



# Onshore Oil & Gas Sector Guidance

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We are the Environment Agency. We protect and improve the environment and make it a better place for people and wildlife.

We operate at the place where environmental change has its greatest impact on people's lives. We reduce the risks to people and properties from flooding; make sure there is enough water for people and wildlife; protect and improve air, land and water quality and apply the environmental standards within which industry can operate.

Acting to reduce climate change and helping people and wildlife adapt to its consequences are at the heart of all that we do.

We cannot do this alone. We work closely with a wide range of partners including government, business, local authorities, other agencies, civil society groups and the communities we serve.

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# What's this guidance about?

This guidance is for oil and gas companies and their consultants setting out which environmental permits you need for onshore oil and gas operations in England. This guidance will help you understand how the existing legislation within our remit applies to oil and gas activities and what you need to do to comply. It explains the permits you will need and, where relevant, the Best Available Techniques (BAT) that you should use to meet regulatory requirements.

This includes the following activities:

- Constructing your well pad
- Drilling exploratory wells
- Flow testing and well stimulation, including hydraulic fracturing
- [Storing and handling crude oil](#)
- [Treatment of waste gases \(including flaring\)](#)
- [Handling, storage and disposal of produced waters and flowback fluid](#)
- [Managing extractive wastes](#)
- [Extraction of coal mine methane](#)

The guidance does not cover:

- [Underground coal gasification](#)
- Exploration, appraisal or production of minerals other than oil and gas

A [glossary](#) and list of abbreviations used in this guidance is provided at the end of this document.

## Understanding what you need to do

Activities carried out at onshore oil and gas sites in England fall under different pieces of legislation. This means you are likely to need several permits and permissions from the Environment Agency, including:

Under the Environmental Permitting Regulations (England and Wales) 2010

- [Installations activities](#)
- [Mining waste activities](#)
- [Radioactive substances activities](#)
- [Water discharge activities](#)
- [Groundwater activities](#)
- [Flood risk activity permit](#)

Under the Water Resources Act 1991

- [Notices to construct a boring for the purposes of searching for or extracting minerals](#)
- [Water abstraction licences](#)

Under the Control of Major Accident Hazards Regulations 2015

- [Notification to the Competent Authority](#)

# Before you apply for planning permission or environmental permits

We recommend that you talk to us before you apply for your planning permission or environmental permits, so we can help you through the process. This is called 'pre-application advice'. When possible you should seek pre-application advice for planning and permitting at the same time. The granting of planning permission does not guarantee you will be issued with an environmental permit or any other necessary authorisation.

We have a dedicated Oil and Gas Permitting Team who are the designated Single Point of Contact for the industry. Contact the Permit Support Centre by telephone on 01142 800 678 or 01142 800 682 to obtain contact details.

## Pre-application advice for permit applications

Contact the Environment Agency for permit pre-application advice to help you get your application right first time and help us make a decision about your application more quickly.

We offer 15 hours of free pre-application advice for applications for a new bespoke permit, variation of permit conditions, permit transfer and permit surrender. If you need more than 15 hours of advice we will charge an hourly fee for every hour beyond 15 hours. If your application relates to a standard permit, or a deployment notification under mobile plant, we can provide up to 1 hour of advice free of charge, where needed. Refer to [GOV.UK](https://www.gov.uk) for more information on permitting.

We can:

- identify which environmental permissions you need to apply for
- explain what information you need to include in your application
- direct you to guidance which is relevant to your application
- discuss your proposed activities and identify potential environmental issues
- help you calculate your Operational Risk Appraisal (OPRA) score for a bespoke installation permit
- discuss what information you will need to provide to demonstrate that any specialist contractors you appoint have an appropriate level of expertise
- advise you about what you need to do to comply with radioactive substances legislation, including whether you need to appoint a Radioactive Waste Advisor and complete a radiological assessment
- identify whether we will consider your application to be of [high public interest](#) and advise you to engage the local public as early as possible

## Other sources of useful information

You may also find it useful to refer to:

- guidance for developments requiring planning permission and environmental permits [www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/297009/LIT\\_7260\\_bba627.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/297009/LIT_7260_bba627.pdf)
- our environmental risk assessment for shale gas exploratory operations in England [www.gov.uk/government/publications/shale-gas-exploratory-operations-environmental-risk-assessment](https://www.gov.uk/government/publications/shale-gas-exploratory-operations-environmental-risk-assessment)
- Defra's core guidance on environmental permitting [www.gov.uk/government/publications/environmental-permitting-guidance-core-guidance--2](https://www.gov.uk/government/publications/environmental-permitting-guidance-core-guidance--2)
- the 'UK Onshore Shale Gas Well Guidelines' [www.ukoog.org.uk/onshore-extraction/industry-guidelines](https://www.ukoog.org.uk/onshore-extraction/industry-guidelines), published by United Kingdom Onshore Oil and Gas (UKOOG)

- onshore oil and gas core guidance [www.gov.uk/oil-and-gas-onshore-exploration-and-production](http://www.gov.uk/oil-and-gas-onshore-exploration-and-production)
- the guidelines on the Oil & Gas UK website <http://oilandgasuk.co.uk/publications> that apply to both the onshore and offshore oil and gas industry
- coal bed methane risk assessment [www.gov.uk/government/publications/an-environmental-risk-assessment-for-coal-bed-coal-mine-and-abandoned-mine-methane-operations-in-england](http://www.gov.uk/government/publications/an-environmental-risk-assessment-for-coal-bed-coal-mine-and-abandoned-mine-methane-operations-in-england)
- onshore hydraulic fracturing safeguards from the [Petroleum Act 1998 as amended by the Infrastructure Act 2015](#). This requires operators who wish to undertake high volume hydraulic fracturing (i.e. associated hydraulic fracturing, [as defined in the Act](#)) to meet a number of conditions to obtain a Hydraulic Fracturing Consent from the Department of Energy and Climate Change (DECC). Four of these conditions relate to environmental protection: groundwater monitoring for methane, monitoring of methane to air, a ban on hydraulic fracturing in protected groundwater source areas and the approval by the regulator of substances to be used in hydraulic fracturing. Information on this, where they are relevant to environmental permitting, is included in this document.

## Pre-application advice for planning

We are a statutory consultee for onshore oil and gas planning applications.

Contact us:

- before you apply for planning permission so we can identify any environmental issues while it is still early enough for you to develop and include solutions in your planning proposal. This should help to avoid any delays at the planning application stage
- if you need to produce an Environmental Impact Assessment (EIA), we are a statutory consultee for scoping opinions and will advise you and the Mineral Planning Authority (MPA)

We recommend you contact us for site-specific planning advice on your pre-application by filling in our pre-application [enquiry form](#).

We will give you our preliminary opinion free of charge. We charge per hour for more detailed technical advice, for which we will give you a written formal agreement that includes a programme of advice and our standard terms and conditions. Refer to our [webpage](#) for more information on our planning advice service.

When you contact us, you should tell us:

- your chosen method of borehole construction
- the chemicals you propose to use for drilling and/or well stimulation
- whether you intend to use well stimulation and if so, the nature of this
- whether you intend to use a flare
- whether your facility will include storage of crude oil, including gas condensate

There may be specific issues that need to be considered and agreed by both the mineral planning authority and the Environment Agency, for planning and environmental permitting reasons respectively. These frequently include site condition reporting and restoration, details of the impermeable membrane, site layout, drainage, details of the flare etc. While there might appear to be an overlap we are actually assessing different aspects of the information provided.

We will also be able to advise you which of the technical documents you propose can be used to satisfy both the planning and permitting regimes.

# Land use planning and Environmental Impact Assessments

## Our role

We are a statutory consultee for Environmental Impact Assessments. We give opinions and provide advice to developers and MPAs, from the pre-application stage through to planning applications and the formal discharge of any relevant conditions.

Read our [guidance](#) for developments requiring planning permission and environmental permits. This explains how we'll advise other organisations including MPAs and, where appropriate, Public Health England, Natural England, the Marine Management Organisation and the Forestry Commission about environmental permits at the planning stage.

## Environmental Impact Assessment

Your EIA will determine whether there are any environmental impacts associated with the proposed development during construction and operation, what the significance of any impacts might be and whether these impacts can be mitigated and / or measures put in place to compensate for the impacts.

You will need to produce an EIA if your activities fall within the applicable thresholds and criteria set out in the [Town and Country Planning \(Environmental Impact Assessment\) Regulations 2011](#).

You should contact the MPA for a formal screening opinion to determine whether an EIA is required. If an EIA is required then you can request that the MPA consult us, and other relevant organisations, on the scope of the EIA.

Where an EIA is required it should be submitted to the MPA as part of the planning application process. We will also ask you to submit your EIA to us as part of your environmental permit application if your operation includes a [mining waste facility](#).

For the areas that we regulate, and depending on the activities proposed, we may expect to see some or all of the following in an EIA for an onshore oil and gas site:

- a description of the development including;
  - a detailed description of the physical characteristics and design of the development
  - its location and land use requirements during set up and operation
- a description of the activities during construction and operation, including;
  - the nature, quantities, and types of chemicals and materials to be used
  - the type and scale of equipment
  - the duration of activities
- a description of the type, quantity and location of potential emissions from the operation, including;
  - point source and fugitive emissions to air
  - emissions to surface water and groundwater
  - wastes produced, including;
    - waste drilling muds
    - drill cuttings
    - flowback fluid
    - radioactive scale and sediments
    - waste gas



- consideration of cumulative, short, medium and long-term effects on water and land, groundwater and surface waters, both permanent and temporary
- an assessment of the short and long term air quality impacts from the activities –such impacts should be investigated in relation to the amenity of nearby sensitive receptors
- a description of the mitigation measures and of the management of the development to prevent soil and water contamination, such as secondary and tertiary containment measures
- the requirement for water during the operation and the percentage of water that will be re-used or recycled
- an assessment of the risk of flooding from all potential sources
- an assessment of the impacts on sensitive ecological receptors i.e. European sites such as SACs, SPAs and also Ramsar sites, European protected species, nationally important sites such as SSSIs, local wildlife sites, and notable species and habitats such as included on the list by the Secretary of State under section 41 of the Natural Environment and Rural Communities Act 2006
- a hydrogeological risk assessment clearly listing any 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 as a minimum sensitive groundwater and surface water receptors shall include:
  - any aquifers (rocks containing groundwater that may be used for water supply)
  - abstraction boreholes (public and private)
  - surface waters fed by groundwater
  - groundwater dependent terrestrial ecosystems (such as a wetland area or sand dunes)
  - groundwater bearing strata, at a greater depth than the aquifers
  - an indication of any difficulties (technical deficiencies or lack of know how) encountered by the applicant in compiling the required information

While we would expect to see this information to be in the EIA, we may not provide detailed comments on it through the planning process unless the planning and permit applications have been twin tracked and we are in a position to provide some detailed advice without prejudicing the determination of the environmental permits.

Further information on Environmental Impact Assessment requirements can be found [here](#).

In the [Onshore Hydraulic Fracturing \(Protected Areas\) Regulations 2015](#), the Government sets out where operators are not able to undertake [high volume hydraulic fracturing](#) (i.e. “associated hydraulic fracturing”). These protected areas are at depths of less than 1200m from the surface in National Parks, the Broads, areas of outstanding natural beauty, World Heritage Sites and protected groundwater source areas (Groundwater Source Protection Zone 1).

The Government has also confirmed that surface activities linked with high volume hydraulic fracturing will be restricted in specified areas. These restricted areas are Sites of Special Scientific Interest, Ramsar, Natura 2000 sites, National Parks, the Broads, areas of outstanding natural beauty, World Heritage Sites and Groundwater Source Protection Zone 1.

## Health Impact Assessment

Where the Mineral Planning Authority considers that your planning application may have a significant impact on the health and wellbeing of the local population or particular groups within it, it may consult the Director of Public Health.

Where a health impact assessment is completed the Environment Agency will need to consider the potential health effects identified as part of our permit determination process.

It is important that where a health impact assessment is required, health effects are considered as early as possible in the planning application process to avoid delays in planning and permit determination.

## Other sources of useful information

You may also find it useful to refer to:

- [UKOOG Guidelines for Addressing Public Health in Environmental Impact Assessments for Onshore Oil and Gas](#)

# Environmental permits and permissions for onshore oil and gas activities

You may need to apply for the following types of environmental permit, under the Environmental Permitting (England and Wales) Regulations 2010:

- mining waste operation permit
- radioactive substances activity permit
- installation permit
- groundwater activity permit
- water discharge activity permit

You may also need to apply for:

- water abstraction licences
- flood risk activity permit

You will also need to notify the Environment Agency of your [intention to drill a borehole\(s\)](#), in accordance with section 199 (1) of the Water Resources Act (1991).

## How to apply

Refer to [GOV.UK](#) for information on how to apply for a bespoke environmental permit, a standard rules permit or a permit variation. There are links to application forms and guidance on how to complete them, and information on application fees. We recommend that where possible you twin track your permit applications alongside your planning application.

## Permit options - standard rules and bespoke permits

General information on the types of permits that you can apply for can be found on [GOV.UK](#).

For oil and gas operations, you can choose to apply for a standard rules permit, a bespoke permit, or a combination of both, depending on the activities you wish to carry out.

For oil and gas there are standard rules available for the following activities:

- drill and core activities using water and oil based muds: [SR2014 No 2 The management of waste, not including a waste facility, generated from onshore oil and gas prospecting activities without well stimulation \(using water and/ or oil based drilling mud\)](#)
- accumulation and disposal of radioactive waste: [SR2014 No 4 Accumulation and disposal of radioactive waste from the NORM Industrial Activity of the production of oil and gas](#)

- drill and core activities including leak off testing (LOT), acid wash and decommissioning: [SR2015 No 1 The management of extractive waste, not including a waste facility, generated from onshore oil and gas prospecting activities including drilling, coring, leak off testing \(LOT\), acid wash and decommissioning](#)
- storage and handling of crude oil: [SR2015 No 2 Storage and handling of crude oil arising from onshore oil and gas exploration and production activities](#)

More information is contained in the relevant sections of this guidance.

You will need a bespoke permit:

- if you cannot comply with the conditions set in the standard rules permits above
- if you are undertaking activities for which standard rules permits do not exist
- if you want to combine standard rules and bespoke permits

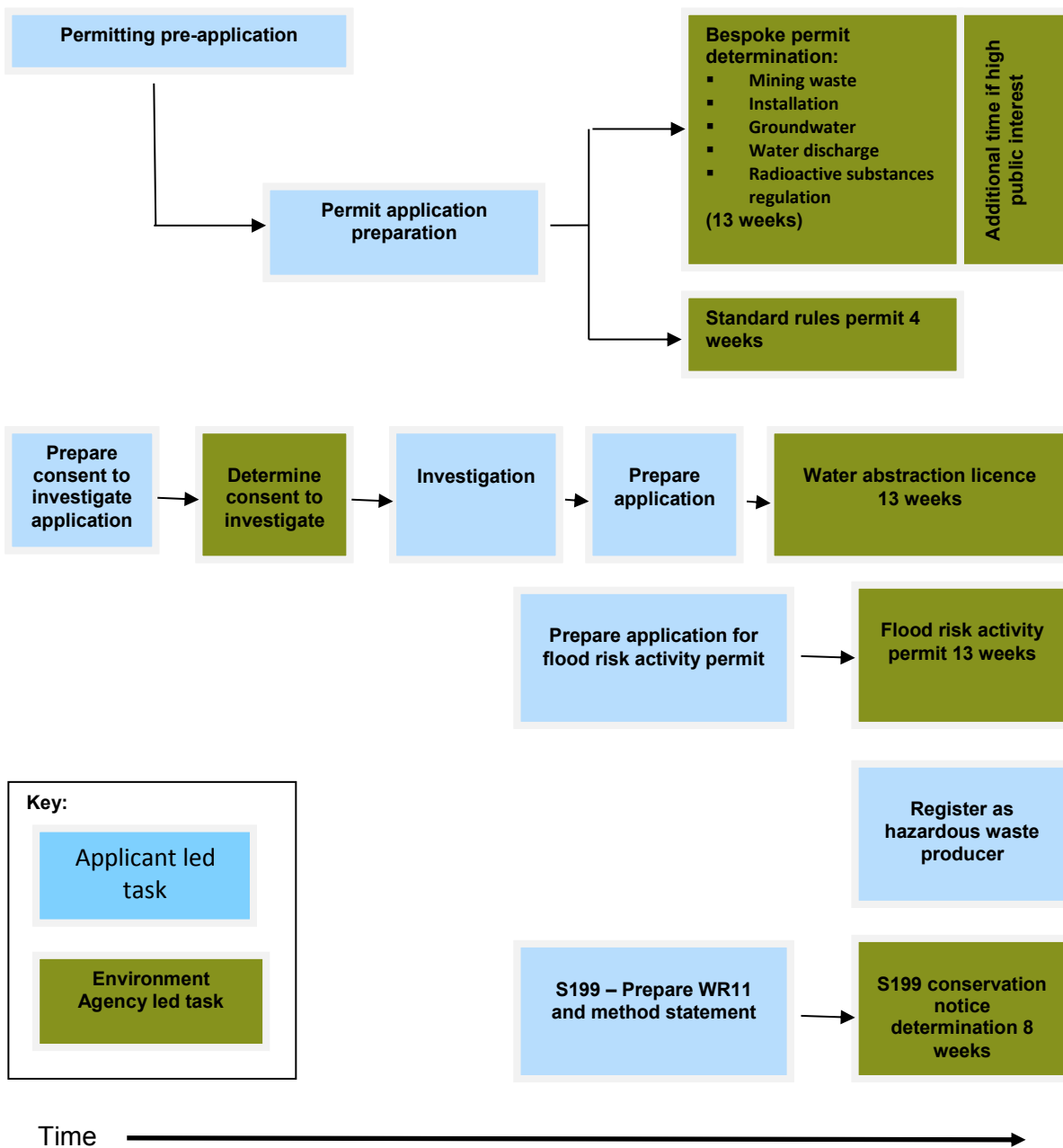
## Applying for bespoke permits

In cases where bespoke permit applications are made for all activities on site we will seek agreement for the applications to be determined concurrently, and if we decide to grant the applications, we will issue any permits at the same time. We will consult on all the bespoke applications at the same time and when necessary undertake any “[minded to](#)” consultations together.

