apply the surface restrictions in Sites of Special Scientific Interest, Ramsar and Natura 2000 sites, as well as the areas covered by the draft regulations. We have consulted with industry and other interested parties on how best to implement this commitment and are currently considering responses.

Follow-up Questions from Scrutiny Session

1. What are the efficiency rates of shale gas to produce electricity when compared to other sources of energy?

- Shale gas is for all practical purposes chemically identical to natural gas – both are essentially methane with a small amount of higher alkanes embedded in it. Whereas conventional gas occurs underground in reservoirs, shale gas is contained in micro-pores in rock. The difference is in the extraction method.
- Under the current legislative framework, all gas must meet legally binding standards on quality before being injected into the national network. Once in the network, gas extracted from shale will blend with other conventionally extracted gas. So if shale gas were being injected into this network, it would be the same as any other gas.
- The average efficiency in which heat energy contained in the fuel is converted to electrical energy for 2014 for different fuels are as follows¹¹:

Combined Cycle Gas Turbine: 47%
 Coal: 35.9%
 Nuclear: 39.6%
 Bioenergy: 36.8%

2. How do the emissions from shale gas compare to emissions from conventional gas sources?

- According to the MacKay-Stone report, emissions from shale gas operations are comparable to those from conventional sources, as long as the extraction is adequately regulated. They found that shale gas extraction and use is likely to be in the range 200–253 g CO₂e per kWh of chemical energy, which makes shale gas's overall carbon footprint comparable to gas extracted from conventional sources (199–207g CO₂e/kWh(th)), and lower than the carbon footprint of imported Liquefied Natural Gas (233-270g CO₂e/kWh(th)). When shale gas is used for electricity generation, its carbon footprint is likely to be in the range 423–535g CO₂e/kWh(e), which is significantly lower than the carbon footprint of coal, 837–1130g CO₂e/kWh(e).¹²
- Similarly, Imperial College's review of methane and CO₂ emissions from the natural gas supply chain concluded that emissions from conventional and unconventional gas extraction are comparable as long as methane is captured rather than flared, using techniques called 'green completions'¹³.
- Any flaring or venting of gas from a well is minimised by the environmental regulator and OGA through controls under the licences. Amongst other things, this requires the use of "green completions" (techniques applied to 'well completions' to significantly reduce the emissions of gases to the air) to minimise emissions.¹⁴

¹¹ [Digest of UK Energy Statistics](#), Chapter 5: Electricity, Department of Energy and Climate Change.

¹² [Potential greenhouse gas emissions associated with shale gas extraction and use](#), Professor David MacKay and Dr. Timothy Stone, Sept 2013

¹³ [Methane & CO₂ emissions from the natural gas supply chain](#), Sustainable Gas Institute, Imperial College London, April 2015.

¹⁴ [Onshore oil and gas sector guidance](#), Environment Agency, November 2015.

3. Are the licence fees from Petroleum Exploration and Development Licences ring-fenced for DECC?

- The onshore licence fees for PEDLs are not ring-fenced for DECC and are paid into a consolidated fund, which goes to the Treasury.

4. Will protected areas become encircled by shale developments as a result of fracking being permitted underneath them?

- The landscape impacts of shale gas proposals will be considered through the planning process. There is a duty on all local planning authorities – not just national park authorities – to have regard to the purposes of National Parks and AONBs. This duty is relevant in considering development proposals – including those for shale gas - that are situated outside National Park or AONB boundaries, but which might have an impact on the setting of, and implementation of, the statutory purposes of these protected areas.
- Furthermore, more generally, national planning guidance states that in respect of minerals like shale oil and gas, new development should be appropriate for its location – taking account of the effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution.

