Environment Agency Permitting Decisions

Bespoke permit for accumulation and disposal of radioactive waste

1. What this document is about

This document which accompanies the permit is our record of our decision-making process, to show how we have taken into account all relevant factors in reaching our decision.

2. Preliminary information

The number we have given the permit is EPR/RB3895DK. We refer to the permit as "the **permit**" in this document.

We gave the application the reference number EPR/RB3895DK/A001. We refer to the application as "the **application**" in this document.

The applicant is Hutton Energy UK Limited. We refer to Hutton Energy UK Limited as "the **applicant**" in this document. Where we are talking about what would happen after the permit is granted, we call Hutton Energy UK Limited "the **operator**".

The site for the proposed radioactive substances activity (the accumulation and disposal of radioactive waste arising from the NORM industrial activity of oil and gas production) is at Harlequin 3 Wellsite, Grantham Road, Radcliffe on Trent, Nottinghamshire, NG12 2AW ('the **premises**')

The application was duly made on 15/12/14. This means we considered it was in the correct form and contained sufficient information for us to begin our determination.

We subsequently asked the applicant to provide additional information through a formal request under Schedule 5 to the Environmental Permitting (England and Wales) Regulations 2010 on 27/1/15. We asked the applicant to provide evidence that disposal routes were available for offsite transfer of radioactive wastes, and for more details about the aqueous wastes to be accumulated on the site. The applicant provided a satisfactory response on 28/1/2015.

3. Use of terms

EPR

The Environmental Permitting (England & Wales) Regulations 2010 and the amendments made to radioactive substances regulation in the Environmental Permitting (England & Wales) (Amendment) Regulations 2011 are referred to together as "the EPRs". References to schedules or paragraphs in EPR are to the schedule or paragraph currently in force. Radioactive substances activities have to meet the requirements set out in Schedule 23 of the EPRs. The current version of Schedule 23 is contained in the 2011 Regulations. EPR permits for radioactive substance activities are referred to as RSR permits.

NORM
NORM is "naturally occurring radioactive material" derived from the radioactive decay of uranium and thorium naturally present in rocks since their formation. NORM will contain many different radioactive materials in differing amounts from the radioactive decay of uranium and thorium. Radium 226 and radium 228 are typically the radioactive materials of most significance in oil and gas production.

NORM Industrial Activity (NIA)
NORM industrial activities are listed in Part 2 of Schedule 23 of the EPRs. Waste arising from a NIA is considered to be radioactive waste, and has to be managed under an RSR permit, if the concentration of radioactivity in the wastes exceeds the thresholds given in Table 1, Part 3 of Schedule 23. "Production of oil and gas" is a NIA. We consider that production of oil and gas begins when oil or gas flows to the surface, even if this is during production testing.

Produced water
Produced water is water naturally present in the oil bearing strata that is brought up to the surface during the extraction of oil and gas. It is the produced water that carries the NORM, usually in sufficient quantities for it to be classified as a radioactive waste. Sometimes the produced water gives rise to pipeline scale and sediments that also contain NORM at sufficient levels to be classified as solid radioactive waste.

Regulated facility
This is the term used in the EPRs. Those regulations provide that any regulated facility must be operated only under and in accordance with an environmental permit.

Well stimulation fluids
Fluids, often water, mixed with additives used to encourage more oil and gas to flow from a particular rock formation.

4. Brief outline of the process

This application was made for a permit for the management of radioactive wastes arising from the NORM industrial activity of production of oil and gas.

The operator intends to drill a well to explore for oil. After this the operator may carry out well testing, flowing oil to the surface, to assess the production prospects, possibly using well stimulation. During the test production for oil, water may also be brought to the surface (produced water). If water is encountered, it will be separated at surface from the oil and accumulated in tanks for subsequent offsite disposal at a third-party waste facility. Any natural gas associated with the exploration will be diverted to a flare located on site and incinerated.

