

Determination of an application for an environmental permit under the Environmental Permitting (England and Wales) Regulations 2010 for the management of radioactive waste

Our decision document recording our decision-making process

The permit number is: EPR/KB3795DQ

The applicant is: Cuadrilla Elswick Limited

The facility is located at Roseacre Wood Exploration Site, Roseacre Road, Fylde, Lancashire, PR4 3UE.

What this document is about

This decision document which accompanies the permit explains how we have considered the Applicant's Application, and why we have included specific conditions in the permit we are issuing to the Applicant. It is our record of our decision-making process, to show how we have taken into account all relevant factors in reaching our position. Unless the document explains otherwise, we have accepted the Applicant's proposals.

We try to explain our decision as accurately, comprehensively and plainly as possible. Achieving all three objectives is not always easy, and we would welcome any feedback as to how we might improve our decision documents in future.

Preliminary information and use of terms

We gave the application the reference number EPR/KB3795DQ/A001. We refer to the application as "the Application" in this document in order to be consistent.

The number we have given the permit is EPR/KB3795DQ. We refer to the permit as "the Permit" in this document.

The Application was duly made on 16/06/2014

The Applicant is Cuadrilla Elswick Limited who we refer to as "the Operator". Cuadrilla Elswick Limited's site for the proposed radioactive substances activity is located at: Roseacre Wood Exploration Site, Roseacre Road, Fylde, Lancashire, PR4 3UE.

This Application was made for a permit for the management of radioactive waste resulting from prospecting for shale gas.

The flow-back fluid (returned waters), drill cuttings, drilling muds and waste gases arising from the hydraulic fracturing process are considered to be mining waste and as such fall under the Mining Waste Directive. Any fracking chemicals left underground in the shale bed are also considered to be mining waste. The activity of managing these particular wastes is classified as a mining waste operation with no mining waste facility, and will be regulated by the Environment Agency by means of a separate permit subject to the Environmental Permitting Regulations, reference EPR/BB3800FQ.

The flow-back fluid may contain naturally occurring radioactive materials (NORM) in sufficient quantities to be classed as radioactive waste, and therefore an application has been submitted for the management of these wastes. Our permit also recognised that a residual layer of spent drilling mud, which may contain NORM, may remain in the area adjacent to the wellbore. This would constitute a disposal of radioactive waste, occurring in the area of or immediately adjacent to the

vertical and horizontal wells. This disposal has been taken into account in our decision to permit this activity. Our decision below covers this application.

We consider in reaching that decision that we have taken into account all relevant considerations and legal requirements and that the permit will ensure a high level of protection of people and the environment. These considerations and legal requirements are set out in the published government and Environment Agency guidance supporting the Environmental Permitting Regulations.

Our decision

Unless specified otherwise below, we have accepted the applicant's proposals and grant a permit to the applicant. This will allow it to carry on the regulated facility subject to the conditions and limitations in the permit.

The permit contains conditions taken from our standard environmental permitting template, including the relevant Schedules.

We developed these conditions in consultation with industry, having regard to the legal requirements of the Environmental Permitting Regulations and other relevant legislation.

The document does not therefore include an explanation for these standard conditions where they are included in the permit. We have considered the Application and have accepted that the details are sufficient and satisfactory to make standard conditions appropriate.

What we have taken into consideration

Justification

Justification is not required in this case because the radioactive substances activity being carried out is not a "practice" as defined in relevant legislation. This is naturally occurring radioactivity and use is not being made of its radioactive, fissile or fertile properties. The radioactive waste produced is a result of natural radioactivity present in the rocks being unavoidably displaced by the permitted operations.

Operator and operator competence

We are satisfied that the applicant is the person who will have control over the operation of the facility after the grant of the permit.

We have assessed the applicant's management arrangements against our guidance. We have not identified any reasons indicating that the applicant is unable to operate in accordance with the permit.

Disposal of radioactive waste - optimisation

We have assessed the applicant's proposals against our guidance on 'best available techniques'. We are satisfied that the applicant has demonstrated that the best available techniques will be used to minimise the creation of radioactive waste and the activity in (and volume of, where appropriate) radioactive waste to be disposed of.

There is no main sewer connection to the site and so the only suitable disposal route is to store and tanker offsite to a suitably permitted operator. In determining the permit for such an installation the radiological impact will have been taken into account.