Even when bespoke permit applications are submitted together, the processes can get out of step due to the duly making assessments or requesting information during determination. Where this happens we would also seek agreement from operators for the applications to be determined at the same time, including the timing of any consultations.

Figure 1 below presents the approximate timings of the permits that may be applied for.

Figure 1 Timetable for bespoke and standard rules permit applications.



## Combining standard rules and bespoke permits

Where an operator wishes to apply for both standard rules and bespoke permits for a single site we will encourage a staged approach so that operators apply for permits in the order in which the on-site activities may take place. Bespoke applications, that require consultation, should be applied for earlier than standard rules permits because we determine applications for standard rules permits more quickly. Standard rules permits should be applied for towards the end of the determination of applications for any bespoke permits: for example for High Public Interest applications when we have come to a 'minded to' decision, or for other applications when we have completed consultation. This is presented in figure 1.

## Defining your regulated facility and installation

All onshore oil and gas sites will involve activities that require permitting as a regulated facility. We have produced guidance defining a regulated facility - [RGN 2: Understanding the meaning of regulated facility](#). Where individual regulated facilities are located at a distance from one another, or managed by different operators, it is clear that they will be regulated under separate permits.

Where regulated facilities are located close together, appear to have a very clear connection and are managed by the same operator, we will need to assess whether they should be regulated under one permit.

Before we can regulate two or more locations under a single permit we need to be sure that if looked at objectively it would be concluded that they represent a single site. The [Defra core guidance](#) identifies three relevant considerations:

- proximity
- coherence
- integrated management system

If you can satisfy us that you meet the requirements for all three considerations, it is likely that your activities can be considered to be on the same overall site and it may be appropriate for them to be regulated under one environmental permit. We will assess whether a single permit is applicable based on the following questions and on a case by case basis:

Question	Qualifier
<b>1. Are the locations in proximity to one another?</b>	Proximity is not defined as a specific horizontal distance, which means we will assess this on a site-specific basis.
<b>2. Do the locations demonstrate coherence?</b>  <b>a) Does the same operator manage at all locations?</b>  <b>b) Is there a clear and logical interconnection between each location?</b>	All locations must be under the control of the same operator for a single permit to apply.  Justification that locations are connected is necessary to support a single site approach.  This may be infrastructure related (such as a bespoke haul road or pipeline), or can be a location that is dependent upon other(s) for routine function and operational integrity. In practice it is likely that there will be clear benefits for environmental protection and regulatory efficiency before multiple locations are considered to represent one site.
<b>3. Are the locations dependant on the same integrated management plan?</b>	There must be an integrated management plan that covers all locations so that it is clear they represent a single site.

For onshore oil and gas operations 'the site', referred to in the application form and detailed in the waste management plan, will be the land occupied at the surface (as delineated on the site plan) as it is from here that operators have control over potential environmental impacts. Where there are proposals to undertake high volume hydraulic fracturing (i.e. 'associated hydraulic fracturing'), as defined in the section 4B (1) Petroleum Act 1998 (as amended by Infrastructure Act 2015), the permit must include a site plan showing the proposed extent of the below ground extractive waste facility to be created by each hydraulically fractured well. The facility will also be limited by description to particular geological formations and the geographical extent of this area will be referred to in the permit.

## Screening for protected areas

Operators applying for environmental permits are required to consider the effect that their activity may have on protected sites, habitats and species. To help customers meet this requirement the Environment Agency provides a screening service relevant to the proposed activity. The screening will identify if there are any sites of heritage and nature conservation, or protected species and habitats relevant to your proposed activity. Where these are identified the Environment Agency may need to consult with other bodies such as Natural England.

For further information visit [GOV.UK](https://www.gov.uk).

## How the Environment Agency will determine your application

The Environment Agency will check your application and if you have provided all the information required we will call it 'duly made'. If you have not considered this guidance and not followed our pre-application advice then we may return your application as 'not duly made'. In that event you would have to re-apply.

If you have applied for a bespoke permit we will consult the public on your application. This includes:

- putting details of the application on our website and the public register
- consulting and considering the comments we receive from the public that are relevant to the permit determination
- liaising with other statutory agencies, including the local Mineral Planning Authority, Public Health England, Health and Safety Executive, Natural England and Water Companies

We aim to determine permit applications within 13 weeks but high public interest applications will take longer (see below). We publish our final decisions on applications on the public register.

## Sites of high public interest

We have a position that where a site is deemed to be of [high public interest](#), we will enhance our public consultation process.

It is highly likely that if your operation involves high volume hydraulic fracturing, we will treat your application as a site of high public interest, and you should plan accordingly. Sites of high public interest can take between 4-6 months to determine, depending on the quality of the application and the extent to which the operator has engaged the local community prior to making an application.

We may:

- tailor the consultation to local circumstances
- extend the time allowed for public consultation on the permit application
- advertise the application more widely or hold drop-in sessions
- where, in principle, we decide to grant a permit, conduct a second public consultation on our draft decision (known as a 'minded to' consultation)

For more information on how we consult the public, refer to our [public participation statement](#).

## Managing mining waste

The Extractive Waste Directive (2006/21/EC), more commonly referred to as the [Mining Waste Directive \(MWD\)](#) is implemented through Environmental Permitting (England and Wales) Regulations 2010 (EPR). Under [Schedule 20](#) to EPR a permit is required for a "mining waste operation" which is defined as the management of extractive waste whether or not that involves a waste facility.

## Extractive waste

Extractive waste, more commonly referred to as mining waste is waste directly resulting from land based prospecting, extraction, treatment and storage of mineral resources.

The MWD relies on the definition of “waste” set out in Article 3(1) of the Waste Framework Directive 2008/98/EC. The definition is; ‘waste shall mean any substance or object which the holder discards or intends or is required to discard’. Further information including the legal definition of waste is available at [here](#).

Waste that is not directly generated by the prospecting, extraction, treatment and storage of mineral resources is not extractive waste and will remain regulated by the Waste Framework Directive. See paragraphs 3.16 to 3.18 of Defra’s core guidance [here](#).

The term “management” in this context has a wide meaning and also includes the prevention and minimisation of waste, in addition to how actual wastes arising are dealt with. The legislation requires that extractive waste is managed in a way that minimises the risk of harm to the environment and human health.

The requirement to prevent and minimise extractive waste will include re-use of materials or substances where reasonably practicable.

## When you will need a permit to manage extractive waste

Every onshore oil and gas operation will require a permit for the management of extractive waste. You will need to apply for a mining waste permit to manage any extractive waste that your activities generate during construction, operation and decommissioning of sites, including where wastes are prevented or minimised. The actual injection or reinjection of produced water may not require a mining waste permit, however the overall management of waste produced waters will need to be authorised by such a permit.

The oil and gas activities that produce extractive waste include, but are not limited to:

- drilling boreholes or laterals to access the resource formation
- well completions
- well workovers
- well bore treatment including acid wash to remove formation binding
- formation testing activities such as leak off tests
- well stimulation including hydraulic fracturing
- production of oil and gas to the surface
- suspension or decommissioning of a well
- well abandonment

The extractive wastes generated by these activities include, but are not limited to:

- drilling muds
- drill cuttings
- waste cement
- well completion fluids
- flowback fluid mixed with formation minerals and salts
- produced and formation waters
- proppants such as sand removed from flowback fluid
- waste suspension and spacer fluids
- any condensates that are discarded
- testing or well stimulation fluids
- waste gases, including fugitive emissions



Where waste gases, including methane, are produced which will be disposed of by a flare with a capacity (limited by condition, where necessary) to below 10 tonnes per day, these will be managed through a mining waste permit. Where the flare has a capacity rated above 10 tonnes a day this would also require a permit under the Industrial Emissions Directive (IED). For more details please refer to the [installation section](#) of this guidance.

## Extractive waste permit options

### Standard Rules

The Environment Agency has produced a suite of standard rules permits, a generic risk assessment and a standard waste management plan to cover a range of activities including:

[SR2015 No 1 The management of extractive waste, not including a waste facility, generated from onshore oil and gas prospecting activities including drilling, coring, leak off testing \(LOT\), acid wash and decommissioning](#)

[SR2014 No 2 The management of waste, not including a waste facility, generated from onshore oil and gas prospecting activities without well stimulation \(using water and / or oil based drilling mud\)](#)

All of the criteria, conditions, techniques of the standard waste management plan and parameters of the generic risk assessment of a set of standard rules, relevant to the activity must be met for these to apply. Where this is not the case a bespoke permit would be required. The standard rule sets are kept under regular review.

### Bespoke Permits

If your activities are not contained in a standard rules permit, or if you cannot adhere to the conditions in the standard rules permit, you will need to apply for a bespoke permit.

We recommend that early in your project you make contact with the Environment Agency to discuss your proposals and seek pre-application advice, as it will be necessary to consider:

- how you will minimise the waste generated and its harmfulness
- how you will manage extractive wastes, including any possible waste facility
- your method of extraction
- whether you will treat the mineral resources
- how you will classify your wastes
- how you will dispose of your wastes

You will also need a bespoke permit if your site includes a '[waste facility](#)', which is an area designated for the accumulation or deposit of extractive waste. This is because a mining waste facility requires additional controls and requirements that are not covered in the standard rules permits.

### Mining waste operations not involving a waste facility

We expect that in most cases the oil and gas site will manage extractive waste and will therefore involve a mining waste operation. A permit for a mining waste operation ensures that all extractive wastes are managed on site properly. The operator will be required to produce a [waste management plan](#) to cover these activities, which will need to accompany the permit application. A waste management plan will have to be approved by us. We will consider whether to approve the plan as part of the permit determination. If a permit is granted, any changes to the plan will also have to be approved by us.

Where solid non-hazardous waste is stored temporarily, and only as part of collection and transportation from site, then this will not amount to a waste facility – in other words, it is not an area designated for the accumulation or deposit of waste because it is only temporary. For example, collection of waste in skips which are removed from site as soon as practicable.



## Mining waste operations involving a waste facility

In addition, in managing extractive waste some oil and gas sites may require permits that also cover the deposit or accumulation of extractive waste in a waste facility. The definition of a waste facility is based on there being an area designated for the accumulation or deposit of waste subject to certain timescales, depending on the nature and source of the waste. In these circumstances, and in addition to a permit for a mining waste operation, additional requirements will apply. One of these will be the requirement to identify where hydraulic fracturing fluid will be left underground. Please also see [Sub Surface Information Plan](#) for more details.

We expect a number of different types of activity to fall under this category of permit, including but not limited to:

- liquid or solid hazardous extractive wastes stored, even if temporarily, other than only as part of collection and transportation from site. This may be the case if waste is stored in containers that remain on site once they are filled
- where materials are being injected into the formation, such as hydraulic fracturing fluid, any material that remains in the formation will become waste when it no longer serves a useful purpose. Where waste remains in the formation and is not returned to the surface, the area in which the material is retained will amount to a waste facility. Where the injection of produced water is allowed (see section [re-injection and re-use](#)), this is regulated under Directive 2000/60/EC the Water Framework Directive and will not amount to a waste facility.

Where the proposed activities include a waste facility, the waste management plan must include an assessment of whether the proposed facility will be classified as Category A or not (see section [below](#)).

## Waste management plan

Any bespoke permit application must be accompanied by a waste management plan.

There must be enough information in the waste management plan to allow us to evaluate your ability to meet the objectives of the regulations. We must ensure you take the necessary measures to prevent, or reduce as far as possible, the waste generated and any adverse effects on the environment and human health brought about by the management of extractive waste.

It's important to note that by issuing you a permit we are approving your waste management plan and the plan becomes a material part of your permit. As such, you are bound by what you write in the plan and must not deviate from it without first seeking prior authorisation from the Environment Agency. Failure to do so could lead to enforcement action. Depending on the nature and extent by which you wish to amend your waste management plan, a permit variation may be required.

The waste management plan must be phrased in clear and certain terms so that we can be both satisfied it contains the correct measures and so there is no ambiguity in your plans. You may refer to standards provided by other relevant legislation but we will need to be satisfied that the standards meet the objectives of the legislation.

During pre-application discussions, you should agree with us the detail of the specific requirements, such as whether a groundwater activity will be part of the extractive waste operation or whether air dispersion modelling is required. The Plan should provide full details of the following:

- how you will meet the objective of preventing or reducing the waste generated and the harmfulness of any waste generated, and in particular you must demonstrate how you have done so by consideration of the matters stipulated in Article 5 (2) of the MWD
- where applicable, the proposed classification for the waste facility in accordance with the criteria laid down in Annex III
- where a Category A waste facility is required, a document demonstrating that a major-accident prevention policy, a safety management system for implementing it and an internal emergency plan will be put into effect in accordance with Article 6(3) (see also section [below](#) for additional guidance)
- when the operator considers that a Category A waste facility is not required, sufficient information justifying this, including an identification of possible accident hazards

- waste characterisation in accordance with Annex II and a statement of the estimated total quantities of extractive waste to be produced during the operational phase. The wastes should be characterised in accordance with the [European Waste Catalogue – List of wastes](#) (see also section [below](#))
- a description of the operation generating such waste and of any subsequent treatment to which it is subject
- a description of how the environment and human health may be adversely affected by the deposit of such waste and the preventive measures to be taken in order to minimise environmental impact during operation and after closure, including the location, construction, management, and eventual rehabilitation of the waste facility
- the proposed control and monitoring procedures pursuant to excavation voids, when applicable, and regular monitoring and inspection
- measures for the prevention of deterioration of water bodies status in accordance with the Water Framework Directive (2000/60/EC) and for the prevention or minimisation of air and soil pollution
- a survey of the condition of the land to be affected by a waste facility
- how you will meet the objective of encouraging the recovery of extractive waste by means of recycling, re-use or reclamation of waste materials or materials which could potentially become waste
- how you will meet the objective of ensuring short and long term safe disposal of extractive waste. This should include the design of any waste facility, taking into account the matters specified in Article 5 (2) of the MWD
- how you will manage waste gases, including details of any waste incineration / flaring activities. This should include an estimate of the amount of gas you expect to flare, including for maintenance and as a result of predictable safety measures. We do not expect you to include waste gas that would arise from an unforeseen and or unplanned events (see also the [installations](#) section on how we will regulate flaring)
- the proposed plan for closure, including rehabilitation, after-closure procedures and monitoring

## Extractive waste and waste classifications

Waste is defined in Article 3(1) of the Mining Waste Directive in the same terms as Article 3(1) of the Waste Framework Directive 2008/98/EC. The definition is; ‘waste shall mean any substance or object in the categories set out in Annex I which the holder discards or intends or is required to discard’. The wastes are defined in Article 3 of the Mining Waste Directive as inert, non-hazardous or hazardous.

### Classification of waste

The Waste Framework Directive (2008/98/EC) (WFD) sets out what waste is and how it should be managed. The classification of waste is determined by the List of Wastes Decision (2000/532/EC). The List of Wastes decision identifies how to classify a waste, and to identify if it is a hazardous waste.

The technical guidance document [‘Waste Classification – Guidance on the classification and assessment of waste \(1st edition 2015\) Technical Guidance WM3’](#) provides a common technical basis for applying the definition of hazardous waste in the UK.

Wastes that contain Naturally Occurring Radioactive Material (NORM) above the out of scope values are classified as Radioactive Waste and are not within the scope of the Waste Framework Directive (2008/98/EC).

### Inert waste

The term ‘Inert waste’ is not part of the waste classification; however it forms an important part of the waste description. It is defined as waste that does not undergo any significant physical, chemical or biological transformations. Inert waste will not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact in a

way likely to give rise to environmental pollution or harm human health. The total leachability and pollutant content of the waste and the ecotoxicity of the leachate must be insignificant, and in particular not endanger the quality of surface water and/or groundwater.

### Waste water based drilling muds and related wastes

Waste water based drilling muds are classified on the basis of their type and composition as follows:

Code Description	Waste Code	Note
<b>Drilling muds and other drilling wastes containing hazardous substances</b>	01 05 06*	These are water based drilling fluids weighted with barite
<b>Barite-containing drilling muds and wastes other than those mentioned in 01 05 05 and 01 05 06.</b>	01 05 07	
<b>Drilling muds and other drilling wastes containing hazardous substances</b>	01 05 06*	Water based drilling fluids containing significant levels of chlorides (such as salt-saturated and potassium chloride drilling fluids)
<b>Chloride-containing drilling muds and wastes other than those mentioned in 01 05 05 and 01 05 06.</b>	01 05 08	
<b>Fresh water drilling muds and wastes applies to water-based mud/fluids.</b>	01 05 04	Fresh water based drilling muds (not weighted with barite or containing chlorides)

Note: Barite and chloride containing drillings muds and wastes are potentially hazardous waste. The composition of wastes must be assessed to determine if the waste displays a hazardous property (or contains persistent organic pollutants) before a classification can be assigned. If the waste displays a hazardous property (or contains persistent organic pollutants), then 01 05 06\* must be assigned as the classification. Further information on how to assess your waste can be found in [Technical Guidance WM3](#).

### Processed drill cuttings, acid wash returns, spacer and suspension fluid contaminated with water based muds

The classification for drilling muds given above includes 'drilling muds and wastes'. This means that it includes some other directly related wastes arising from the drilling activity, specifically:

- processed drill cuttings
- acid wash returns, and
- spacer and suspension fluid

These wastes will typically be contaminated with the drilling fluid used, and are classified using the code(s) given above for that type of 'drilling mud and waste'. This means that those used with barite or chloride contaminated drilling muds are potentially hazardous waste and must be assessed for hazardous properties (and persistent organic pollutants) before a classification code can be assigned.

Before being transported off-site drill cuttings will be screened on-site as part of the drilling operation to reduce the surface contamination by water based drilling muds and fluids.