Further Information

Baseline Monitoring

- The British Geological Survey (BGS), along with the universities of Birmingham, Bristol, Liverpool, Manchester and York and partners from Public Health England, has started an independent environmental baseline monitoring programme for the first potential shale sites¹⁵. DECC received £1.7m to establish independent environmental monitoring and has agreed grant-funding to BGS to expand the existing Lancashire-based programme for gathering baseline environmental data to North Yorkshire.
- The programme has two project areas: in Lancashire around the two proposed Cuadrilla Resources exploratory fracking sites and in the Vale of Pickering, North Yorkshire, where Third Energy has submitted a planning application to frack.
- The monitoring will characterise the environmental baseline for each of these locations before any fracking and gas exploration or production takes place (in the event that planning permission is granted). The investigations will be independent of any monitoring carried out by the industry or the regulators, and information collected from the programme will be made freely available to the public. This information will also support peer-reviewed scientific evidence.
- The monitoring will include: water quality (groundwater and surface water), seismicity, ground motion, air quality (including radon) and soil gas.
- In addition to the baseline monitoring conducted by the BGS, operators will be required to undertake environmental monitoring during fracking operations, including emissions monitoring, to demonstrate compliance with their permits. In some cases, depending on the risks presented by a site or community concerns, the Environment Agency may undertake extra monitoring themselves.
- The recent Infrastructure Act 2015 makes clear that any hydraulic fracturing activity cannot take place unless appropriate arrangements have been made for monitoring methane in groundwater and emissions of methane into the air.
- The Secretary of State will not grant issue a hydraulic fracturing consent unless he or she is satisfied that an environmental permit is in place which contains a condition requiring compliance with a waste management plan providing for the monitoring of methane in groundwater in the period of 12 months before hydraulic fracturing begins, and emissions of methane into the air for the period of the permit.

Liability for decommissioned wells

- Each licensee (and there may be more than one for each licence) is responsible for the well and liable for decommissioning wells and for any damage it may cause.
- As part of the petroleum licensing process, and prior to awarding a licence, the Oil and Gas Authority (OGA) assesses whether a company has adequate financial capacity for its planned operations. The OGA also checks at the drilling and, where relevant, production stage that the company has sufficient funding and appropriate insurance.

¹⁵ British Geological Survey, [Shale gas environmental monitoring website](#).

- When operations finish, the licensee 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. 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.
- One of the central aims of the current regulatory framework is ensuring that wells are appropriately designed and operated and that when operations cease they are properly decommissioned.
- The relevant planning authority may require suitable restoration of the site as a condition of the planning permission. In England the Environment Agency requires 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.

Environment Agency Responses to North Yorkshire County Council (NYCC) Scrutiny Questions

What monitoring will be undertaken by the Environment Agency before, during and after shale gas extraction has taken place, to supplement the operator's own monitoring, and what enforcement action will be taken if permitted levels are exceeded e.g. air emissions? Will the Environment Agency be seeking bonds from the fracking industry when granting permits to allow for clean up in the event of contamination?

The response to this question has been broken into the following sections:

What monitoring will be undertaken by the Environment Agency before, during and after shale gas extraction has taken place, to supplement the operator's own monitoring?

Answer: The Environment Agency expects operators to undertake their own monitoring, this will be a requirement of permits issued for oil and gas activities including where fracking is planned and means the costs of that monitoring will be picked up by the operator rather than the taxpayer. Our permits stipulate that the monitoring equipment, techniques, personnel and contractors employed for the monitoring of emissions will have either MCERTS certification or MCERTS accreditation (as appropriate), where available, unless otherwise agreed in writing. The Environment Agency set up the Monitoring Certification Scheme (MCERTS) to provide a framework of standards for monitoring things that affect the environment.

MCERTS covers;

- the standards of performance that monitoring equipment must meet
- the level monitoring staff must be qualified to
- accrediting laboratories and on-site inspections in line with European and international standards.

We will review and check the monitoring data that operators submit to us ensure they are complying with their permit conditions. We could also choose to observe the contractors while they carry out sampling and audit their procedure as part our checks on permit compliance. As for other industrial activities we regulate there may be some circumstances where we think it is necessary or appropriate to take our own samples or to carry out additional monitoring – for example if we believed a specific site or activity presented a risk of harm to the environment or local communities.

