

Shale gas and oil guidance for planners

The role of the Health and Safety Executive

Introduction

The Health and Safety Executive (HSE) is the health and safety regulator for Great Britain. This includes oil and gas exploitation both onshore and offshore. HSE's regulatory regime is long-established. It is also goal-setting. In other words, it sets a general goal to be achieved (as opposed to a process) and supplements this with more specific regulations that are particular to extracting gas and oil through wells, both onshore and offshore, including shale gas operations.

HSE's role is to ensure the well operator complies with specific health and safety regulations particular to the extraction of gas and oil through wells and to prevent, so far as reasonably practicable, those working at the site, or others who could be affected by the work (including members of the public), from suffering injury or ill health.

Well integrity is key to ensuring health and safety and protecting the environment. Therefore, health and safety regulations require that well operators must design, construct, operate and abandon the well in such a way that there can be no unplanned release of fluids.

The decision on where oil and gas operations can be conducted is a matter for the Mineral Planning Authority. Planning is a devolved matter in the UK – Wales and Scotland have separate legislation.

HSE is a statutory consultee on certain types of development within the notified zones of a major hazard site, major accident hazard pipeline, or HSE licensed explosive site. As with other mineral extraction sites, unconventional oil and gas extraction sites (including sites where hydraulic fracturing is used) do not fall within the criteria on which HSE must be consulted for land use planning purposes.

However, HSE is a non-statutory consultee and plays a role as the health and safety enforcing authority for these activities. The Department of Communities and Local Government (DCLG) guidance (<http://planningguidance.planningportal.gov.uk/blog/guidance/minerals/planning-for-hydrocarbon-extraction/>) for planners makes clear that the planning system should be focused on whether the development is an acceptable use of land and the impacts of that use. For the purposes of planning, the mineral planning authority should assume that the regulatory regime is appropriate and will operate effectively.

Shale oil and gas wells

Wells drilled to explore for shale oil or gas are designed and constructed to the same standards as conventional oil and gas wells that have been in operation in UK for a number of years. There have been 350 onshore oil and gas wells drilled in the UK since 2000.

All wells must be constructed to recognised industry standards (UK Onshore Oil and Gas, Oil and Gas UK) and are cased using steel and cement to ensure there is no unplanned release of fluids, so far as is reasonably practicable. Near the surface, where there is nearby groundwater, or an aquifer, there are normally three layers of this steel casing. The operator will conduct a range of checks on the well to test for leaks. Suitable well control equipment must also be provided to protect against blowouts (an unintentional and uncontrolled release of material from the well).