Hydrochloric acid solutions (15%) are used during the acid wash process and in volumes which ensure they are neutralised within the formation. The back circulated flush fluid will also contain rock particles and drilling muds.

## Cement

Code Description	Waste Code	Note
<b>Concrete</b>	17 01 01	Set, mixed cement, leftover from drilling operations will fall within this classification.
<b>Mixtures of, or separate fractions of concrete, bricks, tiles and ceramics containing hazardous substances.</b>	17 01 06*	In the unusual event that the cement becomes contaminated with hazardous substances, the waste will fall within this classification.

The cement is a potentially hazardous waste and its composition would need to be assessed to identify if it displays any hazardous properties (or contains persistent organic pollutants).

## Flowback fluid

Code Description	Waste Code	Note
<b>Waste from mineral non-metalliferous excavation</b>	01 01 02	Flowback fluid from hydraulic fracturing activities.

## Pipe scale

Code Description	Waste Code	Note
<b>Drilling muds and other drilling wastes containing hazardous substances</b>	01 05 06*	We fully expect pipe scale to exceed the out of scope values for NORM and to be classified as Radioactive Waste. However, in the very unlikely event that NORM is not present this will be the classification.

## Waste oil based drilling muds and related wastes

Code Description	Waste Code	Note
<b>Oil-containing drilling muds and wastes</b>	01 05 05*	Oil based drilling muds that will be returned to the supplier will not be waste. If any oil based muds are lost to the formation or spoiled they will be waste and fall within this classification.

This entry is an absolute hazardous waste so will always be hazardous.

As it is never the intention to lose oil based drilling muds in the process of drilling, any losses will be treated as a fugitive emission. We would expect operators to take immediate remedial action to stop the losses and report any emissions in writing to the Environment Agency, giving details of the quantities of oil based mud lost, where in the geological sequence they were lost and how the losses were controlled.

## Processed drill cuttings, acid wash returns, spacer and suspension fluid contaminated with oil based muds

Code Description	Waste Code	Note
<b>Oil-containing drilling muds and wastes</b>	01 05 05*	These wastes will typically be contaminated with the oil based drilling fluid used, and are classified using the code(s) given above for that type of 'drilling mud and waste'. This means that those used with oil based drilling muds are similarly

		hazardous waste and fall within this classification.
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Drill cuttings will be screened on site as part of the drilling operation to reduce the surface contamination by oil based drilling muds and fluids and to reduce the amount of waste generated. The processed drill cutting will be classified as hazardous waste and categorised as above.

## Hydrocarbons

Code Description	Waste Code	Note
<b>Gases in pressure containers (including halons) containing dangerous substances.</b>	16 05 04*	Natural Gas, should it arise, will display one of the hazardous properties listed in Annex III of the revised Waste Framework Directive and is therefore defined as hazardous waste by H3A, fourth indent (“Highly flammable”: gaseous substances and preparations which are flammable in air at normal pressure”).
<b>Oil-containing drilling mud and wastes. This entry is an absolute hazardous waste so will always be hazardous</b>	01 05 05*	If oil is encountered it will also display one of the hazardous properties listed in Annex III and when mixed with drilling muds and cuttings will fall within this classification.

## Derived Oil

Code Description	Waste Code	Note
<b>Oil spills</b>	13 08 99	An accidental oil spill on site – crude oil that is pumped to the surface as a product is spilt and becomes waste when the site is cleaned up.
<b>Solids from grit chambers and oil/water separators</b>	13 05 01	Grit collected in the 3-phase separator that has been in contact with crude oil.
<b>Oil from oil/water separators</b>	13 05 06	Waste crude oil from oil / water separators (e.g. very small quantity of oil produced along with gas) not economically worth treating as a product.
<b>Oily water from oil/water separators</b>	13 05 07	Waste oily water from oil/water separators (e.g. water that is not going to be used in the process of re-injection).

Where unwanted residues, including grit, oily sludge and condensates arise on an ongoing basis within on-site machinery (e.g. phase separators), these residues are considered waste at the point of separation. If the waste residues are removed from the machinery at regular servicing intervals the machinery will not be a waste facility provided that:

- a mining waste permit (mining waste operation) includes a Waste Management Plan that reflects the situation described above, and;

- the Waste Management Plan addresses the requirements in the Mining Waste Directive for waste prevention and minimisation
- servicing intervals will be appropriate for the specification of the machinery and will achieve Best Available Techniques (BAT)

## Financial provision

If you manage hazardous waste using a waste facility or deposit non-hazardous waste in a Category A facility you are required to provide a financial guarantee. This financial provision is to ensure funds are available to meet the obligations of the permit and to rehabilitate the site in the event that this ever became necessary.

Where financial provision is required it will be limited to ensuring compliance with the permit conditions and rehabilitation of land relating to the waste facility; it will not relate to the wider management of extractive waste. Financial guarantees should be discussed at pre-application and, if required, will need to be in place before any permit is issued.

## Category 'A' waste facility

The Mining Waste Directive requires that the amount of extractive waste generated and risk posed is minimised. If a mining waste facility falls within the definition of a Category A facility specific and additional regulation will apply. Based on our current knowledge, we would normally expect the onshore oil and gas sector to design their waste management arrangements so that any waste facility would not fall to be classified as Category A.

Article 9 of [Directive 2006/21/EC](#) requires that waste facilities are classified as Category A in accordance with the criteria set out in Annex III. [Commission Decision 2009/337/EC](#) expands on Annex III and provides further information on the assessment process. Guidance has been provided in the [Defra Environmental Permitting Guidance: The mining waste directive](#).

- where the management of extractive waste involves a waste facility which you do not consider to be a Category A facility, you will need to provide an assessment against the Annex III criteria
- you will need to carry out a risk assessment to assess the potential risk to cause a major accident posed by the failure or incorrect operation of the extractive waste facility

In relation to waste in containers, a waste facility would not be classified as Category A simply due to the fact that the waste stored is classified as hazardous, if at the end of planned period of operation, the area that such waste is stored in contains no hazardous waste. Where the activities involve a waste facility for hazardous waste, we would expect any such waste to be stored for no longer than is reasonably practicable and to be removed from site before the end of the planned period of operation. If that is not the case, then you will have to demonstrate why you consider that it does not fall within the Category A criteria.

More information on Category A classification of mining waste facilities is contained in: [How to comply with your environmental permit \(EPR 6.14\). Additional guidance for mining waste operations](#)

## BAT for managing extractive waste

The techniques used for any particular drilling operation will likely comprise a mixture of technologies and management methods. Below is provided specific guidance on indicative BAT for the management of extractive waste:

### Planning and Design

Good planning of sites can allow easier handling and management of drilling arising's and help ensure that waste handling is in accordance with the permit and WMP. The following measures are considered indicative BAT during the planning and design stage:

- assess the wastes that will be generated on the site prior to operations commencing; i.e. at initial planning stage
- apply the waste hierarchy to all wastes; this means that the onsite activities will be conducted so as to prevent waste generation wherever practicable, and appropriate measures will be



taken to reduce the quantities generated in all other cases. Consideration should be given to all possible reuse or recycling of any material

- optimise the well construction to reduce the amount of drilling mud required and the drill cuttings produced, whilst maintaining a design with satisfactory well control and integrity
- evaluate whether any solid wastes with elevated concentrations of naturally occurring radioactive substances are expected to be generated; and if so develop specific plans for identifying and managing this material in accordance with the [RSR section](#) of this guidance

## **Fluid Selection and Management**

The following measures are considered indicative BAT with respect to drilling fluid management:

- drilling muds should be designed in a manner which minimises losses of mud and gains in fluid, taking into account the filter cake design, inclusion of non-hazardous lost-circulation materials, and appropriate mud weights
- following completion of drilling each well, oil-based mud should be displaced from the well and all recovered mud should be returned to the supplier. Oil-based mud returned to the supplier will not be considered a waste
- oil based drilling mud should be used in a closed loop system, with mud passing through the solids control equipment and recirculated in the well
- partially closed loop systems, which allow continuous fluid level management, should be used for water-based mud. Spent water-based mud which is no longer suitable for use will be extractive waste
- the mud management system should be monitored to assess for any losses or gains
- mud pit volume totaliser should be used to identify loss of drilling mud to the formation or fluid gains

## **Well Pad Construction**

The following measures are considered indicative BAT with respect to extractive waste and the construction of the well pad and associated surface infrastructure:

- constructed well cellars should be water tight and provide control of any well head spills
- a blow out preventer should be tested, installed and operated on the well which conforms to (American Petroleum Institute) API Standard 53 (API, 2012)
- well cellar integrity should be checked before commencing drilling
- all casings and tubing should be tested to the appropriate API Series 5 (tubular goods) standards or specifications and be appropriate to the pressures and conditions under which they are to be deployed
- anything that penetrates the well pad or lining systems, such as a rat hole, will need to be watertight to prevent losses of site surface water or well head spills entering the underlying land and groundwater

## **Drill Cuttings Management – general management**

The following measures are considered indicative BAT with respect to management of drill cuttings:

- drill cuttings should be separated from the drilling mud, as far as reasonably practicable, at the surface using suitable solids control equipment
- the solids control equipment should include a mechanical separator, for example a shaker (or equivalent) suitable for separating the drill cuttings from drilling fluid
- the solids control system should use mud cleaners (de-sanders and de-silters) and centrifuges to further remove finer fraction cuttings from the drilling fluid
- drill cuttings should be collected and transferred into skips or temporary containers designated for either oil-based cuttings or water-based cuttings and separate from any spent drilling muds pending collection. Cuttings derived from the use of water-based mud should be segregated

from cuttings derived from oil-based mud, with separate temporary containers or skips for each type

- drill cutting skips or temporary containers should be covered to prevent the ingress of water
- the waste cuttings should be individually characterised and removed from site as soon as reasonably practicable by an authorised waste contractor to an appropriately permitted waste management facility
- drill cuttings that are hazardous waste should not be mixed with non-hazardous waste and there should be continuous supervision of the cuttings skips when active mud management is in operation
- on-site secondary treatment of cuttings to dewater or reduce the hydrocarbon concentration/remaining on cuttings (ROC) may be employed subject to site-specific cost-benefit analysis. On-site secondary treatment may include (but may not be limited to): cuttings dryers; and/or thermal desorption. The use of on-site secondary treatment can be considered as part of the Environmental Permit application and relevant sector-specific BAT (e.g. thermal desorption) for the treatment type proposed should be applied

### **Management of Spacer Fluids, Suspension Fluids, Kill Fluids, Workover Fluids and Completion Fluids and Interfacial Mixtures/Slops**

The following measures are considered indicative BAT with respect to management of spacer, suspension fluids:

- all substances used should have a Material Safety Data Sheet (MSDS) available on site
- chemical storage areas should be clearly marked and bunded in accordance with the standards of CIRIA C736 (CIRIA 2014)
- chemicals should not be stored on site no longer than operationally necessary

### **Cement**

The following measures are considered indicative BAT with respect to management of waste cement:

- sufficient cement should be pumped to seal off the formations when installing casing and during well abandonment. Calculations should be made to estimate the amount of cement required and the volumes measured to reduce the amount of cement waste generated by excess
- if returning cement cannot be reused on site, any excess cement should be stored as concrete in temporary lined skips prior to being removed from site as soon as reasonably practicable by an authorised waste carrier to an authorised waste management facility

### **Hydrocarbons**

The following measures are considered indicative BAT with respect to management of waste hydrocarbons:

- waste oil should be separated from other wastes to a tank in a bunded area. Tanks and bunds should be subject to regular maintenance inspections
- emergency spill response equipment, expertise and procedures should be located on site
- waste oil should be taken offsite for oil recycling at a permitted facility
- waste gases which are incinerated or flared must be managed in line with this guidance (see [installations](#) section)

### **Proppants**

The following measures are considered indicative BAT with respect to management of waste proppant:

- on site returned proppant should be separated into an enclosed sand bin located on the site well pad membrane
- opportunities for re-use or recycling should be considered if reasonably practicable



- remove spent proppant offsite for recycling or disposal at a permitted facility

## Spill Control

The following measures are considered indicative BAT with respect to spill control:

- an impermeable membrane should be installed across all areas of the site (as determined using a risk-based approach) before the start of any drilling operations, using appropriate construction quality assurance standards for the materials being installed. Attention should be paid to ensure the continued integrity of seals in all areas, particularly areas that are trafficked, used for the temporary storage of extractive wastes or where structures are built. All areas for the temporary storage of extractive wastes should be constructed in accordance with CIRIA C736 (CIRIA, 2014)
- the modelled lifespan of the impermeable membrane should comfortably exceed the anticipated life of the well site
- all on-site storage tanks should be bunded
- the operator should have a spill management plan which ensures that any material spilled on site will be contained and removed such that this minimises the potential for environmental harm
- all site personnel supervising, loading or transferring wastes on site should be trained to use spill kits which will be available at all times in all areas where extractive wastes are transferred or temporarily stored
- the pipework and the associated storage tanks of the drilling mud system should be inspected daily for leaks and damage. Where leaks or damage are identified the equipment should be immediately repaired or taken out of service. Any spills should be cleaned up and recorded
- all equipment used on site for the movement of fluid materials should have spill kits available and be operated by or supervised by staff trained in the use of the spill kit
- details of all uncontained spills or breaches of containment should be notified to the Environment Agency in accordance with the permit requirements. In the event that the operation of the activities gives rise to an incident or accident which significantly affects or may significantly affect the environment, the operator must immediately:
  - inform the Environment Agency
  - take the measures necessary to limit the environmental consequences of such an incident or accident
  - take the measures necessary to prevent further possible incidents or accidents

## Waste Removal

The following measures are considered indicative BAT with respect to removal of extractive waste from the site:

- subject to a risk-based approach, consignments of waste should be sampled and characterised prior to despatch and a reference sample retained
- records should be maintained of the quantities of drill cuttings and their characterisation and these records retained for at least two years
- records of all waste transfers should be retained by the operator for a minimum of 2 years and made available for inspection by the Environment Agency on request

## Permit compliance and the management of extractive waste

Refer to [EPR 6.14 How to comply with your environmental permit: additional guidance for mining waste operations](#) for information on the meaning and requirements of your permit conditions. If you are unsure about compliance, you can seek additional guidance from the Environment Agency.

# Radioactive Substances Activities

Producers of oil and gas must protect members of the public and the environment from the impacts of ionising radiation from the management and disposal of radioactive waste containing naturally occurring radioactive material (NORM). In doing so they must adhere to Schedule 23 to the Environmental Permitting (England and Wales) Regulations 2010.

## When you will need an environmental permit

You will need an environmental permit from the Environment Agency to accumulate, dispose of or receive radioactive waste that arises from the production of oil and gas, unless an exemption applies. Our starting point is that you will require a radioactive substances activity permit if you are flowing (producing) oil or gas.

This will apply to you if:

- your operations cause the natural or stimulated flow of oil or gas. This is what we consider 'production' to mean for the purposes of radioactive substances regulation (RSR). You can expect to produce oil and gas where you provide facilities to handle and store oil and gas at the wellhead, or to combust, flare or vent gas, and
- you produce wastes during production which have a NORM content above the 'out of scope' levels specified in the regulations. Refer to Table 1 for examples. You will need to consider all of the NORM radionuclides that are present. You should refer to the [Guidance on the scope of and exemptions from the radioactive substances legislation in the UK](#)

**Table 1: Concentrations of NORM below which wastes are not radioactive waste ('out of scope' values)**

Radionuclide	Solid (Bq*/g)	Aqueous Liquid (Bq*/l)	Gaseous (Bq*/m3)
<b>Ra-226+</b>	0.5	1	0.01
<b>Pb-210+</b>	5	0.1	0.01
<b>Po-210</b>	5	0.1	0.01
<b>Ac-227+</b>	1	0.1	0.001
<b>Th-232sec</b>	0.5	0.1	0.001
<b>Th-232</b>	5	10	0.001
<b>Ra-228+</b>	1	0.1	0.01

**\*Becquerel (Bq) is the International System of Units (SI) unit of radioactivity**

Experience from the current oil and gas industry indicates that the concentrations of NORM activity in wastes will normally exceed these values. You must therefore obtain a radioactive substances permit before you begin producing oil and gas.

If you consider that your operation will not generate waste containing or contaminated with NORM above the 'out of scope' values, you should provide evidence of that at pre-application stage. It is an operator's responsibility to have the correct permits in place and if your operations result in wastes containing NORM radionuclides above these values you will be liable to enforcement action by us if you don't have the correct permit in place.

Radioactive wastes may be in the form of waste equipment such as pumps, process vessels or pipework, containing or contaminated with NORM; waste water, often referred to as 'produced water' or 'flowback fluid'; waste solids such as sands, sediments, scales and sludges removed from process vessels and waste gases containing NORM.

You will not need an environmental permit for the accumulation and disposal of:

- NORM contained in wastes generated before the production of oil and gas commences, such as drilling muds and drill cuttings, as these are out of scope of the regulations if this is the only wastes you are managing (i.e. if you are not intending to produce oil or gas)
- NORM contained in wastes that are below the 'out of scope' levels set out in Table 1
- NORM wastes covered by all the exemption conditions in the regulations, see for example the provisions relating to solid and NORM wastes in the [Guidance on the scope of and exemptions from the radioactive substances legislation in the UK](#)
- Radon, which is naturally present at low concentrations in all natural gas. However, the Environment Agency will take account of any radiological impact from exposures to radon associated with the accumulation and disposal of radioactive waste.

## Environmental permits for radioactive imaging

You will need an environmental permit if:

- you use wireline well logging equipment, containing radioactive sources. If you employ service companies to undertake this work then they must hold the necessary environmental permits
- you intend to use radioactive tracers to determine the extent of shale bed fracturing or similar environmental investigations. You should discuss this with the Environment Agency at the earliest possible opportunity. These permits are unusual and will need special consideration

## Radioactive substances permit options

Contact our [Permit Support Centre](#) to identify and speak to the Environment Agency radioactive substances officer for the relevant part of the country about your application early on, to identify issues and discuss which type of application and permit is best for you.