Additional comment: An extensive process of environmental baselining is currently being undertaken by the British Geological Survey (BGS) in the Vale of Pickering – this work is being funded by the Department for Energy and Climate Change but the Environment Agency has been involved in defining some of the objectives. Some of the data gathered so far is already available on their [website](#) and once complete all the information will be made publically accessible. This adds to [earlier work](#) done by the BGS on a national methane baseline survey for groundwater in the UK.

What enforcement action will be taken if permitted levels are exceeded e.g. air emissions?

Answer: The Environment Agency has a hierarchy of enforcement responses that range from providing permit holders with advice and guidance to help them improve their compliance through to suspension of permits and prosecution for serious or serial permit breaches.

In deciding what action is appropriate in each case we look at the circumstances of the particular breach and consider issues like the operator's past performance, their intent and attitude. Our enforcement decisions are also informed by the actual or potential environmental impact of the breach.

Additional Comment: Our [Enforcement and Sanctions Guidance](#) provides more detailed background on the decision making process we follow in deciding the appropriate response to environmental offences.

Will the Environment Agency be seeking bonds from the fracking industry when granting permits to allow for clean up in the event of contamination?

Answer: The Environment Agency will not normally seek bonds from fracking industry operators to pay for clean-up costs in the event pollution is caused. We describe bonds for sites operating under environmental permits as 'financial provision'. The Mining Waste Directive does set a requirement for the operators of certain mining waste activities to make financial provision, however this only applies to activities that are classified in the Directive as Category A or hazardous waste facilities. Sites that meet these descriptions also require environmental permits and the Environment Agency is responsible for ensuring the operators of those sites have the appropriate financial provision. These funds are specifically to ensure the obligations of permits are met if a company has financial difficulties rather than being a resource that is available to tackle or clean up pollution.

Additional Comment: A Committee Member observed that some form of financial assurance had been required through the planning permission for the proposed potash mine in North Yorkshire. Our response was that we believe it is possible to require a guarantee to ensure a site will be properly restored through planning conditions but that this was best clarified with the authority's Planning Department.

Does the Environment Agency have any arrangements in place for on-going liaison with other regulatory bodies in relation to regulation of fracking activity?

Answer: Nationally the Environment Agency liaises frequently with other regulators in relation to fracking activity specifically but also much more broadly on other topics of Onshore Oil and Gas regulation. Locally there are also existing strong relations between the Environment Agency and other regulators; in June when we held our drop-in event at Kirby Misperton we were supported by representatives from the Health and Safety Executive (HSE) and Public Health England (PHE), having colleagues from our partners there presented members of the public with an opportunity to speak to them about their role.

More directly in terms of active regulation while the recent exploratory wells for conventional gas in East Yorkshire were operational the Environment Agency Officer responsible for those sites talked to the HSE Well Inspector as necessary about operational issues.

Some of these arrangements have been formalised; in November 2012 the Environment Agency and HSE signed a Working Together Agreement setting out how the 2 agencies would regulate unconventional oil and gas developments. The agreement was aimed at new and first time shale gas operators and provided for a review, subject to operating experiences, after the first 6 months and every 12 months thereafter. This agreement has been periodically reviewed and we are currently working with HSE on an updated version of the agreement that will be finalised in 2016.

The Environment Agency has stated in the past that damage to groundwater may be irreversible. 'Groundwater protection: Principles and practice', Environment Agency, August 2013, p20. **What, if any, safeguards can be put in place to avoid contaminating through ground water supplies and aquifers?**

Answer: There are two key approaches applied that safeguard groundwater from oil and gas activities; the first is the importance placed on the integrity of the wellbore from the initial design, through construction and the operational phases and to ensure safe abandonment. Well integrity is the responsibility of the HSE and was covered in detail in their response to the committee. As previously mentioned we work closely with the HSE and well integrity is an area of joint interest.

All operators must notify the Environment Agency of their intention to drill a borehole and provide details of how they intend to protect water resources, including groundwater, in the construction and use of the borehole. If we are not satisfied, we may serve a notice on the operator to take appropriate measures to conserve water quantity and quality.

