

How HSE regulates onshore oil and gas

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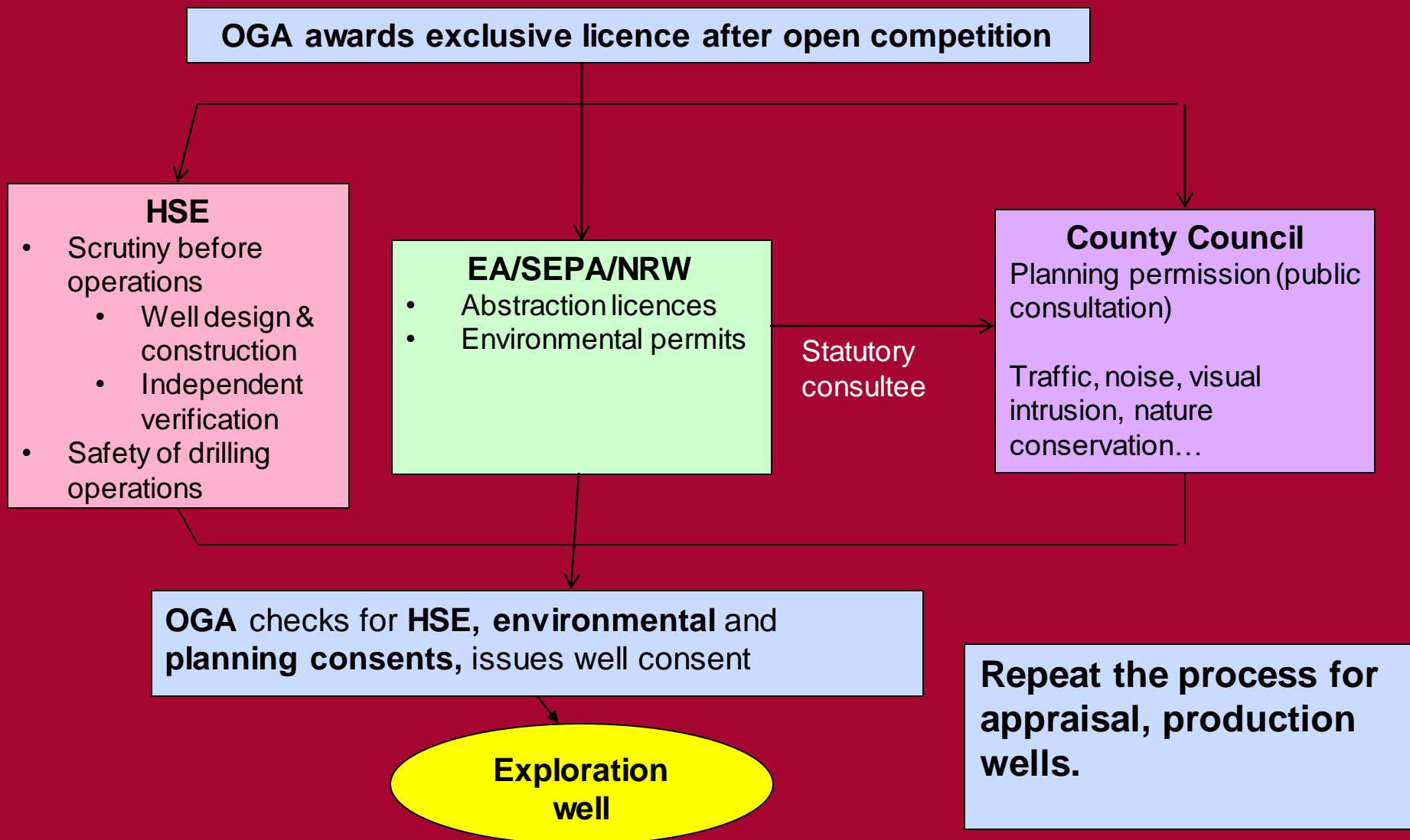
Health & Safety Executive



Health and Safety Executive's role

- Britain is one of the safest places to work in the world
- Over 20 years' experience of regulating the oil and gas industry on and offshore
- HSE has no involvement in setting UK energy policy or environmental and planning decisions
- Cooperation with other regulators and public bodies
- Operators are responsible for managing risks
- HSE regulates and holds them to account

Regulatory landscape for unconventional gas



UK Oil & Gas Regulations

- Health and Safety at Work etc Act 1974 (HWSA)
 - The Six Pack
- Borehole Sites and Operations Regulations 1995 (BSOR)
- Offshore Installations and Wells (Design and Construction, etc) Regulations 1996 (DCR)
- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR)
- The Offshore Installations (Offshore Safety Directive) (Safety Case etc) Regulations 2015

Goal Setting Legislation

Health and Safety at Work etc Act 1974 (HWSA)



- Based upon the Robens Report on Health and Safety at Work in 1972.
- Section 2 - Duty of employers to their employees
- Section 3 – Duty of employers and self-employed to those not in their employment.
- Section 7 – Duties of employees at work
- Section 20 – Powers of Inspectors

The Six Pack

- Management of Health and Safety at Work Regulations 1999
- The Workplace (Health, Safety and Welfare) Regulations 1992
- Provision and Use of Work Equipment Regulations 1992 (PUWER)
- Personal Protective Equipment at Work Regulations 1992 (PPE)
- Health and Safety (Display Screen Equipment) Regulations 1992 (DSE)
- Manual Handling Operations Regulations 1992

Borehole Sites and Operations Regulations 1995 (BSOR)



- Regulation 6 – Notice of commencement of drilling operations.
 - Schedule 1 outlines what is required within the Notification documentation
- Regulation 7 – The Health and Safety Document
- Regulation 8 – Duties of Operators
- Regulation 9 – Additional Health and Safety Requirements.
 - Schedule 2 outlines requirements for person in charge, competency, instructions, permits, maintenance.