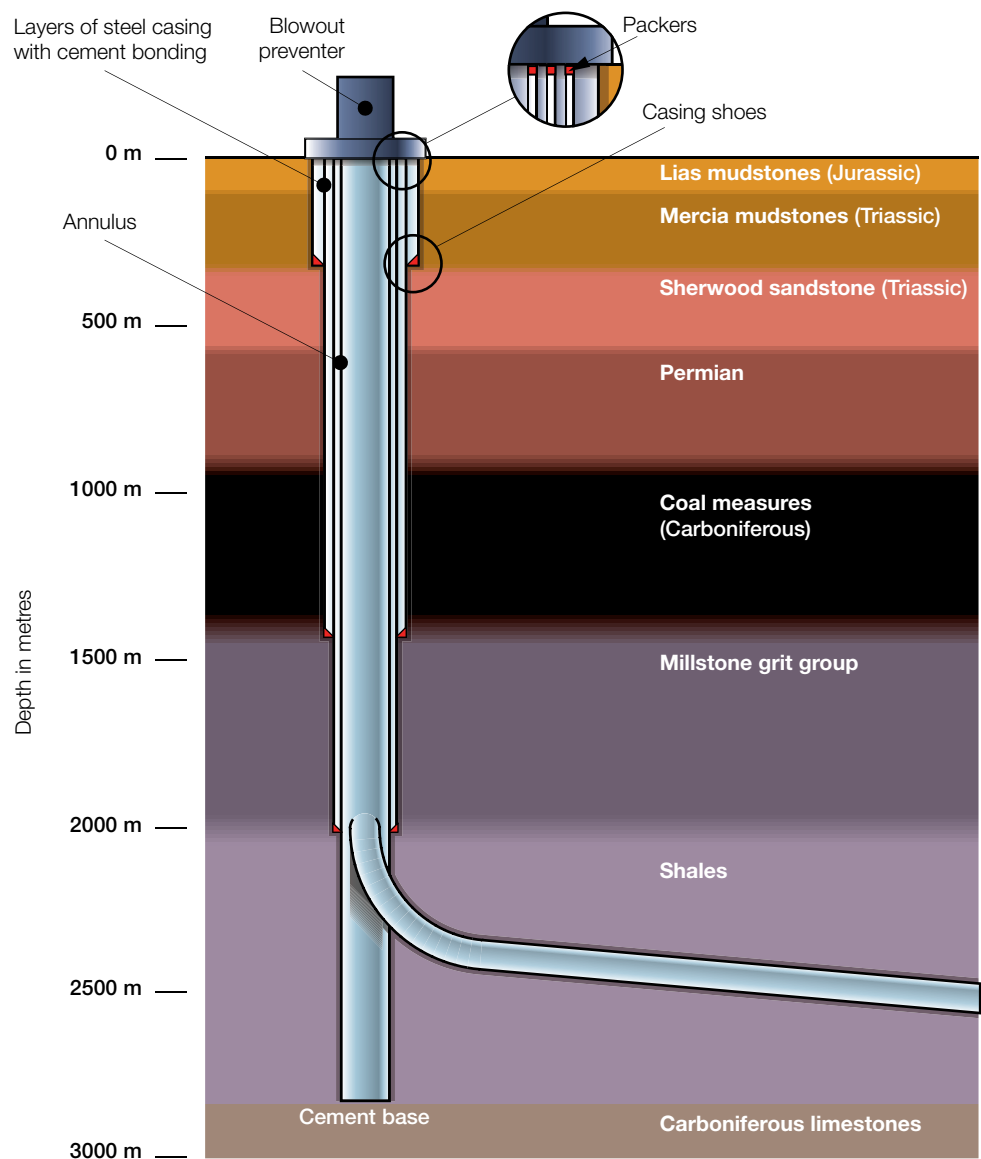


Diagram 1 Well casing features and pressure control/blowout prevention equipment

When operators have finished production, and before they leave the site, the well must be abandoned in such a way that there can be no unplanned release of fluids, as far as is reasonably practicable. This is done by blocking the well with steel plugs and for hundreds of metres with large volumes of cement.