Disposal routes and limits

We have assessed the applicant's proposals against our guidance on 'best available techniques'. We are satisfied that the applicant has demonstrated that the best available techniques will be used in respect of disposal routes and limits. The applicant was asked to relook at the proposed activity levels for accumulated waste as the Environment Agency considered these were too conservative. The applicant subsequently provided lower levels with an explanation. The Environment Agency has transposed these revised levels into schedule 3 of the permit.

Assessment of activity in discharges and disposals

We are satisfied that the operator has identified appropriate measures to assess the activity in discharges and disposals.

Radiological assessment

A radiological assessment is not required.

Our draft technical guidance note states that an applicant will not have to assess the radiological impacts of:

- Transfers of radioactive waste to another operator, for example where you transfer liquid waste to another operator for treatment and disposal. This is because we assessed the impacts of disposals from the waste disposal operators when we issued their permits.
- Any residual well stimulation fluid left underground or waste water arising from the production of oil and gas that is returned underground, because there is no credible pathway leading to the radiological exposure of members of the public or the environment from such disposals

We are satisfied that the authorised accumulation and disposals of radioactive waste will not give rise to any dose exceeding the public dose limit of 1000 microsieverts per year, and the source dose constraint of 300 microsieverts per year and that exposures have been reduced to a level that is as low as reasonably achievable taking into account economic and social factors.

Consultation

We consulted Lancashire County Council's Environment Directorate. They raised two issues relating to sufficient capacity to treat waste containing NORM and use of the waste hierarchy. We are satisfied that the applicant has provided evidence of suitable contracts for any proposed disposals and that capacity exists and that the applicant has considered the waste hierarchy in its assessment of best available techniques.

We consulted the HSE. They made no comments in relation to radioactive waste.

We consulted Public Health England. They have raised two matters relating to Radon and NORM. They made several observations in relation to Radon. As Radon is out of scope of the 2010 Regulations it is not considered in this determination. In relation to NORM they have reiterated that the radiological dose assessment using the Initial Radiological Assessment Tool developed by the Environment Agency shows that the dose levels for the proposed waste disposal routes are within the appropriate range. However it should be noted that this assessment would be part of the determination of any environmental permit issued to the waste treatment site and not the applicant as the waste producer.

We have also considered the Report of the Lancashire County Council Director of Public Health on the Potential Health Impacts of the Proposed Shale Gas Exploration Sites in Lancashire. Whilst the report itself makes no recommendations that are relevant to the application for a radioactive substances activity there are several points raised in the supporting documents.

Prior to this application by Cuadrilla Elswick Limited a similar application was also made by sister company Cuadrilla Bowland Limited. We consulted on that application and have considered the matters raised from that consultation in this one.

Issue Raised	Response
Clarification as to whether there will be periods of higher exposure to radon (e.g. during the 120 day flare period assumed by the radon modelling) than is suggested by the ES reporting the exposure levels as an annual effective dose. Notably whether peak levels will exceed 400 Bq/m ³ in any 24 hour period at any receptor (on or off site). [This clarification is unlikely to change the overall conclusion in terms of public health, but would assist in resolving this as an issue for the HIA.]	As Radon is out of scope of the 2010 Regulations it is not considered in this determination. See above for further explanation.

Clarification of whether one or two flares have been included for the radon modelling. It would be useful for actual receptors and weather data to be used in the radon modelling. [This clarification is unlikely to change the overall conclusion in terms of public health, but would assist in resolving this as an issue for the HIA.]	As Radon is out of scope of the 2010 Regulations it is not considered in this determination. See above for further explanation.
Request additional modelling of the likely radon exposure levels during unplanned events (e.g. loss of gas containment at ground level) for occupational and residential receptor doses. For each radon modelling result (including those requested above), data in unit of $\mu\text{Sv}/\text{year}$ and Bq/m^3 would be useful. [This clarification is unlikely to change the overall conclusion in terms of public health, but would assist in resolving this as an issue for the HIA.]	As Radon is out of scope of the 2010 Regulations it is not considered in this determination. See above for further explanation.
Confirms with the Environment Agency that the Project's impact on the capacity of regional waste sites to treatment/disposal of medical waste is being considered as part of the permitting process.	The Environment Agency is satisfied that there is no link between radioactive waste from medical waste and those considered as part of this application.
Seeks clarification on how much equipment, which has been radioactively contaminated with NORM, will need to be disposed of and what implication this has for waste management capacity.	The application covers this and it is reflected in table s2.1 and s3.3 of the permit.
Seeks clarification on the locations and routes for hazardous and radioactive waste treatment. It is noted that hazardous loads are a familiar feature of the UK road network. Once the locations of relevant treatment facilities have been identified, the Director of Public Health for LCC could comment on the need for routing away from population centres and accident hotspots.	The transport of radioactive waste is not subject to the Environmental Permitting Regulations and is not regulated by the Environment Agency.