The second set of safeguards are introduced through our environmental permitting process, we will require operators to have a groundwater permit unless they can demonstrate that there will be no, or a trivial impact on groundwater. In all other cases, we will require a permit to regulate any actual impact on groundwater or the risk of an impact.

The type of permits required and the conditions in the permit will be site specific and depend on the nature of the activity, geological conditions and risks to groundwater including drinking water supplies. We will not issue a permit for activities where there is a significant risk that pollution to groundwater will occur.

Concern is often expressed about the additives that may be used in fracking fluids. As part of our permitting process we assess all the additives an operator proposes to see whether they are hazardous. In making this assessment we use the definition of hazardous which is set out in Schedule 22 (4) of the Environmental Permitting Regulations 2010 (as amended). Hazardous substances are those which are toxic, persistent and liable to bioaccumulate. Other substances still have the potential to pollute and are classified as non-hazardous pollutants.

The Water Framework Directive (2000/60/EC) and the Groundwater Daughter Directive (2006/118/EC) require EU Member States to protect groundwater against pollution and deterioration by preventing or limiting entry of pollutants (substances liable to cause pollution) to groundwater. Hazardous substances must be prevented from entering groundwater and the input of non-hazardous pollutants must be limited to ensure that groundwater does not become polluted. The respective UK and Ireland environment agencies are responsible for considering whether a potential pollutant should be determined to be a hazardous substance or a non-hazardous pollutant. The Joint Agencies Groundwater Directive Advisory Group (JAGDAG) reviews assessments made by the agencies. JAGDAG comprises the Environment Agency (EA), the Scottish Environment Protection Agency (SEPA), the Northern Ireland Environment Agency (NIEA), the Environmental Protection Agency Ireland (EPA), Health Protection Agency (HPA), Department of Environment, Food and Rural Affairs (Defra), Welsh Assembly Government (WAG) and industry representatives. Assessments are then subject to public consultation, and may be subject to further review by the respective governments, before a final determination is made.

We will not permit the use of 'hazardous substances' for any activity, including hydraulic fracturing where they would or might enter groundwater and cause pollution. If we are satisfied that the additives are non-hazardous we will then carry out a further site specific assessment to confirm that there would not be a significant impact on groundwater by introducing non-hazardous pollutants – we will only issue a permit if we are satisfied this is the case.

Should pollution of groundwater occur, the Environment Agency can take enforcement action to prevent or remedy pollution of groundwater caused by the actions of operators.

Additional Comment: Committee members reflected concerns expressed by members of the public that there was a degree of secrecy around the additives that would be used in fracking fluids. Any application for an environmental permit that proposes fracking must include full disclosure of all substances proposed for use in fracking process so they can be assessed as described above. Environmental permit applications are placed on our public register and are available for members of the public to view; we have also held public consultations on applications for fracking offering an additional opportunity for people to see the full details of what is proposed.

The Chartered Institution of Water & Environmental Management has said that: “any negligence associated with storage, transportation and operational spills represent the greatest threats to surface water, as well as to groundwater.” CIWEM, Written Submission, House of Commons Environmental Audit Committee: Environmental Risks of Fracking Enquiry, January 2015 **What enforceable safeguards can be put in place to dispose of waste water safely or ensure that it is stored safely above the ground on-site even in the event that heavy rainfall causes the site to flood?**

Answer: We recognise that there is potential for spillages or escapes of polluting substances from oil and gas sites and that this presents a risk to both surface and ground water. These

risks are at their greatest during the early stages of exploration and development and reduce significantly once a site enters the production phase. We expect operators applying for environmental permits to identify these risks and explain how they will be minimised as part of their permit application. The techniques that the operator describes for minimising pollution from leaks and spills in their application are incorporated into their environmental permit and become enforceable in that way.

These risks can be minimised in a number of ways; during construction wellsites can be engineered so they are impermeable meaning any leaks or spills can be safely contained on the site. The site drainage can be designed so it can be easily controlled, allowing polluting substances to be prevented from leaving the site. Through the permits we issue we require potentially polluting liquids to be provided with secondary containment (for example a bund) to prevent their escape should the storage container fail or be damaged.