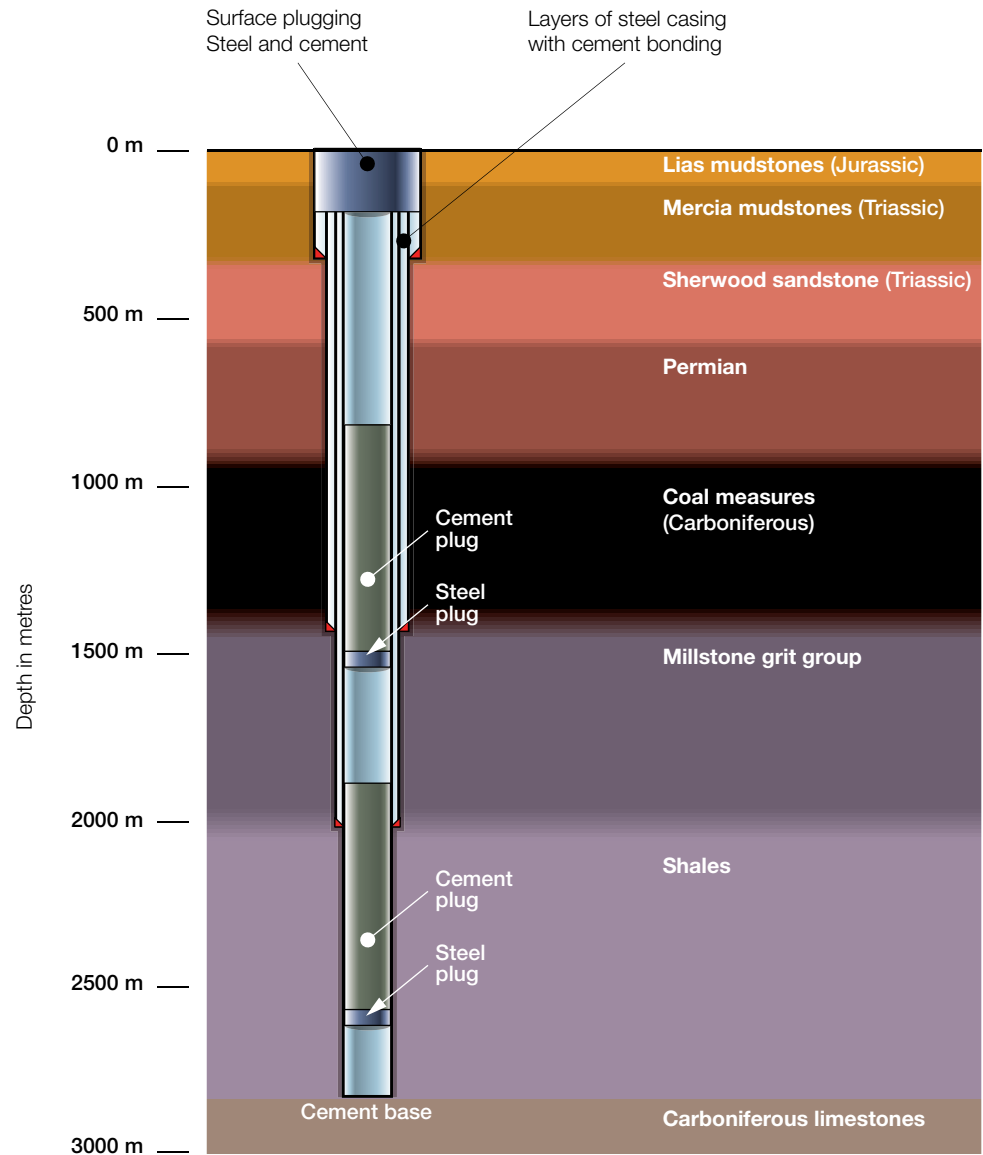


Diagram 2 An abandoned well indicating steel and cement plugs

Regulators and their roles

Planning and permitting

- **Department of Energy and Climate Change (DECC)** – issues licences for exploration of petroleum, also responsible for ensuring that operators address the risk of induced seismic events.
- **Environment agencies** – ensure that any environmental risks are properly managed. The operator may need a permit from the Environment Agency (EA) for groundwater extraction, handling of mining waste and naturally occurring radioactive materials, surface and groundwater discharge facilities.
- **Minerals Planning Authority** – determines planning applications and imposes planning conditions.

Ongoing regulation

- **Health and Safety Executive (HSE)** – ensures that the operator manages health and safety risks appropriately and complies with the relevant health and safety legislation.
- **Environment agencies** – ensure that any environmental risks are properly managed and permits are complied with.
- **Minerals Planning Authority** – ensures operators adhere to the planning conditions.