Comments were also received from members of the public and have been summarised in the table below.

In respect to the responses below it should be noted that an Environmental Permit for a Radioactive Substances Activity is only required for a NORM industrial activity as specified in the regulations. The relevant NORM industrial activity is production of oil and gas. The drilling of the borehole is not the production of oil and gas and thus not subject to an Environmental Permit for a Radioactive Substances Activity, as set out below.

The European Commission and the International Atomic Energy Agency recommend regulating only certain NORM industries. These are the ones which are considered to be of significance in terms of radiation protection.

The listed NORM Industrial Activity (NIA) relevant to oil and gas exploration is "production of oil and gas". The reason that this industry is listed is because there is always some water produced when oil or gas flows to the wellhead. It is this "produced water" that carries the NORM, and it is the disposal of the water and the pipe scale and sediments it produces that require regulatory control and are classified as "radioactive waste".

Boreholes are drilled for a wide range of reasons besides oil and gas exploration, for example for water abstraction. The drill cuttings do contain NORM, but no more than the rocks that are drilled. Such drilling activities do not produce a radiation protection issue and drilling is not on the NIA list. Consequently we have no statutory powers to regulate drilling and the disposal of cuttings and spent drilling muds as radioactive waste.

Issue Raised	Response
<p>Concerns were raised that the drill cuttings and returned muds will contain naturally occurring radioactive material. Concerns that the risks associated with the disposal of these wastes have not been assessed adequately (and don't have the necessary regulation) and concern on the applicants estimates of levels of radioactivity they may contain.</p>	<p>The drilling cores, cuttings or muds will be generated before the production of gas starts so could not be part of the NORM Industrial Activity, see above.</p> <p>The drill cuttings and returned muds will be subject to the conditions set out in the Mining Waste permit EPR/BB3800FQ.</p> <p>UK and world-wide experience suggest that the levels of naturally-occurring radioactivity in drill cuttings would be so low (around 0.1 Bq g⁻¹) that they would not be considered to be radioactive waste and assessment of radium releases would be unnecessary. As mentioned above, drilling a well of any sort is not a radioactive substances activity.</p>
<p>Concerns were raised that it is possible to dump radioactive waste in landfill sites where there is no monitoring by the EA, the industry operators, nor the receiving sites.</p>	<p>Any facility permitted to dispose of waste (including radioactive waste) will need to hold the relevant environmental permit under the Environmental Permitting Regulations 2010.</p> <p>The environmental permit will set out the types of waste that can be accepted as well as the monitoring requirements.</p> <p>It is the operator's responsibility to comply with the conditions of their permits, including any monitoring conditions. If we have required monitoring at a site, data will be submitted and checked by us to ensure compliance. We can also take samples ourselves and send samples to our own laboratories for analysis. We focus our monitoring work on those sites where we believe the risk of harm to the environment or local communities is highest.</p>
<p>Concerns raised on the amount of radioactive waste water that will be produced during the initial flow testing phase. In addition how will the waste be treated? Where will it be treated? Who is treating it? Where is it being disposed? How will it be independently monitored?</p>	<p>The applicant has demonstrated that there are suitable existing permitted waste facilities that can accept and treat the radioactive waste water.</p> <p>The waste will need to be treated at a suitably permitted site to carry out the physio-chemical treatment process. The facility will be subject to monitoring conditions as set out in the environmental permit. In addition to these monitoring requirements the Environment Agency is able to carry out independent monitoring if required.</p>

<p>A number of concerns were raised about the potential safety to public health both for on-site activities and during transportation.</p>	<p>The Environment Agency's role is to permit developments that provide a high level of protection for people and the environment. We will not allow companies to start work unless they can demonstrate how they will provide that protection.</p> <p>We have considered the applicant's assessment and are satisfied that the radiation levels are within the statutory limits and government guidance. As part of our determination we have also consulted Public Health England and the Director of Public Health for Lancashire County Council. Neither of these raised concerns.</p> <p>We are satisfied that the interim storage of radioactive waste in tanks will not give rise to any dose exceeding the public dose limit of 1,000 microsieverts per year, and the source dose constraint of 300 microsieverts per year. In addition we are satisfied that the dose levels for the permitted waste disposal routes are within the appropriate range.</p>
<p>Question asked about the classification of Flowback fluid which is kept above ground classed as hazardous waste and that left underground classed as non hazardous; asking for us to explain that discrepancy?</p>	<p>We do not use the term 'hazardous' when describing radioactive waste because the effects (on human health or the environment) depend on a range of factors, like the activity and type of radio-nuclides, and exposure times. Instead, we look at the radiation dose that various receptors might receive.</p> <p>Both waste flowback fluid and waste retained hydraulic fracturing fluid remaining within the formation are classified in the Waste Management Plan as non-hazardous waste and we are satisfied with this classification. The management of these extractive wastes is covered by the mining waste permit EPR/BB3800FQ and discussed in detail in the Decision Document for that permit.</p>
<p>A question was asked about how disposal of NORM (sometimes called Technically Enhanced NORM) and contaminated scales from equipment will be controlled and monitored.</p>	<p>The Operator's proposed methods are set out in the application.</p> <p>We are satisfied that these methods are appropriate.</p>