Contaminated water, for example returned fracturing fluids that are not suitable for re-use, would be considered as potentially polluting and must be stored in suitable containers before removal for disposal at a suitable facility. The use of engineered pits or open lagoons for storage of liquids will not be permitted at oil and gas sites in England.

Clean surface water run-off from sites can often be safely discharged to watercourses through an interceptor. We may set conditions for such discharges through environmental permits or restrict discharges depending on the activities at a site.

As a consultee in the planning process we consider the risk of flooding for any development we are consulted on including oil and gas sites. Where appropriate, we will require flood risk assessments and may object to developments if flood risk is unacceptable or require conditions on how the site is constructed and operated to mitigate flood risk, through flood consents.

Additional Comment: We explained that the Environment Agency is responsible for the regulation of waste liquids produced through the fracking process. Producers of waste have a responsibility to ensure it is disposed of safely, as with other industries we expect operators of oil and gas activities to only send their waste to sites that are authorised to receive it. In the case of waste fracking fluids the receiving site will need to be permitted to accept waste containing Naturally Occurring Radioactive Material (NORM) – any such site in England would also operate under an environmental permit and be regulated by us.

Other points raised by the Environment Agency

- Our role in the safe abandonment of oil and gas sites

Environmental permits that cover oil and gas activities require the applicant to submit a report that sets out the condition of the site before any activities are undertaken (Site Condition Report). Before an operator can surrender their permit they have to provide an updated copy of this report. This must demonstrate the permitted activities have ceased, decommissioning works are complete, pollution risk has been removed and that the land and waters at the site are in a satisfactory state. We will not allow a permit to be

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surrendered until this has been demonstrated or necessary work carried out to remediate the site. Operators must continue to comply with permit conditions until the permit has been surrendered.

- Funding for the regulation of onshore oil and gas

In the financial year 2015/16 the Environment Agency received additional funding of £3.1 million from DEFRA in recognition of our role in the regulation of onshore oil and gas industry and the increased focus on those activities.

We have made a case for additional funding of £2.6 million for 2016/17, of which £1.1m is specifically intended for regulation with 24% of that resource proposed for regulatory activities in the Environment Agency's Yorkshire area. As with all our work we will ensure we focus our available resources on the activities that present the highest risk.

Public Health England

How comprehensive and robust is the research and information on the public health impacts of fracking?

Public Health England's 2014 Review of the potential public health impacts of exposures to chemical and radioactive pollutants as a result of the shale gas extraction process includes a comprehensive review of 229 papers or reports relating to the direct health impacts associated with fracking up to January 2014. The report focussed only on the potential direct impacts to human health arising from these emissions. As with all evolving technologies the body of evidence grows with time over which the particular technology is utilised. This is the case with shale gas extraction as some countries' industries are more developed than others. The research and information available is only as good as the data collected and the analytical methods used. What is important is to consider the context in which the research is undertaken (country, regulatory framework, population etc.), and also the strength of the evidence. PHE in its 2014 report reviewed the available literature in formulating its conclusions and recommendations. PHE continues to review the literature to assess whether its conclusions and recommendations remain valid and to date this is the case.

The majority of research published thus far focuses on environmental outcomes and the potential for impacts on air, water and soil quality. A few studies have suggested associations between adverse health impacts and shale gas extraction activities; however, the authors highlighted study limitations and although equally these limitations do not mean that associations can be ruled out, it is evident that further work is required.

The PHE review noted that the UK has the opportunity ahead of significant development of shale gas extraction activities to consider appropriate environmental and epidemiological studies to extend and strengthen the evidence base on potential health impacts from shale gas extraction emissions. PHE is exploring the options available for any such studies, including the current BGS-led baseline environmental monitoring study in the Vale of Pickering.

In examining the potential cumulative long-term impacts on health, is there a need to establish a comprehensive health and exposure monitoring programme, to assess the extent and level of the release of pollutants from the fracking process? If so, and acknowledging that in order for the results to be statistically reliable, would it be appropriate for PHE to conduct or co-ordinate this surveillance using North Yorkshire as a pilot area?