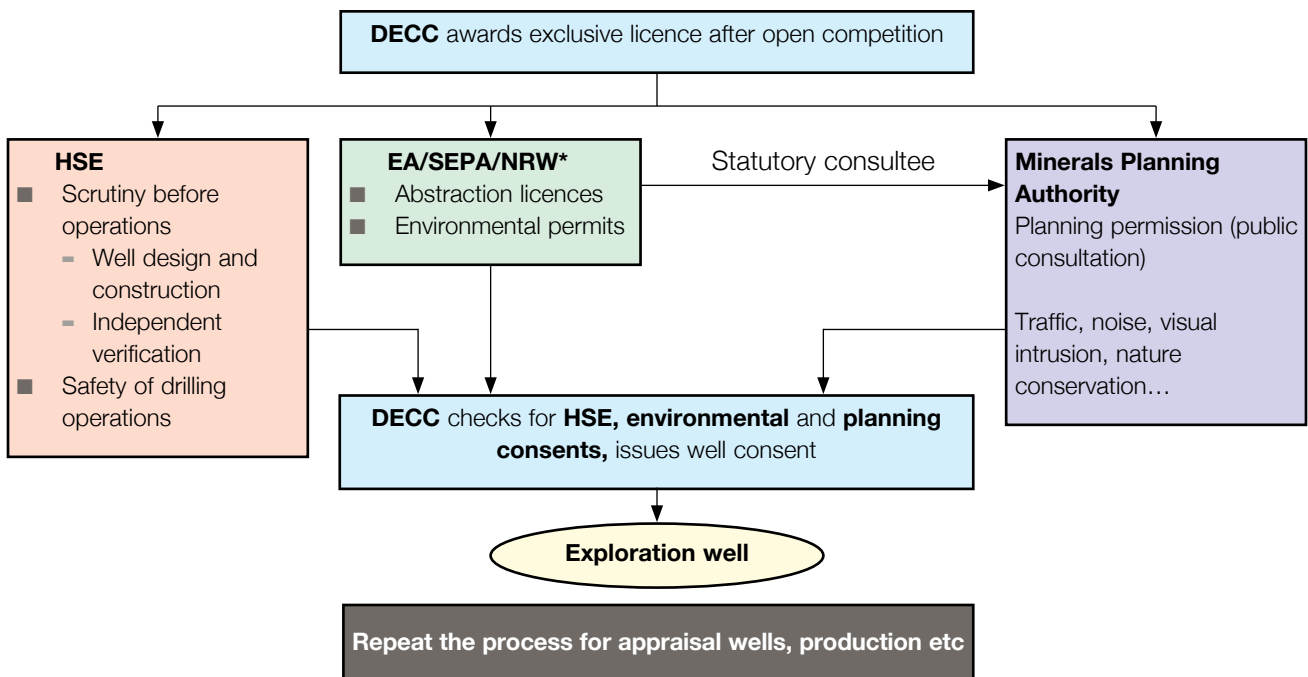


Diagram 3 Regulatory road map

* SEPA – Scottish Environmental Protection Agency
NRW – Natural Resources Wales

Health and safety regulations applicable to onshore wells

HSE's regulatory regime is long-established and goal-setting. The general duties under the **Health and Safety at Work etc Act 1974 (HSWA)** require risks to workers and the public to be reduced so far as reasonable practicable. This is supplemented with more specific regulations particular to the extraction of gas and oil through wells, which includes shale gas and oil operations.

The Borehole Sites and Operations Regulations 1995 (BSOR) apply to all onshore oil and gas wells. These Regulations require notifications to be sent to HSE about the design, construction and operation of wells, and the development of a health and safety plan which sets out how risks are managed on site.

The Offshore Installations and Wells (Design and Construction etc) Regulations 1996 (DCR) include specific requirements for all wells, whether onshore or offshore, and include well integrity provisions which apply throughout the life of shale gas or oil wells. They also require the well operator to send a weekly update to HSE during the construction of the well so that inspectors can check that work is progressing as described in the notification.

This combination of duties ensures that HSE is provided with information at key stages in the lifecycle of a well and allows HSE inspectors to assess whether risks are being adequately controlled and, if not, to take the appropriate regulatory action.

