Briefing Paper 12

Fracking and radioactive waste management

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nuleaf
nuclear legacy advisory forum

1: Introduction

The production of unconventional gas by 'fracking' creates low-level radioactive waste and is therefore an issue of interest to Nuleaf and local government. This Briefing Paper explains current Government policy and the implications for Waste Planning Authorities in relation to radioactive waste arisings. It does not address in detail the wider issues around fracking and the range of economic, social and environmental concerns that local authorities and communities may have in relation to such proposals.

For further guidance on the role of Local and Waste Planning Authorities in the management of nuclear and radioactive waste, members should refer to Nuleaf Briefing Papers 4 and 11.

2: What is fracking?

According to the UK Government[1], 'Hydraulic fracturing' or 'fracking' 'is a technique which can be used in the extraction of gas from shale rock.' It uses fluid, usually water, pumped at high pressure into the rock to create narrow fractures that create paths for gas to flow into the well bore and to the surface. The water normally contains small quantities of other substances to improve the efficiency of the process, e.g. to reduce friction. Once the fractures have been created, small particles, usually of sand, are pumped into them to keep the fractures open. Fracking is one of a number of alternative oil and gas production techniques now being used across the world.

3: How does it generate radioactive waste?

Radioactive materials such as uranium and thorium were incorporated in the Earth's crust when it was formed; these normally exist at trace (parts per million – ppm) concentrations in rock formations. Decay of these unstable radioactive elements produces other radionuclides that, under certain conditions (dependent

[1] https://www.gov.uk/government/publications/about-shale-gas-and-hydraulic-fracturing-fracking

upon pressure, temperature, acidity etc) in the subsurface environment are mobile and can be transported from the reservoir to the surface with the oil & gas products being recovered.

During the production process, Naturally Occurring Radioactive Material (NORM) flows with the oil, gas and water mixture and accumulates in scale, sludge and scrapings. It can also form a thin film on the interior surfaces of gas processing equipment and vessels. The level of NORM accumulation can vary substantially from one facility to another depending on geological formation, operational and other factors.

4: Where could fracking take place?

Potentially geologically suitable rock formations are located across the UK. The Government's guidance page notes that the British Geological Survey has estimated that the total volume of gas across Northern England and the Midland Valley of Scotland is some 1300 trillion cubic feet[2]. It states that *'this is much larger than our annual gas usage. However, the amount of shale gas that can be extracted is currently unknown and is likely to be smaller.'* The Oil and Gas Authority has prepared an interactive map showing the location of onshore oil and gas wells including shale gas across Great Britain. New research by the University of Nottingham and the British Geological Survey published in 2019 casts doubt on the original claims as to the amount of shale gas. The research has been dismissed by the gas companies.

5: Government policy and strategy on fracking

Current Government policy is to encourage shale gas exploration to determine its potential to provide the UK with greater energy security, growth and jobs, and it has published guidance on its approach to the issue.

To date, only two consents for fracking have been issued: both to Cuadrilla Bowland Ltd for separate wells on its Preston New Road Site in Lancashire. Cuadrilla commenced fracking at this site in October 2018, but this was suspended indefinitely in 2019 due to levels of seismic activity that exceeded levels permissible under the consent order.

[2] https://www.gov.uk/government/publications/about-shale-gas-and-hydraulic-fracturing-fracking/developing-shale-oil-and-gas-in-the-uk

Cuadrilla was requested by the regulator to permanently seal its wells by June 2022, but this requirement has since been withdrawn. The UK Government has also commissioned the British Geological Survey (BGS) to undertake a review of the safety of fracking. A report was submitted on the 6th July 2022 and is currently under consideration by BEIS[3].

The main political opposition parties (Labour, Scottish National Party, Liberal Democrats and the Green Party) are opposed to fracking. The Devolved Administrations in Scotland, Wales and Northern Ireland have placed a moratorium on development until further research is completed on its environmental impact. Objections to fracking include those based on the need to reduce fossil fuel use to tackle climate change, the risk of earth tremors and concerns about pollution of drinking water, though the level of risk and the scale of impact of these issues is disputed.

6: Government strategy on the management of low-level radioactive waste

Radioactive waste from fracking is classified as NORM (Naturally Occurring Radioactive Material) and its management is governed by the **UK Strategy for the management of Naturally Occurring Radioactive Materials (NORM)[4].** The UK NORM Strategy sits alongside other strategies for the management of solid Low-Level Waste (LLW).