The regulatory framework in the UK aims to ensure that emissions are carefully controlled and therefore Public Health England does not anticipate that shale gas extraction activities will lead to significant adverse health effects if it is properly operated and regulated. However the PHE review noted that the UK has the opportunity ahead of significant development of shale gas extraction activities to consider appropriate environmental and epidemiological studies to extend and strengthen the evidence base on potential health impacts from shale gas extraction emissions. PHE is considering the potential need for and options available, including collaboration with academic partners, for further research on the public health impacts of shale gas extraction.

Public Health England's 2014 Review of the potential public health impacts of exposures to chemical and radioactive pollutants as a result of the shale gas extraction process concluded 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. Shale gas developers and operators, through the planning and environmental permitting processes, will be required to satisfy the relevant regulators that their proposals and operations will minimise pollution and risks to public health. PHE will provide support by responding to requests to assess impacts on health in specific cases.

Assessing the potential health impacts of shale gas extraction requires careful consideration. Epidemiological studies or surveillance may be useful to either provide appropriate reassurance by demonstrating a lack of adverse impacts or may identify problems which need resolution. Any epidemiological studies would need to be carefully designed to ensure that there was a good chance of a clear answer to the research questions posed. PHE will continue to work with partners to assess the options for any potential health studies.

Follow up question asked at the meeting by a Member regarding public health baseline monitoring studies of fracking/current discussions.

PHE is currently exploring the range of available datasets to enumerate which can best address each outcome of concern using routine surveillance data. Any health studies or surveillance in relation to shale gas extraction sites needs careful consideration to ensure that the results are scientifically rigorous and able to withstand challenge and scrutiny. PHE is currently considering this issue.

PHE has not held any formal discussions with other Government Departments (DECC or HMT) regarding health monitoring.

- **What are the safeguards taken around wellbore structural integrity and decommissioning of wells?**

There is a robust health and safety regulatory regime in place to ensure shale gas operators are managing and controlling risks in the appropriate way. This includes a coordinated approach between the Health and Safety Executive (HSE) and the Environment Agency (EA) set out in our working together agreement. Maintaining well integrity is central to this approach.

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

HSE take a life cycle approach to well integrity, from the design of the well to final abandonment, which includes:

- Working with industry bodies to ensure the appropriate safety standards are built in to industry standards;
- Assessment of the well notification document that must be submitted to HSE before drilling can start. This allows inspectors to assess well design prior to construction where the vast majority of issues likely to have an impact on well integrity will be identified and addressed by the well operator;
- Scrutinising well construction based on weekly operations reports that must be submitted to HSE by the well operator. This provides HSE with the assurance that the operator is constructing the well and managing the risks as described in the notification, and when they are not, HSE can take appropriate action;
- Meetings with well operators and site inspection, both prior to and during the operational phase; and
- Scrutinising subsequent well notifications and weekly operations reports required for any operation that could result in an unplanned release of fluids (see below for examples).

HSE inspectors can gain access to any site at any time if there is a matter of concern.

Every employer has a duty under the Health and Safety at Work etc. Act 1974 to ensure the health and safety of the people they employ and those who could be affected by the work, so far as is reasonably practical. There are also specific health and safety regulations that apply to all onshore oil and gas wells including:

- The Borehole Site and Operations Regulations 1995 (BSOR) which apply to all oil and gas operations, including shale gas operations. These regulations are primarily concerned with the health and safety management of the site and set out the requirements to send a notification to HSE before drilling or any other activity that could result in an unplanned release of fluids from the well (for example, well completion, workover, integrity testing, hydraulic fracturing etc) can start, and before decommissioning.

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- The Offshore Installations and Wells (Design and Construction, etc) Regulations 1996 (DCR) apply to all wells drilled with a view to the extraction of petroleum (including shale gas) regardless of whether they are onshore or offshore. These regulations are primarily concerned with well integrity, and set out a requirement for the operator to prevent any unplanned release of fluids from the well so far as is reasonably practicable. The requirement to report in to HSE each week is also included in these regulations as is the requirement to have a well examination scheme in place, which is covered below.