How HSE regulates shale gas activity

HSE's intervention approach has two main elements:

- Specialist well engineers help develop best practice standards for the industry as a whole with the United Kingdom Onshore Oil and Gas (UKOOG). All members of UKOOG have agreed to comply with these standards. The latest standards <http://www.ukoog.org.uk/onshore-extraction/industry-guidelines> were published in February 2013.
- The second element is to use risk-based interventions on particular sites and operators and ensuring well integrity. HSE uses its team of expert wells engineers who cover all types of hydrocarbon wells both on- and offshore. An oil or gas well is a complex engineered construction, most of which is below ground and not accessible to visual inspection. HSE therefore takes a lifecycle approach to well integrity, using the notifications and weekly well reports as well as meetings with the operator and on-site inspection to ensure the operator is managing the risks appropriately.

What information is provided to HSE and when?

Well notification(s) submitted by the operator

To comply with BSOR, the well operator must submit a notification to HSE at least 21 days before work commences. It consists of information on the design and construction of the well including:

- the design of the well;
- equipment to be used;
- programme of work;
- location, depth and direction of the borehole;
- its relationship with other wells and mines;

- the geology of the drilling site;
- risks identified with the work and how these risks will be managed.

These notifications allow HSE to assess the well design before construction starts. This is a key phase of work where the vast majority of issues likely to have an impact on well integrity will be identified and addressed by the well operator. It includes ensuring that safety features are incorporated into the design. Inspectors will contact the operator if they have any concerns or queries about the information supplied.

Further notifications are required if there is a material change to the information previously supplied in a notification, if the well is redrilled and before the well is abandoned. Further information is in Annex 1.

Weekly operations reports

To comply with DCR, the operator must report to HSE every week during construction of the well, if the well is redrilled and during work to abandon the well. This provides HSE with assurance that the operator is constructing and operating the well as described in the notification. If they are not, HSE can take the appropriate regulatory action.

The weekly report gives details of all work that has taken place since the previous report including:

- well integrity tests;
- the depth and diameter of the borehole;
- the depth and diameter of the well casing;
- details of the drill fluid density which allows the inspector to gauge the pressure in the well and identify any stability issues.

Reportable incidents

There is also a specific set of occurrences that the well operator must report to HSE under RIDDOR (Reporting of Injuries, Diseases and Dangerous Occurrences Regulations):

- a blowout, ie an uncontrolled flow of well fluids;
- the unplanned use of blowout prevention equipment;
- the unexpected detection of H₂S (hydrogen sulphide – an explosive gas);
- failure to maintain minimum separation distance between wells;
- mechanical failure of any safety-critical element of a well.

Reporting of well incidents enables HSE to investigate those that would have an effect on well integrity and ensures the well operator secures improvements to their operations. Where the regulations have been breached the HSE can take enforcement action including prosecution.

Working with the Environment Agency

HSE has had an agreement with the Environment Agency (EA) since 2012 covering joint regulation of shale gas operations:

www.hse.gov.uk/aboutus/howwework/framework/aa/hse-ea-oil-gas-nov12.pdf

HSE and EA inspectors will:

- meet all new and first-time operators of shale gas wells to advise them of their duties under the relevant regulations;
- jointly visit all shale gas sites during the exploratory phase of shale gas development.

The role of the independent well examiner

DCR requires the well operator to set up a well examination scheme and appoint a well examiner. This is an important quality control mechanism for the operator concerned and is an extra independent verification to ensure they are complying with the law. The well examination scheme and involvement of the independent well examiner is for the complete lifecycle of the well, from design through to abandonment.

The independent well examiner must be an independent competent person. They can be from the same company as the operator, but must be separate from the immediate line management chain of the well operations being examined. To date, for onshore shale wells the independent examiner role has been undertaken by organisations from outside of the operator's company. Where the independent well examiner is part of the same company as the operator, HSE checks that the operator has suitable management separation arrangements in place.