The produced water is likely to contain NORM in sufficient quantities to be classed as radioactive waste.

Solid wastes such as pipeline scale and sediment may also contain NORM in sufficient quantities to be classed as radioactive waste.

The permit also recognises that a residual layer of well stimulation fluid, which may contain NORM in sufficient quantities to be classified as a radioactive waste, 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 well. This disposal has been taken into account in our decision.

The waste gas that is flared may contain small quantities of entrained NORM, and so the permit allows for the disposal gaseous waste to air.

The wastes arising from the drilling are considered to be "extractive waste" and as such fall under the Mining Waste Directive. Managing these extractive wastes is classified as a "mining waste operation with no mining waste facility" and will be regulated by means of a separate permit with reference number EPR/CB3300KR/A001.

5. Record of decision

We have decided to grant the permit specified below.

The permit number is EPR/RB3895DK.

The facility is located at Harlequin 3 Wellsite, Grantham Road, Radcliffe on Trent, Nottinghamshire, NG12 2AW

We consider in reaching that decision we have taken into account all relevant considerations and legal requirements and that the permit will ensure the appropriate 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 EPRs.

6. Reasons for our decision

Unless specified otherwise below, we have accepted the applicant's proposals.

Justification

Justification is the process by which Government decides whether types of practices involving radiation are acceptable, as set out in The Justification of Practices Involving Ionising Radiation Regulations 2004 (the Regulations'). Further information is in Government guidance available at:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48980/Justification_of_Practices_on_Ionising_Regulationsguidance.pdf.
Justification is not required in this case because the radioactive substances activity being carried out is not a "practice" as defined in the Regulations, where the radioactive material is being exploited for its fissile, fertile or radioactive properties. The radioactive waste arises from natural radioactivity present in the rocks being unavoidably displaced by the permitted operations.

Operator and operator competence

We are satisfied that, after we grant the permit, the operator is the person who will have control over the operation of the facility in line with our Regulatory Guidance Note RGN 1: *Understanding the meaning of Operator (version 4.0)*; and that the operator will be able to operate the regulated facility in compliance with the conditions included in the permit.

We have assessed the operator's management arrangements against our guidance (see https://brand.environment-agency.gov.uk/mb/DzM3jp). Having considered the information submitted in the application, we are satisfied that appropriate management systems and management structures will be in place.

Disposal of radioactive waste – optimisation
Operators, when disposing of radioactive waste, need to ensure that the radiological impacts on people are kept as low as reasonably achievable, taking into account economic and social factors. This is the optimisation requirement. We expect operators to achieve this through the use of "best available techniques" (BAT) in the relation to the management of the generation and disposal of radioactive waste.

We have assessed the operator's proposals against our guidance on 'best available techniques' (see *https://brand.environment-agency.gov.uk/mb/DECqof*) to minimise radioactive waste creation and disposals, minimise the time over which radioactive waste is accumulated, and select appropriate disposal routes.

We are satisfied that the operator has demonstrated that the best available techniques will be used to minimise the creation of radioactive waste and the activity in and volume of radioactive waste to be disposed of.

The operator considered various different disposal routes for the aqueous waste. We are satisfied that the selected route, transfer to an offsite treatment facility with a separate RSR permit, represents BAT. When an RSR permit for a treatment facility is determined the impact of any releases of radioactive substances from that facility are assessed. The operator was asked to provide evidence that they had contracts in place, or could readily put contracts in place, for the disposal by transfer of aqueous and solid waste. The operator provided evidence that contracts could be readily put in place.

Permit conditions and limits
Permit conditions specify certain key measures for this type of process to protect members of the public and the environment. We have used the relevant generic conditions from our bespoke permit template along with other process-specific conditions to ensure that the permit provides the appropriate standards of environmental protection.

Our generic conditions allow us to deal with common regulatory issues in a consistent way and help us to be consistent across the different types of radioactive substance activities.