- The Reporting of Injuries Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR). These Regulations set out a specific set of Wells Dangerous Occurrences in Schedule 2, Part I that the well operator must report to HSE. These are:

- A blowout (i.e. an uncontrolled flow of well fluids)
- The unplanned use of blow out prevention equipment
- The unexpected detection of H₂S (hydrogen sulphide)
- Failure to maintain minimum separation distance between wells
- Mechanical failure of any safety critical element of a well

For the drilling process, the HSE scrutinises the well design and construction plan to ensure that health and safety risks are managed appropriately. This involves scrutiny of the design, geology and equipment to be used. It is only when HSE specialist inspectors are convinced the work can proceed safely that they inform the OGA that they are content for drilling to commence.

Once construction starts specialist inspectors then monitor progress on the well to determine if the operator is conducting operations as planned. An oil and gas well is a complex engineered construction most of which is not open to visual inspection and so the key to well integrity is to ensure that the operator is managing risks effectively throughout the life cycle of the well. To ensure this, HSE uses an inspection and assessment process throughout the lifecycle of the well as detailed above.

- **How sure can we be that well casings will not over time lose their structural integrity causing toxic chemicals to contaminate the land and water supply?**

During the design process the operator must assess the risk of deterioration of casing. They must select casing that is suitable for the pressure, temperature and the chemicals likely to be encountered as part of the operation. They must also plan for the eventual safe decommissioning of the well during the design stage.

UK standards ensure that there are multiple casing barriers between the well and any near surface aquifer whether the aquifer is used as part of the water supply or not. This means that if a casing string does fail there are further barriers in place.

The well operator is responsible for decommissioning and abandoning the well in such a way that there can be no escape of fluids from the well or its reservoir post abandonment, so far as reasonably practicable. During decommissioning further barriers, called plugs, are inserted within the well. These consist of a plug and quantities of cement up to 500ft or more in length. Industry standards call for at least two barriers between hydrocarbon bearing zones and surface in each well. Where the well passes through porous rock strata a barrier should be inserted adjacent to or above each porous layer.

To assess the risk of contamination the operator will need to look at:

- The risk of toxic chemicals being present in the well,(something the EA may wish to comment on)
- The pressure within the well (is it such that any toxic chemicals can get near surface) and;
- The risk of multi-barrier failure.

The HSE view is that for shale gas wells the pressure within the well and presence of these multiple barriers means that the risk of a release of fluids from a well post-decommissioning is low.

- **Who will be monitoring this once the well has been decommissioned?**

Before they can decommission a well, the operator must send a notification to HSE detailing how they plan to complete the work safely. The notification is scrutinised by HSE specialists to ensure that the abandonment meets UK standards. HSE specialists continue to monitor the decommissioning process and the operator must provide an update to HSE each week during decommissioning to ensure that the well is decommissioned in such a way that there can be no escape of fluids so far as is reasonably practicable.

Once the decommissioning work is complete HSE's involvement finishes as the well is no longer a workplace. However, the EA and Local Authority may require further monitoring of the site.

- **In 2012 the HSE noted a number of commonly observed weaknesses when inspecting well operators' well examination schemes** 'Well examination schemes – commonly observed weaknesses', March 2012, HSE http://www.hse.gov.uk/foi/internalops/hid_circs/technical_osd/spc_tech_osd_43.htm . **Some of these related to off-shore wells but what assurances, if any, can the HSE give on the robustness of well operators' well examination schemes for onshore shale gas extraction wells?**

To remain effective as a regulator HSE continuously review the regulatory regime, challenging the contribution made by all players and producing information and guidance on the outcomes to be achieved in relation to risk control. This is enshrined in the goal setting approach to health and safety set out in the Health and Safety at Work Act – those who create the risks must properly manage and control them and move beyond minimum standards in a continuous effort for improvement. Part of HSE's regulatory role is to supply information to those responsible for managing the

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risk to enable improvement in their control systems. The circular mentioned above typifies this approach by communicating potential improvements to fellow regulators and operators.