The well operator must send the following documents to the independent well examiner:

- the well construction programme and any material changes to it;
- reports on how the well is being constructed;
- reports on how the well is being monitored;
- at the end of the well's life, a plan for how it will be plugged and decommissioned.

The independent well examiner reviews these documents to ensure the well is designed, constructed and operated as required by the regulations, that it is in line with the well operator's policies and procedures, and following industry good practice.

The independent well examiner may also undertake site visits to check the progress of the work. This will allow them to examine well integrity and fracturing operations in real time, especially during the early stages of a development, to provide a further level of independent assurance.

Information from HSE

Pre-application

The minerals planning authority (including county and unitary councils) may contact HSE at the pre-application stage and HSE may offer advice on the health and safety regulatory regime and comments on well design and construction standards where the mineral authority has particular concerns.

We would not expect at this stage that there will be sufficient information available on the design of the well or the possible hazards associated with the geology and the drilling process for HSE inspectors to offer a firm opinion on the proposal. They will scrutinise the design of the well when they receive the well notification, before work starts.

Planning application

It is for the prospective operator to provide information required to produce any Environmental Impact Assessment required and demonstrate to the planning authorities that the well will be constructed, operated and abandoned in such a way that there will be no uncontrolled release of hydrocarbons or other substances that may be hazardous. HSE can provide advice on the health and safety regulatory

regime and comments on well design and construction standards where the minerals planning authority has particular concerns.

As part of the notification requirements of BSOR, HSE specialists also review the information provided by the operator at least 21 days before well drilling starts. This allows specialist wells inspectors to ensure that the well design and construction is to industry standards and that the well can be constructed, operated and abandoned safely.

Visits to monitor site operations

Representatives of the minerals planning authority may have concerns during or following site visits. Any concerns should be raised directly with the well operator. HSE can provide advice to representatives of mineral planning authorities if they still have concerns following the operator's response.

The HSE website details the process that can be used for raising health and safety concerns if people on or near the site may be at risk of injury or ill health (www.hse.gov.uk/contact/raising-your-concern.htm).

HSE does not regulate matters such as risks of aquifer contamination, seismic activity, drinking water quality or the disposal of waste from the site. Concerns on these matters should be raised with EA or DECC.

Abandonment

The operator must agree restoration and aftercare of the site with the planning authority. They must also send a notification to HSE before abandonment takes place, detailing their proposals for sealing and abandoning the well. This abandonment notification is a requirement of BSOR. The well must be abandoned in such a way that there can be no release of fluids. This is done by blocking the well for hundreds of metres with large volumes of cement and steel plugs.

The operator also has a duty under DCR to update HSE each week on the abandonment work so that activity can be checked against the plan set out in the notification. If HSE has any concerns, inspectors will take the relevant regulatory action.

Post-abandonment

The operator remains responsible for the well post-abandonment. HSE would only become involved if there was an issue with the well that constituted a risk to people's health and safety.

Annex 1 Well notification information

Information provided as part of the well notification must include the following;

Description of:

- the drilling rig and other plant to be used;
- pressure control equipment;
- how the work will be completed, including a timetable for the work;
- any activity that could lead to a leak of fluids.

Drawings of:

- the location and depth of the well;
- direction of the borehole;
- position compared to other wells and mine workings;
- the completed well.

Geological details:

- information on the geology including formations, strata and any fluids;
- any geological hazards that could cause fire or blowout;
- how the well design takes account of the geology;
- procedures in place to check the direction of the borehole.

Further information

For information about health and safety, or to report inconsistencies or inaccuracies in this guidance, visit www.hse.gov.uk/. You can view HSE guidance online and order priced publications from the website. HSE priced publications are also available from bookshops.

This guidance is issued by the Health and Safety Executive. Following the guidance is not compulsory, unless specifically stated, and you are free to take other action. But if you do follow the guidance you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance.

This guide is available at: www.hse.gov.uk/offshore/unconventional-gas.htm

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