Schedule 2 of the permit sets limits on the aqueous and solid wastes that can be accumulated on site. The permit limits the length of time that the solid and aqueous waste can be stored, and the maximum activity in the accumulated waste. We asked the applicant to re-consider the limits they requested in the permit to ensure that these were appropriate for the wastes that might be encountered.

Assessment of the radioactivity in discharges and disposals
We are satisfied that the operator has identified appropriate measures to assess the radioactivity in disposals from the premises.

We are requiring the operator to sample and analyse any accumulated produced water and any solid waste that is generated.

Radiological impact assessment
A radiological impact assessment looks at the potential radiation dose to the public. We will not issue a permit if the radiation dose to the public resulting from the operation of the

regulated facility could exceed 300 microSieverts/year, or if the radiation dose to the public from all permitted sources could exceed 1000 microSieverts/year.

The permit allows the operator to transfer radioactive waste from his site to an authorised waste facility. The operator has not had to assess the radiological impacts of any transfers of radioactive waste to another operator, for example the transfer of aqueous waste to a waste disposal operator for treatment and disposal. This is because we have assessed the impacts of disposals from the waste disposal operators when we granted permits.

There is no radiological impact from any fluids that are left underground because there is no pathway that could lead to the radiological exposure of members of the public or the environment from such disposals. The operator is not intending to dispose of aqueous waste by injection to underground strata, but our permit does allow such disposals.

The waste gas that is flared may contain small quantities of entrained NORM, and so the permit allows for the disposal gaseous waste to air. We have assessed radiological impact of NORM in flared gas and found it to be negligible.

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.

7. Consultation and web publicising

Consultation commenced on: 06/01/2015
Consultation ended on: 06/02/2015

We advertised the Application by a notice placed on our website, which contained all the information required by the regulations, including telling people where and when they could see a copy of the Application.

We placed a paper copy of the Application and all other documents relevant to our determination on our Public Register at The Environment Agency Trentside Office, Trentside North, West Bridgford, Nottingham, NG2 5FA. We also sent a copy to Nottinghamshire County Council for its own Public Register. Anyone wishing to see these documents could do so and arrange for copies to be made.

Further details along with a summary of consultation comments and our response to the representations we received can be found in Annex 1. We have taken all relevant representations into consideration in reaching our determination.

Annex 1: Consultation and web publicising

Summary of responses to consultation and web publication and the way in which we have taken these into account in the determination process.

Brief summary of issues raised	Summary of actions taken or show how this has been covered
Radon The question 'why is radon not regulated under EPR when it is radioactive?' has been asked.	Radon is a naturally occurring radioactive gas that results from the decay of radium-226, and to a lesser extent radium-228. Only naturally occurring radioactive substances listed in Part 3 Table 1 of Schedule 23 are regulated under the EPRs. Radon is not listed and so is outside the scope of the EPRs. This means the Environment Agency does not regulate its accumulation and disposal under RSR permits. We have a responsibility to take account of exposure to radon, where the radon arises from the decay of radium that is being accumulated under an RSR permit. This is explained in paragraph 2.11 of the Guidance on the scope of and exemptions from the radioactive substances legislation in the UK. Public Heath England (PHE) is responsible for assessing the general impact of radon. In 2014 PHE published a "Review of the Potential Public Health Impacts of Exposures to Chemical and Radioactive Pollutants as a Result of the Shale Gas Extraction Process". https://www.gov.uk/government/publications/shale-gas-extraction-review-of-the-potential-public-health-impacts-of-exposures-to-chemical-and-radioactive-pollutants The report relates to fracking, but much of it also applies to conventional oil and gas, which are broadly similar operations apart from the step of hydraulic fracturing [fracking] of the oil and gas bearing rock formation.
Concerns were raised about release of radon gas from the ground. The impact on the human population and wildlife had not been assessed, there was no proposed monitoring and reliance was placed upon out of date evidence.	Chapter 5 of the 2014 PHE report specifically addresses radon, and concludes that "*It is considered unlikely that shale gas extraction and related activities would lead to any significant increase in public exposure from outdoor radon levels or indoor levels in nearby homes...*" Further questions about the impact of radon should be addressed to PHE. We have looked at the impact of the radon that will