The current **UK Strategy for the Management of Low-Level Waste (LLW) for the Nuclear Industry[5]** was published in 2016, while the **UK Strategy for the management of solid Low-Level Radioactive Waste[6]** from the non-nuclear industry in the United Kingdom was released in March 2012. The latter deals with radioactive waste which is generated on non-nuclear licensed sites such as hospitals, pharmaceutical industries, and research and educational establishments.

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[3] https://drillordrop.com/2022/07/06/fracking-review-sent-to-ministers/

[4] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/335821/Final_strategy_NORM.pdf

[5] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/497114/NI_LLW_Strategy_Final.pdf

[6] https://www.gov.uk/government/publications/strategy-for-the-management-of-solid-low-level-radioactive-waste-from-the-non-nuclear-industry-part-1-anthropogenic-radionuclides

7: Regulation

The Department for Business, Energy and Industrial Strategy (BEIS) has developed a **Regulatory Roadmap**[7] setting out the process that developers much follow when seeking to drill for any onshore oil and gas.

Before commencing drilling operations for onshore oil and gas development (including shale gas) an operator must attain several permissions, including a petroleum exploration and development licence (PEDL), planning permission (unless permitted development rights apply) and environmental permits. For hydraulic fracturing for shale the last of these permissions is a Hydraulic Fracturing Consent issued by BEIS.

The Government launched a consultation in 2018 on a proposal that planning permission for shale gas exploration should be through permitted development rights, thus removing the role of local planning authorities in the process. There was considerable opposition to this, including from the Local Government Association (LGA), and in 2019 the Government decided not to proceed with this proposal for the time being[8].

An environmental permit is also required from the relevant environment regulator in England, Wales, Scotland, and Northern Ireland respectively. Currently, however, all planned shale gas developments are located in England, and therefore the Environment Agency (EA) has been responsible for ensuring that any shale gas operations are conducted in a way that protects people and the environment. The Environment Agency's environmental permitting regulations cover:

- protecting water resources, including groundwater (aquifers) as well as assessing and approving the use of chemicals which form part of the hydraulic fracturing fluid
- appropriate treatment and disposal of mining waste produced during the borehole drilling and hydraulic fracturing process
- suitable treatment and management of any naturally occurring radioactive materials (NORM)
- disposal of waste gases through flaring

The Agency is also a statutory consultee in the planning process and provides local mineral planning authorities (normally the county or unitary local authority)

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[7] https://www.gov.uk/government/publications/regulatory-roadmap-onshore-oil-and-gas-exploration-in-the-uk-regulation-and-best-practice

[8] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/843801/Government_Response_to_the_shale_PDR_Consultation.pdf

with advice on the potential risks to the environment from individual gas exploration and extraction sites.

A Shale Environmental Regulators Group (SERG) was established in 2018 to oversee environmental regulation, but this is currently suspended given the moratorium on shale exploration. SERG involves the EA, Health and Safety Executive and Oil and Gas Authority. The Group is also seeking to support Planning Authorities in their role.

8: Implications for Waste Planning Authorities

NORM waste from fracking and other processes can be sent to those facilities currently licensed by the Environment Agency to take Low Level Waste (LLW) from the nuclear industry.

In terms of landfilling, these are the Low-Level Waste Repository and Lillyhall in Cumbria; Clifton Marsh in Lancashire; and King's Cliffe in Northamptonshire. The Stoneyhill landfill site in eastern Scotland is also licensed to accept such wastes. NORM waste can also be incinerated, and three incinerators are permitted to accept this material: Veolia in Ellesmere Port; Tradebe in Fawley; and Grundon in Slough.

Disposal of NORM waste has the potential to affect the capacity of those sites in relation to radioactive waste from the nuclear industry. This raises the prospect that further applications for disposal sites may be made in order to cope with the increased volume of waste although at present this does not appear to be an issue.

It is incumbent upon the supply chain to identify the market potential for sites to take LLW and make the appropriate planning and permitting applications. Nuleaf's advice is that all Waste Planning Authorities should include appropriate policies within their Waste Local Plan to address the potential for such applications (See Nuleaf Briefing Paper 11).