The independent well examiner is not a regulator, but completes an important quality control role for the operator company. Each oil and gas well, whether onshore or offshore must be subject to a well examination scheme. The requirements for this scheme are set out in the Offshore Installations and Wells (design and construction etc) Regulations 1996 (DCR). The 'wells aspect' of these regulations apply to all oil and gas wells.

The Independent Well Examiner can be from the same company as the operator, if they have the competence and right level of separation from the drilling operations. However, the reality is that for onshore operations in the UK they are from separate companies, because, onshore, it is more cost effective to buy-in the services.

DCR requires the operator to set up a well examination scheme and appoint a well examiner. This is an important quality control mechanism for the operator concerned and is an extra independent verification to ensure they are complying with the regulations and industry standards. The well examination scheme and involvement of the independent well examiner is for the complete lifecycle of the well, from design through to abandonment.

The well operator must send the following documents to the independent well examiner:

- the well construction programme and any material changes to it;
- reports on how the well is being constructed;
- reports on how the well is being monitored;
- at the end of the well's life, a plan for how it will be plugged and decommissioned.

The independent well examiner reviews these documents to ensure the well is designed, constructed and operated as required by the regulations, in line with the well operator's policies and procedures, and following industry good practice.

The independent well examiner may also undertake site visits to check the progress of the work. Shale gas well operators will ask their well examiners to examine certain well integrity and fracturing operations in real time, especially during the early stages of a development, to provide a further level of independent assurance.

Inspectors from the Health and Safety Executive (HSE) audit the operator's well examination scheme. This audit examines all aspects of the scheme and includes an interview with the independent well examiner to ensure they have both the right level of competence and the specified independence from the operation. Where areas for improvement are identified by the inspector the operator will be informed and the HSE inspector will check that changes are made to the scheme to ensure it is fit for purpose. This is an ongoing process and so if changes are made to the operator's examination scheme a further audit may take place.

Inspectors have identified some weaknesses during their audits and published their findings in order to prompt colleagues and set out our expectations to industry.

The records from the well examination scheme must be kept in the UK and HSE must be informed of their location.

Once a well is decommissioned how long the lifetime integrity of the materials used in the casings is, moving forward.

This is similar to the question above about how sure we can be that well casing will not over time lose structural integrity. If the well is decommissioned to the correct standard there should be no leak of fluids from it post abandonment. The operator is responsible for ensuring the well is decommissioned and abandoned in such a way that the requirements of the regulations for 'no escape of fluids ... so far as reasonably practical' are satisfied. HSE scrutinises the operation to ensure that the decommissioning follows the relevant standards which means that there are at least two barriers in place each consisting of 500ft of concrete. See above for further details.

Enquiry from Jonathan Spencer: A member of the public who attended the meeting has since raised a point which I would like to check with you. In their own words they state that: "[There was] ... confusing evidence given by UKOOG that the several layers of protection went to the full depth of the well bore - it was not made clear that this was only through the aquifer layers." Is this correct?

There will be multi layers of barrier present in all sections of the well. Through any aquifer there should be at least three layers of casing in place. As the well gets deeper the number of casings will decrease but for production purposes a 'liner' is installed so that there are at least two barriers between the methane and the outside of the well from the point the methane enters to the top of the well.

Enquiry from Jonathan Spencer: The member of the public also mentioned that the initial results just released from the baseline work going on in a study by Durham University (Re-fine) has found that most wells leak. Is that correct?

The research was not commissioned by HSE, but as far as we know the authors of the study do not state that 'most wells leak' anywhere in their conclusions. They conclude that in 33% of sites measured there was an increase in the level of methane which they attribute to a leak from the well. The level of any leak was found to be generally lower than that associated with agricultural use. A difficulty with the study identified by critics is that it could not identify categorically if the methane detected was as a result of a well leak or if it was a product of agricultural activity. It may be more helpful to seek the views of the author's first hand.

<http://www.sciencedirect.com/science/article/pii/S0048969715312535>