Brief summary of issues raised	Summary of actions taken or show how this has been covered
	result from the decay of radium in waste water being accumulated, and our results support PHE's assessment that the offsite impact will be negligible.
Concerns were expressed about increased exposure to radon as a result of dispersion from the flaring of waste gas.	All natural gas contains some radon. As explained above this is not regulated under the EPRs and assessing the impact is the responsibility of PHE. The 2014 PHE report concluded that radon released during flaring "*would be rapidly dispersed in the atmosphere and would be very unlikely to lead to any significant public radiation exposure*". The effects of burning natural gas containing radon were also assessed when the Government issued the Natural Gas Exemption Order in 2002.
Radioactive waste – generation Concern about release of radioactive materials/NORM and damaging effects upon the health of the population and wildlife	The applicant intends to dispose of radioactive waste by transfer to an offsite facility. The applicant has provided evidence that suitable disposal routes are available. The waste will be transferred to a facility that has a permit for the accumulation and disposal of radioactive waste. The applicant's permit will not allow disposal of radioactive waste into the local sewer or watercourse. We are satisfied that the measures that the applicant has described in their application will minimise the risk of an accidental release of radioactive waste. Aqueous radioactive waste will be stored in closed steel tanks; the tanks will be subject to regular inspection. The proposals include the lining of the site with an impermeable membrane to protect the underlying soils and groundwater. The risk assessment includes details of how spillages will be reduced or avoided and how the risks from potential spillages are going to be minimised. The radioactive waste transfer and storage activities will take place on the impermeable surface. Suitable storage will be provided for solid waste. Pipe work contaminated with NORM scale will be capped to prevent release of contamination.
Concerns were expressed that there could be pollution of ground water with radioactive substances, if the	Well integrity is assured through compliance with the well examination regime and regulation by the Health and Safety Executive (HSE), and further

Brief summary of issues raised	Summary of actions taken or show how this has been covered
drill casing leaks.	through conformance to Oil & Gas UK and UK Onshore Operators' Group good practice guidelines for well design and construction. The well will be designed and constructed such that well integrity is appropriate to ensure that the environment is protected from fluid or gas releases, through both our requirements and those of the HSE. These standards of construction are detailed in section 5.4.1.2 of the approved Waste Management Plan. All boreholes (whether offshore or onshore) used for hydrocarbon extraction are subject to The Offshore Installations and Wells (Design and Construction) Regulations 1996 (DCR). These regulations, enforced by HSE, are primarily concerned with well integrity and require the operator to carry out regular monitoring and reporting of the well integrity. This is usually done by monitoring well casing pressure, which would indicate possible failures of casings. The Environment Agency and HSE will work together to carry out inspections and assess well integrity during the lifetime of the well.
Radioactive waste - disposals Concern that removing radioactive waste spreads the risk to wider communities	Radioactive waste has to be transferred to an operator with a separate EPR permit already in place to treat and dispose of radioactive waste. The radiological impact of any releases of radioactive wastes made under that permit will have been assessed and found to be within acceptable limits.
Risk during transport of radioactive waste	The transport of radioactive waste is regulated by the Office for Nuclear Regulation.
Concern that the concentration of the waste was unknown.	The applicant gave figures for the upper limit for the concentration of radioactive waste in their application. We are requiring the operator to sample and analyse any accumulated produced water and any solid waste that is generated
Concern that the applicant had expressed the concentration in Bq/l and the responder did not understand this.	The SI unit for measuring the amount of radioactivity is the Becquerel. For liquids the concentration is expressed in Becquerel per litre abbreviated to Bq/l