Prior to this application by Cuadrilla Elswick Limited a similar application was also made by sister company Cuadrilla Bowland Limited. We consulted on the draft permit and associated specification that we were minded to issue to Cuadrilla Bowland Limited. This was carried out between 10 November 2014 and 15 December 2014.

We consulted on the draft permit and associated specification that we were minded to issue to Cuadrilla Elswick Limited, this application. This was carried out between 24 November 2014 and 6 January 2015.

Both consultations resulted in the following matters being raised in addition to those already addressed above.

Issue Raised	Response
Permit Schedule 1 at A1 refers to disposal of radioactive waste “on” the premises.	In schedule 1, the Environmental Permit permits the disposal of radioactive waste on the premises. This refers to the “permitted activity” as defined in the environmental permitting regulations. It is not a list of disposal options – these options are listed in schedule 3 of the permit and does not permit disposal on the premises with the exception of that portion of the flowback fluid contaminated with NORM that remains underground after hydraulic fracturing, and that some of the formation water containing NORM also remains in-situ.
Permit condition 2.7.3 the operator is required to maintain records of radioactive waste inc. “so far as is reasonably practicable its location on the premises;”	The operator is required to maintain records of where radioactive waste is stored on site, when it is disposed offsite and when and where it is re-injected on site. “So far as reasonably practicable” relates to the maintenance of records, not the whereabouts of radioactive waste and sets a high but reasonable standard for the maintenance of these records.
Permit Specification refers to releases to sewer and controlled water at parts 3 and 4, in direct contradiction of the permit at Table S.3.2 which says there should be no such releases.	The Environment Agency specification requires (in specification paragraph 4 on page 4) that the operator submits an annual pollution inventory report. This is a standard report which contains an extensive list of releases to Air, Water, Sewer and Waste. Not all sections are relevant to each permit we grant. In this case, there is no permitted release to sewer or controlled waters.
Lancashire County Council and Friends of the Earth raised two issues relating to sufficient capacity to treat waste containing NORM and use of the waste hierarchy.	We are satisfied that the applicant has provided evidence of suitable contracts for any proposed disposals and that capacity exists and that the applicant has considered the waste hierarchy in its assessment of best available techniques.
Roseacre & Wharles Parish Council raised that as a concern associated with the proposed operation and the EA have excluded consideration of this issue as it is not part of their 2010 regulations it is unclear how this issue will be addressed as part of the application process. Can the EA advise how it will be considered (which agency) or is it an outstanding issue that will not be considered a part of the planning process?	Natural gas, whether from conventional oil and gas wells or from unconventional sources such as shale beds or coal seams, includes some radon. Radon from these sources was exempt from permitting by the Natural Gas Exemption Order 2002 and in 2011 was excluded from regulation under the Environmental Permitting Regulations 2010. This was on the basis of its low risk, widespread use and that it was not amenable to regulation. This means that discharges of radon in natural gas, being flared or vented at oil and gas-well sites, is not subject to regulation under radioactive substances regulation (RSR). The regulatory treatment of radon is set out in paragraph 2.11 of Guidance on the scope of and exemptions from the radioactive substances legislation in the UK - Guidance Document (September 2011; Version 1.0) which

	<p>is available online at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69357/pb13624-rsl-guidance-110914.pdf. Any questions about radon discharges from flared or vented gas in relation to specific applications should be directed to Public Health England.</p> <p>Public Health England in their Review of the Potential Public Health Impacts of Exposures to Chemical and Radioactive Pollutants as a Result of Shale Gas Extraction, state 'Since this is likely to lead to only very localised increases in airborne concentrations of radon, it is only likely to be of potential relevance to on-site occupational exposures.'</p>
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