### Standard Rules

There are standard rules for the accumulation and disposal of radioactive waste from the production of oil and gas. If you can comply with all the requirements of these rules you should apply for a standard rules permit.

If you apply for a standard rules permit, you will need to confirm that you understand the rules and can comply with them, in particular that you will only accumulate and dispose of radioactive waste within the fixed conditions and limits set out in the standard rules.

Please note however our guidance on [permit options](#), which requests that if you are also applying for bespoke permits for other activities that you sequence your applications accordingly. We can give you further advice at the pre-application stage.

You can find the standard rules at <https://www.gov.uk/government/publications/sr2014-no-4-accumulation-and-disposal-of-radioactive-waste>.

If you cannot comply with all the requirements of the standard rules, you will need to apply for a bespoke permit.

### Bespoke Permit

If you apply for a bespoke permit, you'll need to:

1. Identify and quantify the types of radioactive waste you foresee producing and storing and how you propose to dispose of them. You should include:
  - any waste waters
  - any scale, sediments and contaminated equipment
  - residual NORM-contaminated well stimulation fluids remaining underground that no longer serve a useful purpose
  - NORM in any gas burnt or vented on site; on the basis that there may be some carryover of entrained liquids or solids containing NORM in the gas stream
2. Describe how you will use site specific best available techniques (BAT) to:

- minimise radioactive waste generation and disposals to the environment and reduce the radiological impact of disposals to a level that is as low as reasonably achievable [ALARA]
  - characterise, sort and segregate wastes to facilitate their disposal by transfer by optimised routes and provide those receiving the wastes with sufficient information to allow them to consider the acceptance or otherwise of the wastes
3. Set out how you will receive, accumulate and dispose of radioactive waste. You should assess how to dispose of radioactive wastes with regard to the requirements of the
    - [Policy for the Long Term Management of Solid Low Level Radioactive Waste](#)
    - [Strategy for the management of Naturally Occurring Radioactive Material \[NORM\] waste in the United Kingdom](#)
    - [UK Strategy for Radioactive Discharges](#)
  4. You should have a management plan for all current and future arisings of radioactive wastes that demonstrates you have:
    - considered all practicable options for their management and having regard to the various requirements in the policy and strategy, including that of the waste hierarchy
    - selected the optimised disposal route(s) for the disposal of radioactive waste, that is the route(s) which reduce the radiological impact to as low as reasonably achievable taking account of other considerations as set out in the relevant Government policies

An optimised disposal option for liquid radioactive wastes such as produced water is to inject these into deep underground strata, such as the original oil and gas bearing strata. This prevents the dispersal of radioactivity into the accessible environment, as would occur with other forms of treatment and disposal of the waste, and hence reduces the radiological impact to as low as reasonably achievable.

Refer to the guidance on [reinjection](#) for further information on the permits that you may require. The Environment Agency will only authorise this disposal under RSR where it is consistent with groundwater requirements.

Consider whether you can condition these wastes to re-use or recover them. Refer to the [Strategy for the management of Naturally Occurring Radioactive Material \[NORM\] waste in the United Kingdom](#) .

The Environment Agency will assess the acceptability of your proposals to condition for re-use or recovery on the following criteria:

- a legitimate use for the conditioned materials has been identified. There is demand for the conditioned material
  - public radiation exposure from use of the conditioned material should not differ significantly from the exposure that would result if the conditioned material was not used
  - overall the use of the conditioned material will result in less waste disposal or reduced use of other resources
5. Set out suitable management arrangements to comply with your permit, including having sufficient competent persons and resources.
  6. Assess the radiological impacts of proposed disposals of radioactive waste to the environment from the premises, for example to sewer or to controlled waters:
    - refer to the [Principles for the assessment of prospective public doses](#)
    - ask your local Environment Agency radioactive substances officer for our spreadsheet tool for assessing radiological impact
    - the Environment Agency will use the results of these assessments to determine whether to authorise discharges of radioactive waste

You 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. The impacts of disposals from the waste disposal operators were assessed when their permits were issued
  - any residual well stimulation fluid left underground or waste water arising from the production of oil and gas
7. Demonstrate that you have contractual arrangements for all the wastes you are proposing to transfer to waste disposal companies. This means any operators who can receive, treat and dispose of your radioactive waste. You do not need to specify which sites will receive the waste. You may make these arrangements directly with the waste disposal company, or employ an agent or broker to assist in making the arrangements. Whatever the form of the arrangements, you must be able to demonstrate the substantive requirement, that you have contractual arrangements allowing you to transfer your waste to an appropriately permitted waste disposal company.

## Permit compliance and the management of radioactive waste

Refer to [How to comply with your environmental permit for radioactive substances](#) for information on the meaning and requirements of your permit conditions. If you are unsure about compliance, you can seek additional guidance from the Environment Agency. We would like to emphasise that you must:

- consult a suitable Radioactive Waste Advisor (RWA) about how to comply with your permit. Consider securing that advice as soon as you begin to prepare your permit application
- provide fully contained transfer and storage systems for waste water. The Environment Agency will not accept storage of radioactive waste water in open surface lagoons. You should have contingency plans and equipment to minimise the spread and impact of any spills
- store waste waters for as short a time as is reasonably practicable and in any event no more than three months. You should empty storage tanks at least once every three months, even if not full, to comply with these requirements

## Other sources of useful information

Read the [guidance on radioactive substances regulation for non-nuclear sites](#).

# Operating an Installation

## When you will need an environmental permit

You will require an environmental permit to operate an installation if you undertake any of the activities specified in [Schedule 1 to the Environmental Permitting Regulations \(2010\)](#), including the following:

- incineration of hazardous waste in a plant with a capacity of greater than 10 tonnes per day. The Environment Agency considers a flare to be waste incineration plant
- storage and handling of crude oil, including gas condensate
- disposal of non-hazardous waste in a facility with a capacity of greater than 50 tonnes per day by chemical, biological or physical treatment, or disposal of more than 10 tonnes per day of hazardous waste. This includes effluent treatment plants that treat extractive wastes, such as produced water and flowback fluid and any other effluents produced and treated on site for disposal or destruction

## Standard Rules

A standard rule permit is available for the storage of up to 500 tonnes of crude oil with a hydrogen sulphide content of less than 10ppm. Above these limits a bespoke permit will be required. You

can find this standard rule permit at: [SR2015 No2 Storage and handling of crude oil arising from onshore oil and gas exploration and production activities](#).

## Bespoke Permit

If you cannot meet the requirements of the standard rules permit you will need to apply for a bespoke permit for your activity.

## Information you will need to submit with your application

When you apply for your permit, you will need to demonstrate how you will apply the best available techniques (BAT) in the way you design and operate your facility.

Once your facility is operational you will need to demonstrate to Environment Agency Officers, who inspect your facility, how you have applied the techniques described in your application.

Below is provided specific guidance on BAT for the design and operation of:

- [flaring systems](#)
- [storage and handling of crude oil](#)
- [effluent treatment](#) (including extractive wastes)

You will also need to demonstrate that the impact of your installation upon the environment is not significant. This should be done by producing an environmental risk assessment using our [H1 assessment tool](#).

## How we will permit flares at onshore oil and gas sites

All flares on onshore oil and gas sites are required to be regulated. To do this we will use different permitting mechanisms depending on the primary purpose of running your flare(s) and the rating of flare(s) and other combustion devices in operation at your site.

In order to determine how we will regulate your flare(s), you must ascertain what the primary purpose of the device is. This will fall into two categories – if at any time you are burning your gas as a waste, your device will be classified as a waste incinerator. If your device is only or primarily used as an emergency flare, used to burn gas for safety reasons or during maintenance works, we will consider it a 'safety' device.

In determining how to classify the primary purpose of your flare, the following guidelines should be followed:

- if your site is exploratory, and you are using a flare as a part of well testing (for either oil or gas), and the intention is to discard the gas, the primary purpose of the flare is waste incineration
- if your site is in production, where the objective is to capture the oil or gas as a commodity, and flaring is only used for maintenance or safety, the flares primary purpose will be classified as a safety device. Examples of using flare(s) for safety purposes include emergencies, over-pressure flaring, and maintenance (both scheduled and unscheduled)
- if your site is in production, and your flare is being used for dual purposes, that is, to burn waste gas (because oil is the primary commodity) as well as used as a safety device, we will consider the primary purpose of the flare to be a waste incinerator

Once it is clear whether your flare(s) are primarily performing a waste incineration or safety purpose, the relevant permitting mechanism can be determined in the flow charts in figure 2 and 3 below.

In addition you may also be required to apply for an EU ETS permit if the aggregated total of all combustion units on your site exceeds 20 megawatt thermal (MWth) input. For EU ETS, no distinction is made between the production and exploration phase because all flares (over the relevant thresholds) were intended to be captured by the EU ETS. When calculating the total for your site, a 3 MWth de-minimis applies to combustion units (i.e. units below 3 MWth input are not included). However, once you have exceeded the 20 MWth input limit, all combustion units



regardless of rating will need to be included in the EU ETS permit. Further information on EU ETS permits can be found [here](#).

### Permits for flare(s) performing a waste incineration role

If the aggregated total of all waste incineration flares exceed 10 tonnes/day you will need to comply with the requirements of the IED, whereas below this threshold you will only need to comply with the requirements of the MWD.

In both cases, we will require operators to follow our guidance on flaring systems below.

### Permits for flare(s) primarily performing a safety role

Flare(s) primarily performing a safety role will be permitted differently from waste incinerators.

If your site already includes an IED installation, then in general safety flare(s) will be regulated as a Directly Associated Activity (DAA) to the listed activity. This could, for example, be associated to a refining activity or the handling of crude oil. However, depending on the circumstances it may be appropriate to regulate a flare by incorporating a specific operating technique within the permit or by using the general management condition.

If your site does not include an IED activity, it will be regulated under the general management condition of your mining waste permit.

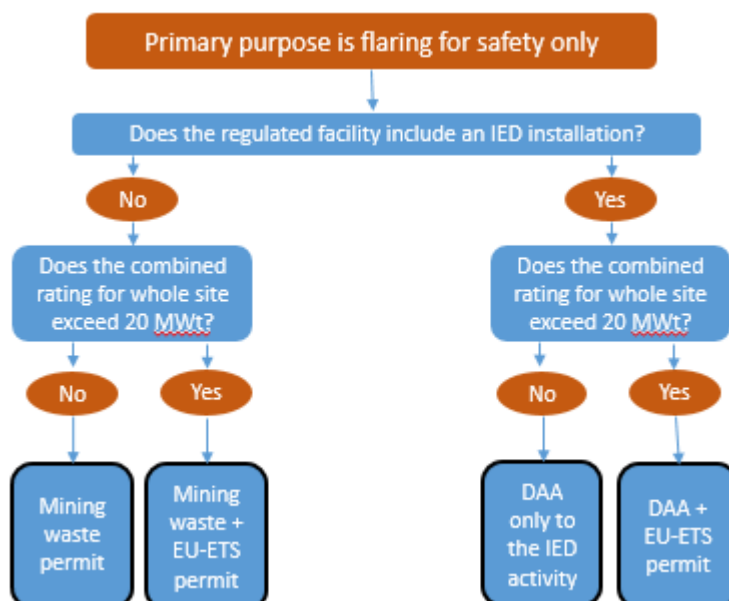
You may also be required to apply for an EU ETS permit if the aggregated rating of all combustion units on your site exceed 20 MWt input (see above).

We may accept elevated pipe flares as acceptable for use as a safety flare depending on site-specific circumstances and the justification made for their use.

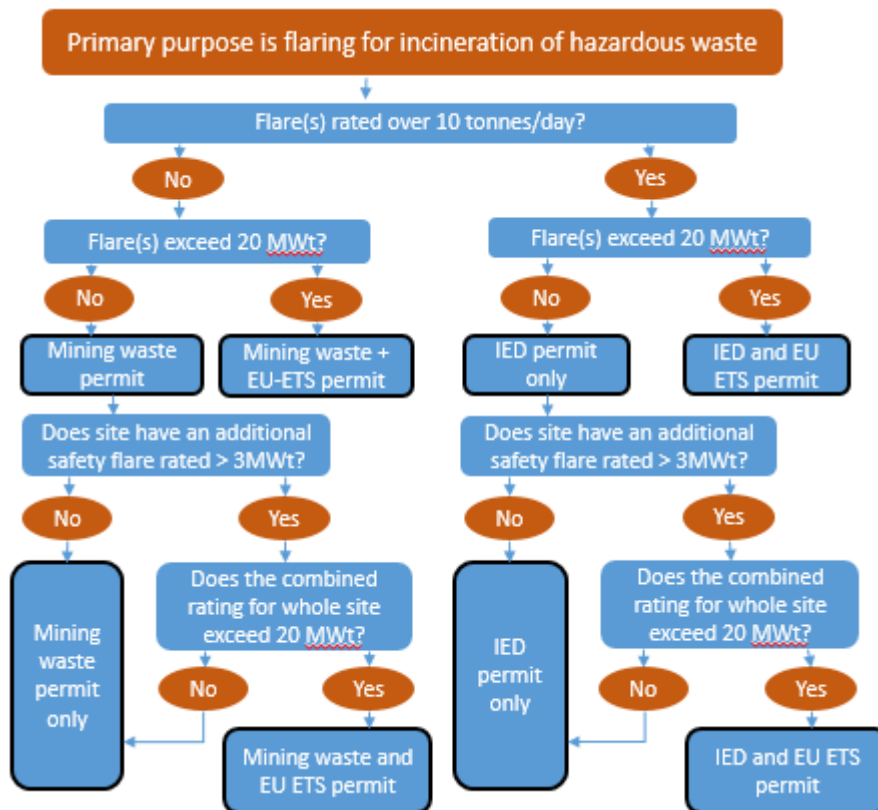
As with other sectors, we will also not place emissions limits or controls on the use of safety flares, as the health and safety of the workforce is paramount. However, sites with safety flares will be required, through conditions in the permit, to monitor and report on their usage, including, but not limited to:

- prior-notification of planned uses of the safety flare (and reasons for use)
- notification of unplanned uses of the safety flare (and reasons for use)
- CCTV records of the flare when in use
- volumes of gas burnt in the flare, calculated for each flaring event and on an annual basis

**Figure 2: Flowchart setting out our position where the primary purpose of the flare is for 'safety' (emergency and maintenance) use only**



**Figure 3: Flowchart setting out our position where the primary purpose of the flare is incineration of hazardous extractive waste**



### Types of flaring system

At present there is no published and commonly accepted Best Available Technique for flaring systems at onshore oil and gas operations, such as a BAT Reference document. In the absence of this, and taking a precautionary approach, we consider enclosed flares to generally provide the best environmental performance for incinerating waste gases.

An enclosed flare is usually characterised by the following features:

- the burners are housed in a thermally insulated enclosure
- the burners are designed to operate within an enclosure
- there is a mechanism to control the combustion air feed rate to optimize combustion

However, we will consider other types of flaring system, including shrouded flares (NB. it is not sufficient to retrofit a shroud around the flame of an open flare) or elevated pipe flares (for sour gas and safety flares only). Where an alternative system is proposed, the operator will need to demonstrate that an enclosed flare is not suitable for their operation and there will not be a worse environmental impact as a consequence of applying the alternative techniques.

The Environment Agency will assess alternative flare types and designs on a case by case basis. Operators are encouraged to provide sufficient information on the proposed flaring system at the permit pre-application stage to avoid delays at the permitting stage. Failure to provide detailed information at this stage may result in the risk of delays during permit determination. If you are proposing a different type of flare, you should also consider engaging with the local community as part of your permit applications.

### Design of a flaring system

For all flaring applications you must consider the following in the design of the flare system and describe it in your permit application or pre-application submission:



- waste gas flow rate: the flare must be designed to operate efficiently across the range of expected waste gas flow rates. Flares have a poor turndown efficiency, which means a large flare is inefficient when operated at low flow. For a wide flow range you may need to install 2 flares, for high and low flow; or install a multiple burner flare, where the burners can be operated independently
- stack height: to ensure adequate dispersion of the exhaust gases
- noise and vibration: especially for flares with a high flow rate
- light
- smoke: there must be no visible smoke from the flare. If smoking is likely a smoke suppression system should be included
- duration
- management of sour gas and odour control

If your proposed flare is not an enclosed flare, you must provide a thorough justification, which includes the applicability limitations that make an enclosed flare unsuitable and supporting evidence to demonstrate that the environmental performance of your proposed technique will be equivalent to that of an enclosed flare.

To demonstrate equivalence you must ensure that:

- there is adequate phase separation
- the shrouded flare is big enough for the gas flow expected and that if it turns out not to be then the gas flow can and will be choked back
- equally that a support gas will be provided to avoid the flare going out due to low flow
- the shroud is sufficiently high to give adequate dispersion and an assessment of flame length has been made to prevent the flame impinging or escaping from the enclosure
- a noise assessment has been done on the design proposed across the gas flow range expected

If this is not possible you should propose additional mitigating measures to minimise the environmental impact of the operation. The Environment Agency may incorporate additional requirements or restrictions into your permit, if it is considered that the technique selected does not provide equivalent environmental performance. An example of this could be limiting the duration of flaring or limiting the cumulative volume of gas which can be flared.

### **Operation of the flaring system**

The Environment Agency also expects you to consider and describe:

- the technically competent personnel operating the flare
- how you will manage the flare and waste gases if the flow rate exceeds or falls below the design flow range
- how the gas is to be extracted from the well; for example, by flow due to pressure within the well or by forced draught
- how the flare system will be maintained, including its associated pipework; to ensure reliability and prevent leaks
- an assessment of whether the borehole would pressurise up if the flare was unavailable and the risk of gas finding alternate pathways
- your proposals for continuous flame monitoring, including the ability to monitor feed gas flow continuously, main flame detection and auto-ignition as well as telemetry to alarm if the flare goes out
- details of safety valves or points where there may be fugitive releases, including the pressure at which they activate and where the gas will be released to
- a monitoring protocol, which should include monitoring of the gas entering the flare and the temperature of the flare and may include a requirement for monitoring of combustion products if their environmental impact cannot be shown to be insignificant

## Storing and handling crude oil

The Environment Agency considers crude oil to be any hydrocarbon extracted from a mineral well that is liquid at ambient temperature and pressure. This includes gas condensate. Crude oil is made up of a mixture of paraffin's (saturated hydrocarbons), naphthenes (unsaturated hydrocarbons) and simple and complex aromatic compounds. The precise composition depends on the geological strata from which it has been extracted. Crude oil may also contain hydrogen sulphide (H<sub>2</sub>S) and other sulphur containing compounds.

You must contain crude oil to ensure that it does not pollute surface water, groundwater or land.

The Control of Major Accident Hazards Regulations (COMAH) may also apply to crude oil storage facilities. This will be dependent on the quantity and composition of the crude oil held. See the [COMAH](#) section of this guidance.

### Design of the storage vessel

The Environment Agency considers the following to be BAT for design of a storage vessel for crude oil; it should:

- be constructed of a material that is impermeable to crude oil and water and resistant to corrosion
- be fitted with level detection and an overfill protection system
- be protected against over or under pressurisation
- be constructed with welded or flanged connections
- have a system that can detect water accumulation and allows accumulated water to be drained off without significant release of crude oil
- For more information on the design of a storage vessel visit <https://www.eemua.org/Coverage/Storage-distribution.aspx>.

### Design of the containment system

The Environment Agency considers the following to be BAT for design of a containment system for crude oil:

- all storage vessels are contained using a bund
- the capacity of the bund is either 110% of the largest vessel or 25% of the aggregate capacity of all the vessels that it contains, whichever is greater
- the bund is capable of withstanding the hydrostatic head of liquid when full
- the bund is constructed of a material which is impermeable to crude oil and water and is resistant to fire
- if there are joints in the bund construction, then metal water stops are installed to prevent leakage from the joints
- sealants used in bund joints are resistant to crude oil and water and are capable of maintaining a seal with thermal expansion and contraction of the bund
- pipework, cables and instruments do not penetrate the bund walls or floor
- the bund is fitted with a high level alarm
- the bund is fitted with a sump to allow removal of accumulated liquid

For more detailed guidance on design of containment systems, refer to the CIRIA report: [Containment Systems for the Prevention of Pollution C736](#).

### Design of the crude oil handling system

The Environment Agency considers that the following elements are BAT for the design and operation of a crude oil handling system:

- ancillary equipment associated with the storage vessel, such as pumps, oil bath heaters and filters are installed in the containment bund

- ancillary equipment such as heat exchangers and filters are protected against over pressurisation
- crude oil pipework joints are located inside the containment bund, where possible
- the ground beneath any crude oil pipework joints is protected by an impermeable membrane, if it is not protected by a bund
- there is an oil/water separation system capable of handling oil contaminated rain water extracted from the bund and accumulated water extracted from the oil storage vessel

### **Operation of the crude oil handling and storage system**

Your operations should also comply with the following requirements:

- you should routinely check and record the level in the crude oil storage vessels
- you should regularly reconcile the quantity of crude oil stored against the expected inventory based on filling and export records
- you should visually inspect the crude oil storage and handling system every day to identify any faults
- you must include the crude oil storage and handling system and their associated containment in your preventative maintenance programme. This will form part of your Environmental Management System (EMS).

### **Managing vent emissions from storing and handling crude oil**

To manage vent emissions you should:

- predict the quantity and nature of the emissions from your crude oil storage vessel vent, based on the expected composition of the crude oil and the predicted oil storage vessel feed rate
- carry out an odour impact assessment and produce an odour management plan, if the crude oil you are storing or handling contains hydrogen sulphide
- identify the site specific BAT for treatment or disposal of the vent gases, such as vapour recovery, scrubbing, adsorption or connection to the flare system. Venting directly to atmosphere can be considered as BAT only if you demonstrate the impact of the emissions is insignificant
- back vent road or rail tankers to the storage vessel during loading

### **Treatment of effluents including extractive wastes**

If your operations produce effluents that require treatment for disposal, any onsite treatment plant will require an installation permit should it have:

- the capacity to treat more than 50 tonnes per day of non-hazardous waste, using chemical, biological and/or physical treatment
- the capacity to treat more than 10 tonnes per day of hazardous waste

**Chemical treatment:** This involves the addition of a chemical reagent to react with pollutants to modify their form so that they can be removed, or render them less harmful to the environment; examples include neutralisation by the addition of acids or alkalis; chemical absorption or precipitation; and flocculation by the addition of flocculating additives.

**Biological treatment:** This involves the use of aerobic or anaerobic bacteria which digest organic pollutants in the effluent.

**Physical treatment:** This involves some form of mechanical or thermal separation; such as filtration (including molecular sieves), adsorption, settlement or evaporation.

You should recycle effluent streams, wherever practical, to minimise the amount of fresh water you need to use and the amount of effluent you need to treat. Examples of likely effluent streams include:

- produced water
- flowback fluid

- well cellar fluids
- contaminated rainwater collected in secondary or tertiary containment facilities
- accumulated water drained from crude oil storage vessels
- other process effluents
- water used during cleaning or maintenance activities

The Environment Agency considers the techniques described in the [Common waste water and waste gas treatment Best Available Techniques reference document \(BREF\)](#) to be BAT for treatment of effluents from onshore oil and gas operations.

In order to identify the appropriate BAT for your effluents you will need to determine the following:

- the expected volume and composition of effluent streams
- the temperature and pH of effluent streams
- whether any effluent streams are chemically incompatible with other effluent streams
- whether any of the effluent streams are odorous
- this information should be included in your permit application along with a description of the treatment technique(s) you have selected

You must design your waste water treatment and storage facilities to be capable of handling abnormal volumes of waste water. You should consider the likelihood and impacts of:

- artesian conditions in an aquifer, which means that the groundwater is pressurised, causing a high volume of produced waters to be generated
- heavy rainfall
- an elevated water table

## COMAH

The Control of Major Accident Hazards Regulations 2015 (COMAH) implement the European Seveso III Directive, aimed at preventing major industrial accidents which can cause serious damage/harm to people and/or the environment. The COMAH Regulations treat risks to the environment as seriously as those to people.

The COMAH regulations are enforced in the UK by a joint competent authority which is made up of the Health and Safety Executive, and one of either the Environment Agency, National Resources Wales or the Scottish Environment Protection Agency.

Whether a site is regulated under COMAH will depend upon the quantity of certain types of substance that the site has the capacity to handle. [Schedule 1 to the COMAH regulations](#) specifies the mass thresholds, for different hazard categories and named substances, above which the regulations apply.

Crude oil is a complex material with a very variable composition; therefore the hazards of crude oil such as flammability and ecotoxicity are also variable. Crude oil is typically classified as 'Hazardous to the Aquatic Environment in category Aquatic Chronic 2 (H411)', which makes it a dangerous substance under the COMAH regulations.

You can carry out ecotoxicity testing on the specific crude oil produced at your site, which may demonstrate that the lower Aquatic Chronic 3 (H412) classification is appropriate, for which COMAH may not apply (Note: whilst H412 is not a category of COMAH dangerous substance, application of COMAH would then be subject to flammability hazard thresholds). If your facility has the capacity to store more than the lower tier threshold of a dangerous substance, you must notify the competent authority. Further guidance on COMAH and how to notify the competent authority can be found in the HSE's guidance '[A guide to the Control of Major Accident Hazards Regulations \(COMAH\) 2015](#)' and '[Understanding COMAH a Guide for New Entrants](#)'

# European Union Emissions Trading System (EU ETS)

The EU ETS is the European Union (EU) cap and trade scheme for the reduction of greenhouse gas emissions by Aviation and Installation Operators.

Flares on onshore oil and gas installations with a capacity of 20MW thermal or 1.5mscfd (million standard cubic feet/day) equivalent fall within the scope of the EU ETS and will require a Greenhouse Gas permit issued under this scheme.

The operators need to apply via our online portal known as ETSWAP which can be found [here](#).

Guidance as to whether an installation would need to apply can be found [here](#).

The eligibility criteria is defined [here](#).

## Protecting Groundwater

All groundwater, particularly near-surface aquifers that are important for drinking water supply and which sustain rivers, lakes and wetlands, must be protected, but care must also be taken not to contaminate saline aquifers. Oil and gas operators should take a precautionary approach to protecting groundwater that is intended for human consumption or that supports dependent ecosystems.

In very low permeability strata, for example clays, evaporites and dense crystalline rocks, it may not be possible to define a zone of saturation (i.e. 'groundwater') because the water is bound to the rock or is relatively immobile. The Environment Agency would normally consider that for all practical purposes shales do not contain groundwater. Deep geological formations that are sufficiently porous and permeable are likely to contain groundwater as defined in the legislation.

The Environment Agency divides aquifers into 'groundwater bodies' for management purposes. These are also defined as drinking water protected areas, which are areas where the water resource is currently used or may be used in the future as a source of drinking water. The depth of a designated groundwater body is determined using available local data but a default maximum of 400m is used where there is no local available data, below which groundwater is generally of poor quality and has limited connection to surface systems.

Source Protection Zones (SPZ) are a key regulatory tool for protecting abstraction sources used for drinking water or food production. The SPZs are defined by the time it would take for pollutants to travel through the aquifer from the edge of a zone to a source of drinking water.

SPZ 1 covers the area within a 50 day groundwater travel time of the source and extends a minimum of 50m from a drinking water borehole. It represents the immediate area around a borehole where remediation of pollution is expected to be unachievable within 50 days.

SPZ 2 cover the area within a 400 day travel time and a minimum of 250m radius from the borehole and SPZ 3 covers the total source catchment.

The Environment Agency has published maps of the larger source protection zones (SPZs) on ['What's in your backyard'](#).

In all cases you must ensure that:

- you can show us how you will apply best available techniques (BAT) to protect groundwater
- your activity will not cause pollution to groundwater
- your activities are not within Source Protection Zone 1 (SPZ1)

- your activity will not cause risk of harm to groundwater protected dependent protected sites (e.g. SSSI's, Natura 2000 sites)

The Environment Agency protects groundwater using controls under the Water Resources Act 1991 and the Environmental Permitting (England and Wales) Regulations 2010

For general information on technical terms, legislation relating to groundwater activities, and the principles for protecting groundwater, refer to:

- [Environmental Permitting Guidance on Groundwater Activities](#)
- [Groundwater protection: Principles and practice \(GP3\)](#)

## Hydrogeological risk assessment

You need to provide information on hydrogeological risks at various stages: land use planning (including an EIA if required), permitting and when submitting your [notice of intention to drill or extend a borehole](#). By preparing comprehensive information at an early stage in your preparations, you will be able to use this for subsequent stages and so save time, adding further detail to the assessment where this is appropriate.

You will need to use specialist experts to complete this risk assessment. You should demonstrate to the Environment Agency that you have the appropriate level of hydrogeological expertise for your site.

Your hydrogeological risk assessment should evaluate any risks to groundwater, and associated receptors, from substances used or released from activities that take place at the surface, or from drilling the well and any subsequent well stimulation or down-hole activities, including hydraulic fracturing. It is possible that the action of drilling the well may release particles of rock, causing increased turbidity in the groundwater, increasing the risk to receptors. Additionally, substances used or released from site activities that may be of concern include additives to drilling and fracturing fluids, and hydrocarbons and other substances released from depth e.g. methane, metals, salts and naturally occurring radioactive materials (NORM).

## When you will need an environmental permit

We regulate activities that have the potential to pollute groundwater under Schedule 22 to the Environmental Permitting (England and Wales) Regulations 2010. This implements the Groundwater Directive (2006/118/EC) and the relevant parts of the Water Framework Directive (2000/60/EC).

A permit to cover groundwater activity is required at sites where groundwater is considered to be at risk. You will need to apply for a bespoke environmental permit if your operations involve a groundwater activity, that is, a discharge of pollutants that results in an input, or that might lead to an input, into groundwater. Direct discharges of pollutants to groundwater are prohibited, subject to the exceptions below.

Chapter 3 of the [Environmental Permitting Guidance on Groundwater Activities](#) gives further information on the definition of a 'groundwater activity' and exemptions to this requirement. Groundwater activities include discharges of pollutants to ground (see also '[discharge of site surface water run-off](#)' and '[reinjection of produced waters](#)'), this may include produced water that is the naturally occurring water produced alongside oil or gas. Hydraulic fracturing for onshore oil and gas constitutes a groundwater activity where there is a risk that injecting volumes of fracturing fluid might create indirect pathways that result in pollutants entering groundwater, even where this is deep below the ground surface.

There will be some types of operation that may not need a permit, subject to a site specific assessment. For example, some activities may be excluded as the discharges are of low volume and have minimal pollutant concentration, as described on page 173 of [Groundwater protection: Principles and practice \(GP3\)](#). We would expect the following activities to be covered by this exclusion, although we will need to assess this on a case by case basis:

- use of additives in drilling fluids, including oil based muds, where they have been assessed and their use cannot lead to groundwater pollution



- borehole acidisation, providing the acids used are not regarded as wastes (in which case a permit for a mining waste operation under Environmental Permitting (England and Wales) Regulations 2010 will be required)
- leak off tests, as this is a small scale test using low volumes of water
- acid wash, since the dilute acid used to dissolve drilling fluid that has entered and blocked pores surrounding the borehole will be quickly neutralised as it reacts with the drilling fluid and the geological formation

Standard rules permits may only be used outside of SPZ1 and SPZ2 for cases where no 'groundwater activity' takes place. Where a groundwater activity takes place this can only be regulated by a bespoke permit.

## How the Environment Agency will assess your application

You must submit a hydrogeological risk assessment with your application for an environmental permit for a groundwater activity. You may base this on the risk assessment that you provided with your planning application, making sure that it is updated where necessary. This information, along with the rest of your permit application, will be placed on the public register. For more information on disclosure see our [disclosure of information](#) section.

The risk assessment should cover the following:

- a site location plan
- a conceptual model showing nearby rivers, lakes, wells and boreholes, wetlands and other dependent ecosystems that may be considered as receptors
- the hydrogeological relationship between the geological formation of interest, any potential receptors identified and any freshwater or saline aquifers that the borehole passes through
- the local and regional geological structures likely to be affected by the operations, any specific local geological features that may impact the flow rates and any supporting information you have used from other boreholes that have been drilled in the area
- how the site will be constructed to protect the underlying ground and groundwater, including use of impermeable membranes and management of surface run-off, use of secondary containment, design and installation of the drilling platform
- the method of well construction, casing and grouting proposals for the full depth of the borehole, and how and when the integrity of the casing is to be tested
- the composition and function of drilling fluids you propose to use for each section of the drilling programme, including a material safety data sheet (MSDS) for each fluid
- safeguards to prevent cross-contamination of aquifers and for management of water ingress, for example through effective installation and cementing in place of casing, during drilling and subsequent operations, and following decommissioning of the well
- details of proposed water use and disposal of effluents
- details of all chemicals to be used for drilling and down hole activities including well stimulations and hydraulic fracturing activities. You need to provide details about each substance that you propose to use, including the maximum quantities and the composition of carrier fluids, the substances used to prop open fissures, how the process will be monitored, and an estimate of the quantity of injected fluids that will remain underground
- details of how you will identify the location, orientation and extent of the induced fractures. Please see [Sub Surface Information Plan](#) for more details on this and other requirements that may apply
- safeguards to prevent uncontrolled loss of fluids in the borehole to formations or ground from the surface (blowouts); restoration measures in the event that a loss of containment does occur
- proposed environmental monitoring (including monitoring of groundwater and surface water receptors). See last section on [monitoring](#).
- the likelihood of induced seismic activity occurring, the maximum possible magnitude of such activity and the equipment, both onsite and offsite, at risk of damage from seismic activity;

methods to measure seismic activity, and the mitigation techniques to reduce the likelihood and magnitude of induced seismic events. Please see Sub Surface Information Plan for more details on this and other requirements that may apply

- any other details on how you plan to prevent fugitive emissions to surface water or groundwater. For more guidance on this, refer to Section 2.2.5 of this guidance or to the [IPPC S1.02 Gasification, Liquefaction and Refining sector guidance](#)

We will take account of the following in assessing your permit application and risk assessment:

- the location of your activity in relation to an SPZ. We will not allow drilling for oil and gas in SPZ1. This includes both SPZ1 areas where the aquifer is at the surface (depicted as SPZ1 on maps) and where the aquifer is confined beneath other layers of rocks (depicted as SPZ1c on maps). (For the purposes of the Hydraulic Fracturing Consent, SPZ1 equates to a Protected Groundwater Source Area, and we will confirm in our permit 'Decision Document' that hydraulic fracturing will not be taking place in a Protected Groundwater Source Area). Outside an SPZ1, we may still object if we think there is a risk to groundwater. This may be in a SPZ2, an SPZ3 or entirely outside of an SPZ
- the distance between your activities (vertical / horizontal / inclined) and the nearest aquifer
- the distance between your activities and the surface. The Petroleum Act sets a minimum depth of 1000 metres from the surface at which high volume hydraulic fracturing may be carried out (ie "associated hydraulic fracturing"). Under the Onshore Hydraulic Fracturing (Protected Areas) Regulations, the Government has classified SPZ1 areas as protected groundwater source areas. This means that in SPZ1, there is a minimum depth of 1200m from the surface at which high volume hydraulic fracturing may be carried out. We would allow hydraulic fracturing under a SPZ, in line with the Government's depth restrictions, as long as operators can demonstrate that the risks to groundwater are very low. For activities that do not fall under the Petroleum Act there is no set minimum separation distance between the target formation and the surface. We will determine the distance that is acceptable in these instances on the case-specific risks
- we will assess and approve your proposed use of substances. You must not use hazardous substances (as defined in the Environmental Permitting (England and Wales) Regulations 2010) for drilling or hydraulic fracturing. You may use other substances providing they do not pollute groundwater. We will use the published assessment methodology for determining hazardous substances, which can be found at <http://www.wfduk.org/stakeholders/mrv-work-area>. If you are applying for a Hydraulic Fracturing Consent from DECC, you will need to demonstrate to DECC that we have approved the use of substances you propose to use
- for principal and secondary aquifers for which 'groundwater bodies' are defined under the [Water Framework Directive](#), air flush, water only or water-based fluids may be used. Acceptable additives for water-based fluids are bentonite, food-grade thickeners (e.g. xanthan or guar gums) and inert materials used to increase density (e.g. barite - barium sulphate, haematite - iron oxide). Use of muds must not lead to pollution of groundwater
- you must gain the Environment Agency's agreement for use of any additives. In the case of karstic or highly fissured conditions only inert materials will be acceptable
- in deeper, saline aquifers, or deep formations that do not contain groundwater, you may use water based muds with a wider range of additives and oil-based muds, providing these would not cause pollution to groundwater

Your permit may include conditions covering site construction, bunding of tanks and arrangements for management of surface water drainage, for instance:

- you should install an impermeable membrane across the site before you start any drilling operations. The risk to the groundwater and surface water environment must be taken into consideration when choosing the specification of the impermeable membrane and any protective geo-textiles or stone layers. This should be constructed in accordance with good practice e.g. CIRIA R164 and C736, using appropriate levels of construction quality assurance. You must ensure the appropriate seals are made in areas where pipe-work or structures penetrate the membrane. You must ensure the continued integrity of seals in all areas,



particularly areas that are trafficked, where the membrane is exposed to light, or used for the storage of wastes, or where structures are built. Where a membrane is due to be in place for many years a testing programme should be included in the management plan. In the event of failure of the membrane appropriate remediation proposals shall be agreed

- you should install locked valves on all surface water drains to be able to securely isolate the site drainage system. All site drains should drain via an interceptor to a sealed tank or an agreed discharge point. You will need a permit for the discharge to surface waters or to ground / groundwater
- you should provide bunding around containers which store any materials that may cause pollution
- you should clean and wash down all equipment in a suitably banded area, and have measures in place to dispose of these wash down waters

## Notice of intention to construct or extend a boring for the purpose of searching for or extracting minerals

Before drilling or extending a borehole you need to submit to the Environment Agency a notice of intention under section 199 of the Water Resources Act 1991 (as amended by the Water Act 2003).

This applies to boreholes on both new and existing sites. If you are drilling a new borehole or extending an existing borehole you will need to notify the Environment Agency of your intentions. You usually do not need to notify the Environment Agency to work over or recomplete an existing well under section 199 (although it may still be necessary to ensure that the appropriate environmental permits are in place if mining waste may be produced). If you are unsure about whether this applies to you, you should check with the Environment Agency.

You are required to serve the notice at least one month prior to drilling. However, to avoid delays, the Environment Agency recommends that you submit a notice as early on in the permitting process as possible. The only exception is in cases of emergency, which is considered unlikely to apply to oil and gas exploratory operations.

## How to submit a notice of intention

You must complete [Form WR11 Notice of the intention to drill for minerals](#). You must submit this along with a method statement to show how you will carry out the work in a way that protects water resources. You should base this on the hydrogeological risk assessment that you have prepared at the planning and permitting stages, updating this information where appropriate. In particular you should ensure you provide any final details of the well design.

## How the Environment Agency will assess your notice of intention

The Environment Agency will ask you to provide more information if it is considered that your form WR11 or method statement is incomplete. If you do not provide this information, the Environment Agency can serve a notice on you under section 201 of the Water Resources Act 1991 to formally request more information.

You may also be asked to revise your method statement if the Environment Agency believes your initial submission will not adequately protect water resources. If you do not address these concerns, or the Environment Agency wish to ensure that specific measures are undertaken during the works, you could be served with a conservation notice under section 199 of the Water Resources Act 1991.

## Well construction and integrity

The Environment Agency recognises that the construction and integrity of any well is key to ensuring that the environment is protected. Our role dovetails with that of the Health and Safety Executive over these areas. We have a duty to protect groundwater quantity and quality and also to ensure that fugitive emissions do not occur. In order to protect groundwater we will review well

design proposals to ensure that adequate levels of protection are in place to prevent the loss of groundwater resources or any detrimental impact to groundwater quality. This protection will consist of suitably designed well casings that are appropriate to the geological conditions and to the sensitivity of any vulnerable resources. The method of drilling will also be assessed to ensure that the activity does not compromise groundwater resources or quality. We will expect well integrity to be tested and assurance provided to us that the construction is sound. These checks will be carried out as part of the Water Resources Act 1991 s.199 notification and also through pre operational conditions on any environmental permit required prior to the commencement of any permitted groundwater activity.

The Health & Safety Executive (HSE) has the primary controls over well construction. HSE's requirements are designed to protect health and safety, especially of workers. These measures will also be effective in protecting groundwater and are generally suitable for meeting requirements for environmental protection. In some cases the Environment Agency may require additional measures to those required by the HSE where this is necessary to protect groundwater, such as long-term monitoring of the integrity of wells.

The [Borehole Site and Operations Regulations 1995](#) (BSOR), together with accompanying guidance, set out minimum requirements for the safety and health protection of workers. Operators must notify the HSE before a well is constructed so that inspectors can ensure that the design meets industry standards and that well integrity can be maintained so far as reasonably practicable. The well notification includes details of the equipment to be used on site, the geology, the expected pressures in the well and an assessment of the risk of an accidental release of fluids from the well.

The [Offshore Installation and Wells \(Design & Construction etc.\) Regulations 1996](#) (DCR) place goal-setting duties on installation owners and operators to ensure the integrity of an installation throughout its lifecycle. They provide a framework for ensuring the safe condition of wells on land and offshore, throughout their lifecycle.

HSE will assess the well design prior to construction, and monitor well operations during construction, based on weekly operations reports submitted to the HSE by the well operator, to ensure the construction phase matches the design intent. Once operational work begins the HSE and the Environment Agency will conduct a joint inspection of all shale gas and oil sites.

## Discharge of site surface water run-off

You need to manage any surface water run-off from your site. You must not allow uncontrolled polluting discharges.

Surface water run-off should be stored in an engineered collection and management system which may need to include treatment, to ensure that the water discharged is uncontaminated.

Where a water course is available it could then be discharged under an environmental permit (as a water discharge activity). If this is not an option then soakaways could be considered if ground conditions are appropriate and the risk to underlying groundwater is demonstrated to be acceptable. Soakaways will not be considered appropriate if the land beneath the site is contaminated and the discharge could mobilise this contamination and cause pollution. An environmental permit (for a groundwater activity) will be required for the discharge via a soakaway.

For our position on the re-injection of surface water run-off see the section [below](#).

Should none of the above options be available to the operator then the site drainage water should be collected and removed from site for disposal at an appropriate facility.

## When you will need an environmental permit

If you want to discharge contaminated site surface water run-off to ground, you will need a groundwater activity permit.

If you wish to discharge it to a local water course, you will need a water discharge activity permit.

## Other sources of useful information

- section G11 and G12 in [Groundwater Protection: Principles and Practice \(GP3\)](#)
- our additional [guidance for water discharge and groundwater \(from point source\) activity permits](#)
- [Risk assessments for specific activities: environmental permits](#)

# Water Abstraction

Early on in the planning process you will need to determine:

- how much water you need, especially if you need large volumes of water for hydraulic fracturing
- when you will need water
- whether you intend to take water from mains water supplies or abstract it from groundwater or surface water
- how you will get the water you need to your site

The Environment Agency publishes information about water availability in its Abstraction Licensing strategies. These are available online at <http://www.gov.uk/government/collections/water-abstraction-licensing-strategies-cams-process>. There may be local constraints on water resources that you need to take into account. The Environment Agency will advise you if this is the case when you make your application.

Through the water abstraction licensing regime the Environment Agency ensures that water resources are safeguarded and that abstractions do not damage the environment. Unregulated abstraction could lead to water supply shortages, increased river pollution, or damage to wildlife and habitats.

## When you will need a water abstraction licence

You will need to apply for an abstraction licence if you plan to directly abstract more than 20m<sup>3</sup> per day. This threshold applies to your entire abstraction and not, for example, to each abstraction point from the same water source.

If you plan to abstract groundwater from a borehole or well, you may need to apply for a separate [groundwater investigation consent](#) to construct the borehole or well and complete test pumping.

You do not need an abstraction licence:

- if your water is supplied through the mains water supply. It is the water company's responsibility to ensure the extra demand for water created by your activities fits within the conditions of their water resource plans and abstraction licences
- to remove formation water from conventional oil and gas activities. The Environment Agency considers this to be a removal of liquid matter as part of mineral recovery
- to remove formation water with hydraulic fracturing fluid from shales. The Environment Agency considers this to be a removal of liquid matter as part of mineral recovery. Shales are not part of the active water cycle. They are an impermeable rock and are unlikely to produce a useable quantity of water
- to abstract water to reduce the pressure on the coal bed strata for coal bed methane extraction. The Environment Agency considers this to be a dewatering activity, which is currently exempt from abstraction licensing. The government is expected to remove this exemption in late 2016 and you will then need to apply for an abstraction licence. There are likely to be transitional arrangements for those companies who are abstracting water when the exemption is lifted. These will allow you to carry on abstracting water while the Environment Agency determines your licence application

If you are applying to abstract water for hydraulic fracturing, your assessment will need to include:

- the extent of the wells and laterals and the properties of the target shales
- the numbers of wells and laterals to hydraulically fractured
- whether singular or multi-stage hydraulic fracturing is to be undertaken
- the timing and duration of the hydraulic fracturing operations and whether the source of water will cover a single well pad or multiple well-pads
- what proportion of the flow-back fluid can be re-cycled (including timing of flow back in relation to subsequent hydraulic fracturing operations)

## Drought

Many abstraction licences contain conditions that constrain abstraction when river flows and groundwater levels fall. In severe drought events, action may be taken to restrict direct abstraction from rivers and groundwater and also restrain demand on public water supplies. These potential restrictions on water use may act to constrain the timing and extent of hydraulic fracturing operations. You should plan for these events so your operations can adapt to changing water availability.

## Applying for an abstraction licence

Refer to the guidance on [the abstraction licence application process](#).

## How the Environment Agency assesses your application

The Environment Agency will screen and appraise all licence applications for potential effects on the environment and other lawful water users. In doing so we must have regard to certain statutory duties or obligations, for instance, the Water Framework Directive, the Conservation of Habitats and Species Regulations 2010 as amended.

As part of your application you will need to provide information on how you have assessed the quantities of water your need.

# Re-injection and re-use

This section sets out the Environment Agency's position on the re-injection of produced water and flowback fluid generated from the exploration and production of onshore oil and gas.

When we use the term produced water, we are referring to those waters resulting from the exploration and extraction of hydrocarbons that are produced from a well alongside oil and gas (with the exception of flowback fluid).

When we refer to flowback fluid, we mean the mixture of hydraulic fracturing fluid, which may include mobilised natural gas and formation water which returns to the surface following high volume hydraulic fracturing.

## Produced water

### Re-injection of produced water to facilitate production

You may re-inject produced water into geological formations from which hydrocarbons have been extracted, or which for natural reasons have been designated by us as permanently unsuitable<sup>1</sup>, in order to facilitate production of hydrocarbons.

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<sup>1</sup> We have explained what we mean by permanently unsuitable in our document dealing with the

In all instances, you will need a permit for a groundwater activity to authorise re-injection.

In addition, and depending on the activities, you may need a radioactive substances permit as follows:

- if you generate and re-inject produced water at the same site, you will not need a permit for a radioactive substances activity if the produced water contains NORM which has a concentration of radioactivity exceeding the out of scope values<sup>2</sup>. This is because the produced water is supporting production and is not waste
- if you plan to re-inject produced water at a different site for which you are also the operator and the concentration of NORM radionuclides in the produced water is above the out of scope values, you will need a permit for a radioactive substances activity. This is because the produced water is an unwanted surplus at the originating site and therefore a waste, even if you intend it for use at the receiving site
- if you transfer the produced water to another operator for re-injection to facilitate production at a different site and the produced water contains a concentration of NORM radionuclides above the out of scope values, both you and the other operator will need a permit for a radioactive substances activity. This is because you are transferring radioactive waste between operators, even if it is intended for use at the receiving site by the other operator

### **Re-injection of produced water for disposal**

Where the produced water contains a concentration of NORM radionuclides above the out of scope values, this can be re-injected for disposal at the original site or at a different site into geological formations from which hydrocarbons have been extracted, or which for natural reasons have been designated by us as permanently unsuitable. This is the best environmental option to minimise the exposure of the public to ionising radiation from the disposal of radioactive waste and is in accordance with our NORM strategy<sup>3</sup>. To do this you will need a permit for a groundwater activity and radioactive substances activities.

Where the produced water contains below out of scope NORM waste values it is not considered radioactive waste but can be re-injected for disposal at the original site under a groundwater activity permit<sup>4</sup>.

Where produced water contains NORM radionuclides below the out of scope values is proposed to be re-injected for disposal at a different site, it can only be authorised by a groundwater activity permit if the formation to which the produced water is being disposed is a geological formation from which hydrocarbons have been extracted or is a geological formation which has for natural reasons been designated by us as permanently unsuitable. This is also the case where the produced water is transferred to another operator for disposal at a different site.

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which you can access here: <https://www.gov.uk/government/publications/groundwater-protection-principles-and-practice-gp3>.

<sup>2</sup> United Kingdom, Environment Agency, 2011a. Guidance on the scope of and exemptions from the radioactive substances legislation in the UK [online]. Available from <https://www.gov.uk/government/publications/guidance-on-the-scope-of-and-exemptions-from-the-radioactive-substances-legislation-in-the-uk>

<sup>3</sup> Our NORM strategy was published in July 2014 and can be found at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/335821/Final\\_strategy\\_NORM.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/335821/Final_strategy_NORM.pdf)

<sup>4</sup> Authorised under Article 11(3)(j) Water Framework Directive



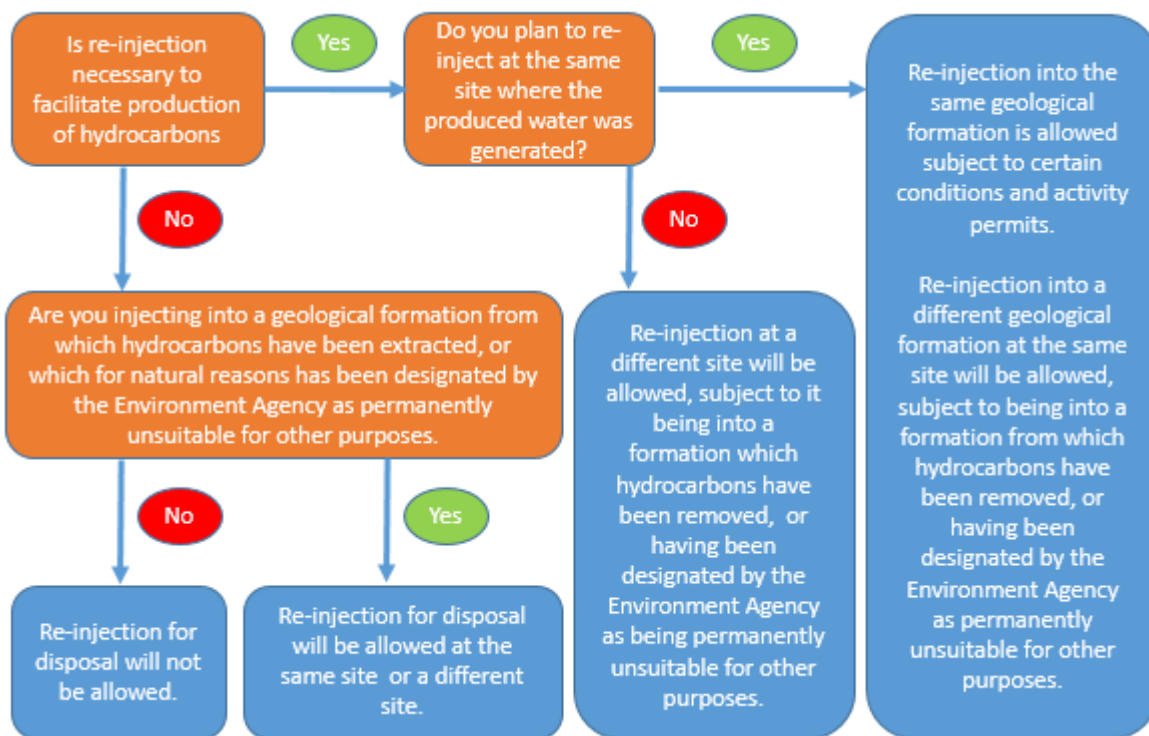
Where hydrocarbons have not been extracted from a geological formation, or where we have not designated a formation as permanently unsuitable for natural reasons, reinjection of produced water for disposal will not be allowed. In these cases, produced water must be taken to an appropriately permitted waste facility.

Waste produced waters are extractive waste and the overall management will require a mining waste permit (see above section on [Mining Waste](#)).

Figure 4 below sets out our position on reinjection of produced water generated from the exploration and production of onshore oil and gas.

**Figure 4:**

**Flowchart setting out our position on re-injection of PRODUCED WATER generated from the exploration and production of onshore oil and gas (not for flow back fluids)**



## Flowback fluid

### Re-injection of reused flowback fluid for hydraulic fracturing

Flowback fluid can be treated and re-used as fresh injection fluid for the purpose of hydraulic fracturing and we consider this to be a suitable environmental option. Flowback fluid must be re-used where it is reasonably practicable to do so to meet the MWD obligation to minimise waste.

However, waste flowback fluid may contain a concentration of NORM radionuclides above the out of scope values. It will then require a radioactive substances activity permit for its disposal. You must send this to an appropriate permitted waste facility for treatment or disposal.

### Re-injection of flowback fluid for disposal

The Environment Agency will not generally permit the re-injection of flowback fluid for disposal into any formation, whether or not it contains a concentration of NORM radionuclides above the out of scope values. The re-injection of flowback fluid for disposal is not necessarily prohibited and may be permissible where, for example, it is injected back into formations from which hydrocarbons



have been extracted and will have no impact on the status of water bodies or pose any risk to groundwater.

The Environment Agency takes a precautionary approach to this activity and do not consider it has been demonstrated that re-injection in these circumstances is BAT.

At present and in the absence of BAT being demonstrated we have determined that overall the long- term objective of ensuring good status of water bodies takes precedence over arguments in favour of the disposal of flowback fluid to underground formations.

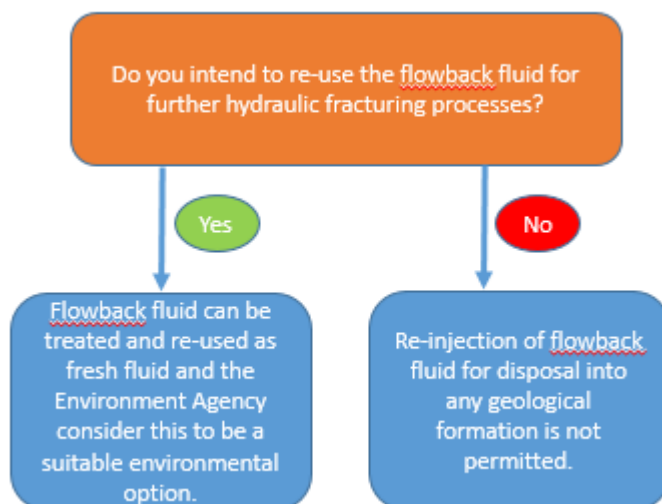
This is reinforced by our view that there are available and viable alternatives, namely disposal at permitted waste disposal facilities or by using onsite waste water treatment facilities. We consider that these techniques are a better environmental option.

We will review this position in light of any increased evidence from hydraulic fracturing operations and from the monitoring of underground waste facilities.

Figure 5 below sets out our position on the management of flowback fluid generated from shale gas exploration and production using hydraulic fracturing techniques.

**Figure 5:**

**Flowchart setting out our position on the management of FLOWBACK FLUID generated from shale gas exploration and production using hydraulic fracturing techniques (not for produced water)**



### Re-injection of surface water run-off

Surface water run-off may be mixed with produced water and re-injected at the same or a different location provided that it is clean (uncontaminated by site activity) and being used to support the production of further hydrocarbons from that location. The Environment Agency will not allow surface water run-off to be mixed with produced water and re-injected for disposal purposes.

## Flood risk activity permit

If you want to carry out works in, over, under or near a main river, flood defence or a sea defence, you'll need to apply to the Environment Agency for a permit. To carry out work on other watercourses, you will need to apply to the Authority responsible for a particular watercourse.

Read more in our [guidance on applying for a flood defence consent](#).

# Seismic activity

The Oil & Gas Authority is responsible for ensuring that operators put in place measures to control the level of induced seismicity from hydraulic fracturing. Operators must carry out prior geological analysis to identify natural faulting, background monitoring of seismicity before operations start and on-going monitoring during operations. Operators must also submit a Hydraulic Fracturing Plan to the Oil & Gas Authority for approval. Operators must use the [‘traffic-light system’](#) to ensure that operations can be stopped quickly and reviewed if seismic activity is detected. If the magnitude increases the operation may need to be reconsidered or stopped altogether.

The Environment Agency is responsible for regulating environmental impacts including those that may occur as a result of induced seismicity. Operators must satisfy the Environment Agency that they have appropriate safeguards in place to avoid impacts on geological structure and infrastructure where this could put the environment at risk.

# Sub-surface information plan

For certain activities, we require additional sub-surface information as part of your permit applications for a mining waste facility and a groundwater activity. This is because we need to know where the fractures will go to understand any risk to groundwater, and where the waste fluid will be left behind so that we can define the extent of the mining waste facility.

You will definitely need to provide this information to us if you are undertaking hydraulic fracturing which meets the definition of “associated hydraulic fracturing” in the Petroleum Act 1998 as amended by the Infrastructure Act 2015. For all other oil and gas applications, we will assess on a case-by-case basis what information you will need to provide depending on the activities you intend to undertake and the associated risks.

We would normally expect to receive this information at the permit application stage as part of the waste management plan, which should include:

- a map showing faults near the well and along the well path, with a summary assessment of faulting and formation stresses in the area and the risk that the operations could reactivate existing faults
- information on the local background seismicity and assessment of the risk of induced seismicity
- summary of the planned operations, including the techniques to be used, the location of monitoring points, stages, pumping pressures, volumes and the predicted extent of each proposed fracturing event
- the processes and procedures that will be put in place during hydraulic fracturing to identify where the fractures are within the target formation and ensure that they are not near the permitted boundary
- in the event that the fractures extend beyond the permit boundary, the steps that would be taken to assess and if necessary mitigate the effect and limit further propagation outside the target rocks
- a comparison of proposed activity to any previous operations and relationship to historical seismicity
- proposed measures to mitigate the risk of inducing an earthquake and monitoring of local seismicity during the operations; The permit will contain a condition that provides that in the event of suspension of activities caused by a seismic event greater than that agreed in your Oil and Gas Authority-approved Hydraulic Fracturing Plan, fracturing cannot resume until we have approved evidence that the wells are not damaged and the groundwater remains protected

- a description of your proposed real-time traffic light scheme for seismicity, and proposed methods for fracture height monitoring
- the type and duration of monitoring and reporting during and/or after hydraulic fracturing has taken place. This will need to include your proposals for post fracturing reporting of the location, orientation and extent of the induced fractures to demonstrate that the permit has been complied with. This will need to include provision for reporting on proposed mitigation measures to prevent propagation should fractures extend to within a short distance of the permitted boundary

Where you cannot provide this information at the permit application stage, we will impose a pre-operational condition to provide the relevant information for our approval before hydraulic fracturing can commence. This can be in a separate sub surface information plan or be incorporated as part of the Hydraulic Fracturing Plan submitted to the Oil and Gas Authority. If you choose to include it in the Hydraulic Fracturing Plan, you will need to submit the plan to both the Oil and Gas Authority and the Environment Agency at the same time for approval. If approved by us, the proposals will form part of the permit requirements.

## Site condition report, operational monitoring and compliance

It is necessary for you to monitor the emissions from your activities and assess their environmental impact in order to demonstrate to the Environment Agency that your undertakings are not causing significant environmental harm and that your emissions comply with the limits specified in your permit. Emissions can be to air, water or land; from an identified point source or from an uncontrolled source, known as a fugitive emission. You may also need to monitor noise, odour and vibration from your site. We expect that all monitoring that you do is carried out to recognised standards by competent personnel.

The BAT requirements for monitoring are not prescriptive in terms of how monitoring should be carried out, recognising the need for flexibility in response to site specific and operational conditions.

Monitoring should be based on a detailed conceptual site model including key sources, pathways and receptors. The conceptual site model should recognise that source-pathway-receptor linkages and associated risks may change through the lifecycle of a development as operations vary through time. This will need to be reflected in the choice of monitoring techniques and monitoring frequencies throughout the lifecycle of an oil and gas development.

To comply with the EPR the starting point is to determine the conceptual site model based on existing available information and to undertake a risk assessment in accordance with the general and detailed provisions of the Environment Agency's H1 guidance. The conditions on the environmental permit for a site will be drafted based on the assessed level of risk from the various site activities that are proposed. It is these conditions that will determine the monitoring approach for the site. Monitoring must be compliant with the requirements of the permit.

As a minimum, monitoring should include:

- Baseline monitoring;
- Monitoring through the operational lifecycle of the site; and
- Decommissioning and post abandonment monitoring (to allow surrender of the permit).

## MCERTS

MCERTS is the Environment Agency's Monitoring Certification Scheme. It provides the framework for businesses to meet our quality requirements.

You should refer to our [Monitoring emissions to air, land and water \(MCERTS\)](#) webpage.

The Environment Agency expects that all monitoring that you do is carried out to recognised standards by competent personnel. We recommend you do this through our MCERTS scheme where applicable. You can choose to use an alternative certified monitoring standard, as long as you are able to provide us with evidence that this is equivalent to the MCERTS standard.

## Site condition report

You will need to carry out some monitoring before starting your operations, so that a baseline can be established. This is called a site condition report (SCR).

If you make an application for an environmental permit to operate an installation, carry out a groundwater activity or carry out a mining waste operation, you must produce a SCR, to accompany your application.

You should use the H5 Site Condition Report [guidance and template](#) to help you produce your site condition report.

The SCR tells the Environment Agency about the nature and condition of the land on which you are intending to carry out your activities, providing information such as:

- geology
- structural geology (fault patterns)
- hydrogeology
- surface and groundwater features
- evidence of historic pollution

If you plan on using a flare, you may also be asked to include an assessment of local air quality in your site condition report.

Throughout the life of your environmental permit you will need to update your site condition report to record information about events that may have had an impact on the site, such as:

- drilling activities
- hydraulic fracturing and other well stimulation activities
- acid washing
- surface spillages
- leaks from the well shaft
- seismic events
- failure of secondary or tertiary containment
- any site remediation activities undertaken
- results of any borehole monitoring carried out during the life of the permit
- periods of suspension
- well capping and abandonment
- flaring of waste gases
- fugitive emissions

At the end of the permit's life you will need to produce a surrender SCR, which will review the original SCR and all the data collected throughout the life of the permit, to demonstrate:

- you have protected land and groundwater during the lifetime of the site
- an assessment of potential fugitive emissions to land and water

- there has been no significant deterioration in the condition of the site during the lifetime of the permit compared to the baseline condition, which was assessed when the permit was issued

If the land or groundwater aren't in a satisfactory state, or the Environment Agency has cause to consider that there is an ongoing risk to the environment, your application to surrender your environmental permit may not be accepted and you may have to undertake further site remediation and/or post-decommissioning monitoring.

## Operational monitoring

### Waste monitoring

The waste monitoring required will be set out in your environmental permit or Waste Management Plan.

For extractive wastes we will expect you to carry out the following monitoring:

- the quantity and composition of produced waters and flowback fluids produced along with the quantities despatched off-site for disposal
- the quantity and composition of waste gas destroyed by flaring
- the quantity and composition of waste drilling muds and drill cuttings produced

When monitoring the quantity and composition of wastes it is important that the source of the waste is also recorded.

Each consignment of waste flowback fluid must be sampled before despatch offsite for disposal and a reference sample retained for further independent analysis.

If your extractive wastes are [radioactive wastes](#) then you will need to also carry out [radioactive substances monitoring](#).

### Radioactive substances monitoring

You should monitor any aqueous radioactive waste to determine:

- the total disposals, including off-site transfer and the re-injection of produced water, other than NORM contaminated well stimulation fluid remaining in situ, per month of Ra-226, Ra-228 (which may be inferred via Ac-228 measurement), Pb-210 and Po-210
- the total activity in accumulation on the last day of each month of Ra-226 and Ra-228

The results of your measurements and analysis should be available, wherever practicable, before aqueous waste is removed from the site or disposed of on site.

You should monitor any solid radioactive waste to determine:

- the total disposals per month of Ra-226, Ra-228, Pb-210, Po-210 and Th-228

The results of your measurements and analysis should be available before solid waste is removed from the site.

Analyses should be carried out by suitably accredited laboratories.

The Environment Agency sets limits and specifies monitoring for radioactive substances from on-shore oil and gas operations, in line with the requirements of the off-shore [environment and emissions monitoring system \(EEMS\)](#).

For aqueous radioactive wastes, you will need to:

- measure the volume(s) of aqueous radioactive waste(s) disposed of each month by each separate disposal route and take at least one representative sample of each waste form disposed of.
- analyse each sample for:
  - Ra 226

- Ra 228<sup>5</sup>
- Po 210
- Pb 210
- if you need to monitor the flowback fluid for radium-226 and radium-228 [Oil & Gas UK](#) can identify laboratories capable of doing this analysis

Calculate:

- for each disposal route, the total volume and activity for each radionuclide above, disposed of each month
- for aqueous waste injected into underground strata the concentration [Bg/l] of each radionuclide above on a rolling 12 monthly average
- the maximum accumulated volume and activity of each radionuclide during each month

For solid radioactive wastes, you will need to:

- analyse each consignment for:
  - Ra 226
  - Ra 228
  - Th 228
  - Pb 210
  - Po 210
- determine the volume of the waste and the activity of each radionuclide above, in each consignment of solid waste removed from the site

Analysis of your radioactive wastes must be carried out by a laboratory which is accredited by the [United Kingdom Accreditation Service \(UKAS\)](#).

You must obtain the results of analyses before removing radioactive wastes from site.

### **Air emissions monitoring**

For your environmental permits, you may need to monitor emissions to air of:

- combustion products and non-combusted methane from waste gas flares, gas engines or micro turbines
- fugitive methane or VOC emissions from infrastructure leaks and storage tanks
- emissions from crude oil storage tank vents or crude oil transfers
- the Petroleum Act 1998 requires operators who wish to undertake high volume hydraulic fracturing (i.e "associated hydraulic fracturing") to make appropriate arrangements for the monitoring of methane emissions to air. To meet this requirement for your Hydraulic Fracturing Consent, you may demonstrate to DECC that you have met the air monitoring for methane requirements of your environmental permit

### **Ambient air monitoring**

Sometimes the Environment Agency may ask you to carry out ambient air monitoring to demonstrate that the air emissions from your site are not causing pollution.

You may be asked to do this if:

- air emissions monitoring has shown that the emissions from the site are higher than was foreseen in the permit application
- the site is in an air quality management area
- to demonstrate that fugitive emissions from the operations on site are minimised



You may also choose to carry out ambient air monitoring to provide reassurance to local communities that your activities are not having a detrimental effect on local air quality.

If you need to carry out ambient air monitoring you should refer to our [M8 Monitoring Ambient Air Technical Guidance Note](#).

For operators who undertake hydraulic fracturing, we would expect you to produce an agreed methane monitoring strategy as part of the Emissions Monitoring Plan and implement it to establish baseline levels of methane and methane levels throughout operations on site. This should include consideration of the duration and variety of operations, sampling period, turnaround time of results and the site leak detection and repair plan in place. [M8 Monitoring Ambient Air Technical Guidance Note](#) should be referenced in the development of this strategy.

## Noise monitoring

If you have an environmental permit to operate an installation, it will include a noise management condition. You may need 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
- gas leaks

Refer to the [H3 Part 2 Noise assessment and control](#) guidance.

## Groundwater Monitoring

Groundwater monitoring (requisite surveillance) will be required at any site that has a groundwater activity included in the permit. However, the Environment Agency consider it to be best practice for all oil and gas sites to undertake groundwater monitoring, even if this is not required as part of a groundwater permit.

Monitoring will be determined by a conceptual site model that sets out the hydrogeological regime and identifies all groundwater bearing units and any interdependent water features. Your monitoring regime should reflect the different activities that will take place over the lifetime of your site. In particular, plan for how your activities may change over time, for example, from lower risk activities, such as drill and core operations, to higher risk activities, such as some forms of well stimulation.

The only situation in which groundwater monitoring will not be required at a specific site is when an appropriate level of hydrogeological risk assessment has been carried out and it can be clearly demonstrated that there are no groundwater, or groundwater dependant, receptors in the vicinity that may be impacted by the proposed activities.

You need to monitor groundwater in areas where activities could cause a decline in groundwater quality or have a detrimental impact on sensitive receptors. It is also important that groundwater is monitored where the activities could lead to the Water Framework Directive objectives being contravened, especially regarding the prevention of deterioration of surface water bodies or groundwater bodies. In specific hydrogeological circumstances we may require monitoring of groundwater in deeper geological horizons that are not classified as groundwater bodies.

Talk to the Environment Agency before you install any monitoring boreholes. Installation and operation of monitoring boreholes must be carried out in a way that does not lead to pollution of groundwater:

- the number and location of monitoring boreholes will depend on the characteristics of the site
- you may need to install groundwater monitoring points outside the site boundary
- there should be a sufficient number to identify the direction of groundwater flow across the site and consider any potential receptors. This should also include any offsite potential pollution

sources. This is important in understanding whether any quality changes in the groundwater are being caused by the site or whether they are due to other influences away from the activity

- you may also need to monitor other groundwater dependent water features, such as springs and wetlands
- you may also be required to monitor off-site monitoring points owned by third parties

The document '[Guidance on the design and installation of groundwater quality monitoring points](#)' provides further information.

You should commence baseline monitoring before you start activities on site to establish existing initial groundwater quality.

The Petroleum Act 1998 requires that for high volume hydraulic fracturing (ie “associated hydraulic fracturing”) the level of methane in groundwater has, or will have, been monitored in the period of 12 months before the hydraulic fracturing begins. To obtain your Hydraulic Fracturing Consent, you will need to demonstrate to DECC that you have undertaken 12 months groundwater methane monitoring. This monitoring may be included in your Groundwater Monitoring Plan which you will submit to the Environment Agency as part of environmental permitting, although this not a requirement under EPR.

In other cases monitoring requirements will depend on the hydrogeological conditions. As a guide:

- in areas where there is a good understanding of groundwater quality, for example on principal aquifers where the Environment Agency has carried out baseline quality monitoring work, fewer samples may be needed than in locations where there is limited existing data
- a basic baseline data set will consist of a minimum of 3 sets of data taken over a 3 month period, to observe natural variations. This should be done prior to any drilling taking place
- more samples will be needed where it is necessary to identify seasonal variations

You should analyse the groundwater for any chemicals that are likely to be used on site during the life of the permit, as well as the likely constituents of flowback fluid and basic sewage parameters. The main constituents of concern are likely to be methane, hydrocarbons, salinity, metals and ammonia. Refer to your site risk assessment, consider known local groundwater sensitivities and talk to the Environment Agency to determine the range of parameters you should monitor. These will be specified in the permit.

Following decommissioning the Environment Agency would generally require groundwater monitoring based on a site specific risk assessment to continue until we are satisfied that there is no ongoing risk to the environment.

## **Surface water monitoring**

If your site has a release point to surface water, ground or groundwater and there is the potential for that release to be anything other than clean water, you may need a permit for this activity. You may also need to monitor the discharge by taking samples prior to discharge and analysing them.

To decide what techniques you should use to sample and analyse your releases to surface water you should refer to our [M18 monitoring of discharges to water and sewer](#) guidance.

In positioning surface water monitoring locations, at least one should be located upstream of the site and at least one located downstream, to allow comparison of water quality coming into and out of the site.

The location should be carefully selected to make sure that when samples are collected, the act of collecting the sample does not influence the result by mixing the water column or artificially creating turbidity. If applicable avoid collecting samples close to banks or bed, as this can adversely disturb the water column when collecting the water sample.

It is important that external influences do not have an impact on the surface water samples being collected. These include making sure the bed is not disturbed when the sample is collected, aeration during filling and contamination of the sample by algae.

## Water resources monitoring

Your abstraction licence will set out conditions including when, where, how much and for what purpose you can abstract water. You will have to measure how much water you abstract and send details to the Environment Agency. For further details visit our [water management: managing your water abstraction or impoundment](#) guidance.

# Compliance

The Environment Agency will adopt a compliance assessment plan for each site that sets out how they will measure the operator's compliance and ensure that environmental risks are properly managed. This may include a variety of methods such as audit, site inspections, check monitoring, sampling, and reviewing operator records and procedures. The Environment Agency carries out spot checks to make sure that operators comply with their permits.

OPRA provides a risk rating scheme which the Environment Agency can use to allocate its regulatory resources. Resources are targeted at those facilities that pose the greatest risk to the environment. Further information on OPRA can be found [here](#).

Details on enforcement and sanctions for non-compliance can be found [here](#).

# Decommissioning Boreholes

Once the decision has been taken to decommission a well the closure must be in accordance with established procedures and the following regulatory provisions:

- the Borehole Sites and Operations Regulations 1995 [BSOR]
- the well aspect requirements of the Offshore Installations and Wells (Design & Construction etc) Regulations 1996 [DCR]
- Petroleum Exploration and Development Licence (PEDL) 1988
- [the Oil & Gas UK Guidelines for the suspension and abandonment of wells](#)

The process of plugging and abandoning a well will require the sealing of any permeable layers within the well, the remainder of the well will be filled with cement between two cement plugs the lower of which should be located at such a level as to prevent any further migration of material from the well into surrounding strata. The wellhead will be removed and the casings cut and sealed below ground level. This process will follow the Oil & Gas UK Guidelines for Suspension and Abandonment, and be reviewed by an independent well examiner and the HSE. The site will then be reinstated back to pre-operative state.

The principal extractive waste streams arising from well abandonment will be:

- surplus cement from well plugging, and
- broken concrete and cement from the removal of the well cellar and conductor

For wells drilled since 1 October 2013 these activities will be included in an operator's extractive waste permit. When the site is closed, a closure plan should be developed and submitted to the Environment Agency. We will not accept surrender of a permit until we are satisfied that there is no ongoing risk to the environment.

For those wells drilled prior to 1 October 2013 the Environment Agency will not require an application for an environmental permit for a mining waste operation, namely the management of extractive waste not involving a waste facility, for the abandonment or decommissioning of an oil or gas well, where all of the above and following requirements are met in full:

- the Petroleum Exploration and Development Licence issued by DECC is complied with in full:

- the activities do not include the management of extractive waste involving a waste facility: and
- the requirements of Article 4 of the Mining Waste Directive are complied with namely, that extractive waste is managed without endangering human health and without using processes or methods which could harm the environment, and in particular without risk to water, air, soil and fauna and flora, without causing a nuisance through noise or odour and without adversely affecting the landscape or places of special interest.

For full details read the Environment Agency's [regulatory position statement](#) .

# Disclosure of Information

The Environment Agency is required by law to maintain and make available public registers of information. It is recognised that some information that you give may be commercially sensitive but in some cases the Environment Agency are obliged to place information in the public domain.

## Public Register

For all permits that you apply for, the Environment Agency will place the permit application form and supporting information, the decision document and, if granted, the permit on the public register. Under the EPR, we can exclude from the public register commercial or industrial information where its confidentiality is provided by law to protect a legitimate economic interest. However, if the information relates to an emission to the environment or, taking into account the presumption in favour of including the information on the public register, the public interest is in favour of disclosure, we must place the information on the public register.

The Environment Agency can request monitoring data from you as part of your permit conditions. This monitoring data will be made available to the public on the public register. This monitoring data will be subject to the same assessment of commercial confidentiality as any information placed on the public register.

## Disclosure of chemicals information

As part of the application for a permit, the Environment Agency requires you to tell us all of the chemicals you propose to use. You are not required to list the chemical specifically against the commercial products that are being used; that is the exact composition of each product including the individual chemicals and precise proportions within each product, but, you must disclose information about the chemicals you will use in total and the maximum amount of each chemical. This includes information on discharges of chemicals which are subject to the 'de minimis' exclusion, that is, discharges that are of low volume and that have minimal pollutant concentration. This information allows us to consider their potential environmental impact.

The Environment Agency considers the injection of hydraulic fracturing fluids to be an emission. Therefore, we will disclose information on the chemical substances and their maximum concentrations on the public register, along with how much of the hydraulic fracturing fluid you expect to remain in the ground.

The Environment Agency assesses the hazards presented by chemicals on a case-by-case basis. We will not permit the use of 'hazardous substances', as defined in, and determined for the purposes of, the Water Framework and Groundwater Directives, for any activity, including hydraulic fracturing where they would or might enter groundwater, unless such use meets the definition of de-minimis set out in paragraph 3(3)(b) of Schedule 22 to EPR. The environment agencies of UK and Ireland and industry representatives work together to peer review hazardous substances' assessments before we submit proposals to public consultation. This process would not itself include information on where use of a chemical had been proposed.

## Environmental Information Regulations

Other information which the Environment Agency obtains after a permit has been issued, for example from an inspection or an audit, might not be placed on the public register. Members of the public can request this information under the Environmental Information Regulations 2004 (EIR) and they can also request information that has been withheld from the public register as being commercially confidential.

Under the EIR, there is also a presumption in favour of the disclosure of environmental information held by public authorities. There are certain exceptions to disclosure that we may apply, one of which is commercial confidentiality. As with the EPR, even if an exception to disclosure applies, we have to carry out a public interest test in which we balance the public interest factors in favour of disclosure of the information against those in favour of withholding the information, and in which we have to take into consideration the presumption in favour of release. This EIR test however has to be carried out when the information is requested and not when the information is given to

us. Again in EIR, the exception for commercial confidentiality cannot be applied to information relating to information on emissions.

When the Environment Agency is considering a request for information, we will usually consult with those who may be affected by its release, to allow them to make representations as to why they believe the information requested should be withheld. Circumstances may have changed since information was withheld from the public register. We take these representations into account when making the final disclosure decision.

When considering requests for information and requests that we exclude information from the public register we cannot take a blanket approach. We have to be able to identify the information which really is sensitive and consider whether that should be protected from disclosure. In doing so, we need to work together with the person or company who will be affected to ensure that we have a full understanding of the adverse effect that would occur if information became public. If the person requesting the information appeals our decision under the EIR, we have to justify refusal to the Information Commissioner. We need to be able to show what that negative effect will be and one of the ways we do this is by providing the correspondence with the affected person.

Because of the requirements of the Freedom of Information Act and EIR, we are not able to guarantee confidentiality to those sending information to us. Operators must be aware that, as a public authority, we are bound to comply with the legislation and should therefore consider the level of detail of information that they provide to us and whether it is more than we need to receive for the purpose for which it is provided. They should also identify, when submitting information, which parts are in their opinion sensitive and should not be disclosed. This will then enable us to consult with them more efficiently and work with them to ensure that we have the necessary evidence of adverse effect and public interest that we would need in order to justify withholding information from the public register or later in the event of an appeal under the EIR.

Defra's permitting core guidance sets out further information on commercial confidentiality: <http://www.defra.gov.uk/publications/files/pb13560-ep2010guidance-120309.pdf>).

## **Data protection**

The Environment Agency must comply with the Data Protection Act 1998 when we process or disclose information that you provide to us. The data protection notices that are included on application forms explain how we will process or disclose that information.



# List of abbreviations

ALARA	As low as reasonably achievable
BAT	Best Available Techniques
BSOR	Borehole Site and Operations Regulations
CIRIA	Construction Industry Research and Information Association
COMAH	Control of Major Accident Hazards
DECC	Department of Energy and Climate Change
Defra	Department for Environment, Food and Rural Affairs
EEMS	Environment and Emissions Monitoring System
EIA	Environmental Impact Assessment
EIR	Environmental Information Regulations
EPR	Environmental Permitting (England and Wales) Regulations 2010
HSE	Health and Safety Executive
IED	Industrial Emissions Directive
LTOBM	Low Toxicity Oil Based Muds
MCERTS	Monitoring Certification Scheme
MPA	Mineral Planning Authority
MSDS	Material Safety Data Sheet
MWD	Mining Waste Directive
NIA	NORM Industrial Activity
NORM	naturally occurring radioactive material
OPRA	Operational Risk Appraisal
RSR	Radioactive Substances Regulation
RWA	Radioactive Waste Advisor
SCR	Site Condition Report
SPZ	Source Protection Zone
TPH	Total Petroleum Hydrocarbons
VOC	Volatile Organic Compound
WFD	Waste Framework Directive

# Glossary

The glossary of terms below is provided to help you understand the language used in this technical guidance. Please note, the definitions provided are not necessarily legal definitions.

<b>Acid washing</b>	A wellbore acid treatment designed to remove scale or similar deposits from perforations and well-completion components. This treatment may be used to repair formation blinding and help restore the natural porosity of the formation. Acid-wash treatments generally do not include injection of treatment fluid into the reservoir formation.
<b>Appraisal</b>	The process of finding out how much oil or gas may be present and establishing if it has the potential to be developed commercially.
<b>Capacity</b>	The design capacity of the installation i.e. the maximum rate at which the installation can operate. It is not historical or actual production levels or throughput.
<b>Condensate</b>	A mixture of lighter short chain hydrocarbons that are present as gaseous components in raw natural gas, and which condense out at lower temperatures (below hydrocarbon dew point of the raw gas). The raw natural gas can be associated with crude oil (separate from oil but present in same formation, or dissolved in the crude) or not.
<b>Development</b>	The process of building production facilities and drilling first exploration and production wells.
<b>Discharge</b>	Direct or indirect introduction or input to surface waters or groundwater.
<b>Disposal</b>	Any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy.
<b>Drill and core</b>	The act of drilling a wellbore and recovering a core sample. A specific drill bit is used that allows a solid core to be extracted instead of crushed rock (cuttings). The core provides much greater geological data to be obtained than is possible from drill cuttings alone.
<b>Drill cuttings</b>	Small pieces of rock that break away due to the action of the bit teeth. Cuttings are screened out of the liquid mud system at the shakers and are monitored for composition, size, shape, colour, texture, hydrocarbon content and other properties by the mud engineer, the mud logger and other on-site personnel.
<b>Drilling [muds] fluids (oil based or water based)</b>	Any of a number of liquid and gaseous fluids and mixtures of fluids and solids (as solid suspensions, mixtures and emulsions of liquids, gases and solids) used in operations to drill boreholes into the earth. Classifications of drilling [muds] fluids can be based on the component that clearly defines the function and performance of the fluid: (1) water-base, (2) non-water-base and (3) gaseous (pneumatic).

<b>Enclosed flare</b>	A flare for which the flame is contained within a thermally insulated enclosure and there is provision for control of the combustion air flow to optimise combustion efficiency.
<b>Exploration</b>	The search for mineral deposits of economic value, including sampling, bulk sampling, drilling and trenching, but excluding any works required for the development of such deposits, and any activities directly associated with an existing extractive operation.
<b>Extractive waste</b>	Waste directly resulting from the prospecting, extraction, treatment and storage of mineral resources and the working of quarries.
<b>Flare</b>	A device for the thermal destruction of flammable gases.
<b>Flowback fluid</b>	Refers to the mixture of hydraulic fracturing fluid, which may include mobilised natural gas and formation water which returns to the surface following high volume hydraulic fracturing.
<b>Formation</b>	Any geological formation being referred to, such as the formation hosting the hydrocarbons or resource formation.
<b>Gas</b>	Any substance that is gaseous at room temperature (20°C) and atmospheric pressure (1.013 barg).
<b>Groundwater</b>	All water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil.
<b>Hazardous waste</b>	Waste as defined in regulation 6 of the Hazardous Waste (England and Wales) Regulations 2005. Hazardous substances include - substances or groups of substances that are toxic, persistent and liable to bio-accumulate, and other substances or groups of substances that give rise to an equivalent level of concern.
<b>High public interest</b>	When determining high public interest we consider each site on its individual merits. A site of high public interest is one that is generating a high level of public and other stakeholder interest or is perceived as being linked to a controversial issue.
<b>Hydraulic Fracturing (Associated hydraulic fracturing)</b>	<p>“Associated hydraulic fracturing” means hydraulic fracturing of shale or strata encased in shale which—</p> <p>(a) is carried out in connection with the use of the relevant well to search or bore for or get petroleum, and</p> <p>(b) involves, or is expected to involve, the injection of—</p> <p>(i) more than 1,000 cubic metres of fluid at each stage, or expected stage, of the hydraulic fracturing, or</p> <p>(ii) more than 10,000 cubic metres of fluid in total.</p>
<b>Minded to decision</b>	If we decide that the permit application is of high public interest, and we are minded to grant a permit, then we will carry out a second consultation.
<b>Natural gas</b>	A mixture of hydrocarbon compounds and some non-hydrocarbons, which exist either in gaseous state or in a solution, often associated with oil and coal. Methane is the main component, typically 90% of the gas, followed by ethane.
<b>Produced waters</b>	A term used to describe those waters resulting from the exploration and extraction of hydrocarbons that are produced

	from a well alongside oil and gas (with the exception of flowback fluid).
<b>Production</b>	Commercial production of oil and/or natural gas from production wells.
<b>Permit</b>	An environmental permit granted under the Environmental Permitting (England and Wales) Regulations 2010 by the Environment Agency which allows the operation of a regulated facility subject to certain conditions.
<b>Radioactive waste</b>	Waste which consists wholly or partly of a substance or article which, if it were not waste, would be radioactive material; and/or a substance or article which has been contaminated in the course of the production, keeping or use of radioactive material, or by contact with or proximity to other radioactive waste. Waste includes any surplus which constitutes scrap material or an effluent or other unwanted surplus substance arising from the application of any process, and any substance or article which requires to be disposed of as being broken, worn out, contaminated or otherwise spoilt; and any substance or article which, in the course of carrying out any undertaking, is discharged, discarded or otherwise dealt with as if it were waste is presumed to be waste unless the contrary is proved.
<b>Radionuclides</b>	An unstable form of a chemical element that radioactively decays, resulting in the emission of radiation, also called a radioisotope.
<b>Rathole</b>	Extra hole drilled at the end of the well (beyond the last zone of interest) to ensure that the zone of interest can be fully evaluated
<b>Reservoir</b>	A subsurface body of rock having sufficient porosity and permeability to store and transmit fluids. Sedimentary rocks are the most common reservoir rocks because they have more porosity than most igneous and metamorphic rocks and form under temperature conditions at which hydrocarbons can be preserved.
<b>Resource formation</b>	The geological formation that contains the oil and gas resources.
<b>Site surface water</b>	Rainwater and/or surface run off accumulating within the site.
<b>Soakaway</b>	A subsurface structure into which surface water is conveyed to allow infiltration into the ground.
<b>Trade effluent</b>	This is any liquid matter, other than clean surface water and domestic sewage that is discharged from onshore oil and gas activities
<b>Waste</b>	Any substance or object which the holder discards or intends or is required to discard. Please see guidance at <a href="https://www.gov.uk/government/publications/legal-definition-of-waste-guidance">https://www.gov.uk/government/publications/legal-definition-of-waste-guidance</a> .
<b>Waste gas</b>	A gas which the holder discards or intends or is required to discard.
<b>Waste facility</b>	Any area designated for the accumulation or deposit of extractive waste, whether in a solid or liquid state or in solution or suspension, for the following time-periods: no time-period for Category A waste facilities and facilities for waste characterised

	<p>as hazardous in the waste management plan; a period of more than six months for facilities for hazardous waste generated unexpectedly; a period of more than one year for facilities for non-hazardous non-inert waste; a period of more than three years for facilities for unpolluted soil, non-hazardous prospecting waste, waste resulting from the extraction, treatment and storage of peat and inert waste. Such facilities are deemed to include any dam or other structure serving to contain, retain, confine or otherwise support such a facility, and also to include, but not be limited to, heaps and ponds, but excluding excavation voids into which waste is replaced, after extraction of the mineral, for rehabilitation and construction purposes.</p>
<b>Water abstraction</b>	<p>Where water is removed from a source of supply (river, watercourse, lake, estuary or groundwater), whether temporarily or permanently.</p>
<b>Well decommissioning</b>	<p>Typically includes plugging of wells; removal of well equipment, production tanks and associated installations; and surface remediation.</p>
<b>Well stimulation</b>	<p>A treatment performed to restore or enhance the productivity of a well. Stimulation treatments fall into two main groups, hydraulic fracturing treatments and matrix treatments. Fracturing treatments are performed above the fracture pressure of the reservoir formation and create a highly conductive flow path between the reservoir and the wellbore. Matrix treatments are performed below the reservoir fracture pressure and generally are designed to restore the natural permeability of the reservoir following damage to the near-wellbore area.</p>
<b>Well stimulation fluids</b>	<p>Refers to any fluids used in treatments to restore or enhance the productivity of a well. The two main groups are hydraulic fracturing fluids and matrix treatment fluids. Hydraulic fracturing fluids are designed to increase the flow of hydrocarbons to the well bore and will contain proppant and friction reducers along with the water. Matrix treatment fluids are typically acid-based and are designed to remove scale and other pore-clogging material from the immediate vicinity of the well bore; unlike hydraulic fracturing fluids they do not penetrate more than a few centimetres into the formation.</p>

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