Offshore Installations and Wells (Design and Construction, etc) Regulations 1996 (DCR)



- Regulation 15 – Design with a view to suspension and abandonment
- Regulation 16 – Materials
- Regulation 17 – Well Control
- Regulation 18 – Arrangement for examination
- Regulation 19 – Provision of drilling information
- Regulation 21 – Information, instruction, training and supervision.

Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR)



Reporting

- Hydrocarbon Releases
- Injuries
- Fatalities

Investigation

- Based on severity of incident/ injury
- All fatalities are investigated

The Offshore Installations (Offshore Safety Directive) (Safety Case etc) Regulations 2015 (SCR)



Safety Cases include:

- CMAPP (Corporate Major Accident Prevention Policy)
- SEMS (Safety and Environmental Management System)
- SECEs (Safety and Environmental Critical Elements)
- IERP (Internal Emergency Response Plan) PFEER & OPEP provisions together.
- Environmental Information.
- Regulation 11 – Establishment of a well examination scheme.

Control of Major Accident Hazards Regulations 2015 (COMAH)



COMAH Regulations are based on a Two Tier System:

- Low Tier COMAH Sites
 - Top Tier COMAH Sites
-
- Tier system is based on the quantity in tonnes of the applicable dangerous substance. For COMAH to apply, a dangerous substance must be present and equal or greater than the qualifying quantity set out in COMAH Regulations Schedule 1.
 - Can be classed as either ‘Dangerous Substances’ or ‘Categories of Dangerous Substances i.e. Toxic, Explosive, Flammable’

For example

- Hydrogen: Low Tier: 5 tonnes. Top Tier: 50 tonnes.
- Hence, COMAH Regulations cover gas storage sites such as in salt caverns.

Infrastructure Act - 2015

Recently implemented to add additional safeguards for onshore hydraulic fracturing operations.

- 1000mTVD depth requirement – “hydraulic fracturing consent”
- HSE Certificate – Confirmation of site visit, received BSOR well notification and received information required by DCR (site safety document)

What are the main hazards?



Uncontrolled release
leading to explosion or
fire

Fluids or water being
released to rock
formations or at surface,
with environmental
consequences

Before work starts

- Industry Standards
- Operator Consultation
- Auditing well examination scheme and appointment of independent well examiner
- Site Safety Document

Well Examination Scheme

- Examination by ‘Well Examiner’
 - Any part of a well
 - Information on design and construction of well, sub-surface environment, formations and fluids within them.
 - Operations in progress.
- Well Examiner Report
 - Findings
 - Remedial action
- Provides assurance that the well is properly designed, constructed and adequately maintained.

The Independent Well Examiner

- Important quality control for the industry
- Independent competent person
- Assess well design, construction and maintenance.
- Review the proposed and actual well operations to confirm they meet the operator's policies and procedures, comply with HSE's Regulations and follow good industry practice.
- HSE checks that the operator has these arrangements in place for the complete lifecycle of the well from design through to final plugging and decommissioning.

Health and Safety Document (BSOR)



- Appropriate for the hazards of the operation.
- Consultation with workforce.
- Demonstration of the risks to employees have been determined, assessed and safeguards in place.

Design of the well

The life cycle approach

- Well must be designed, constructed operated, maintained suspended and abandoned so that there can be no unplanned escape of fluids for its entire life cycle
- Operator must mitigate all risks
- All wells constructed to industry standards with suitable well integrity and well control
- The well must be designed with decommissioning in mind

Guidelines



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**Well Life Cycle
Integrity Guidelines**

Issue 3
March 2016

Well Life Cycle Integrity Guidelines, Issue 3 – March 2016

- Well Integrity, Barriers and Well Control
- Well Design and Operations Planning
- Operations (Drilling, Well Testing, Completion, Commissioning, Intervention)
- Management of late-life and end-of-life wells

Guidelines



UK Onshore Shale Gas Well Guidelines

Exploration and appraisal phase

Issue 3 (March 2015)

Shale Gas Well Guidelines, Issue 3 – March 2015

- Well Design and Construction (Operations Planning)
- Well Integrity – Operations (Production) Phase
- Fracturing/ Flow-Back Operations
- Fracturing Fluids

Well Notification Process

BSOR – Regulation 6(1)

- 21-days before operations commence
- Scrutiny by HSE wells specialists
- Details of well design
- Programme of work
- Safety equipment and rig to be used
- Assessment of geology and any other nearby workings
- Operators held to account against the notification

Construction of the well



Construction of the well

- **Weekly reports.**
 - **Contain details of:**
 - activity since the work started or since the last report
 - the diameter and depth of the borehole
 - the diameter and depth of the casing
 - drill fluid density
- **Purpose** - to check against information in the notification and that the pressure in the well and the well's stability is as expected.
- **Joint site visit – HSE and EA**
- **Infrastructure Act – issue of certificate**
- **Further notifications**

Operation of the well



Operation of the well

Any operations where there is a chance of loss of control must be notified to HSE

Specific incidents must be reported:

- A blowout or uncontrolled flow of well fluids
- The use of blowout prevention equipment to control an unplanned flow
- The unexpected detection of hydrogen sulphide
- Failure to maintain separation distance between wells
- Mechanical failure of any safety critical element of a well

HSE's powers of inspection and enforcement



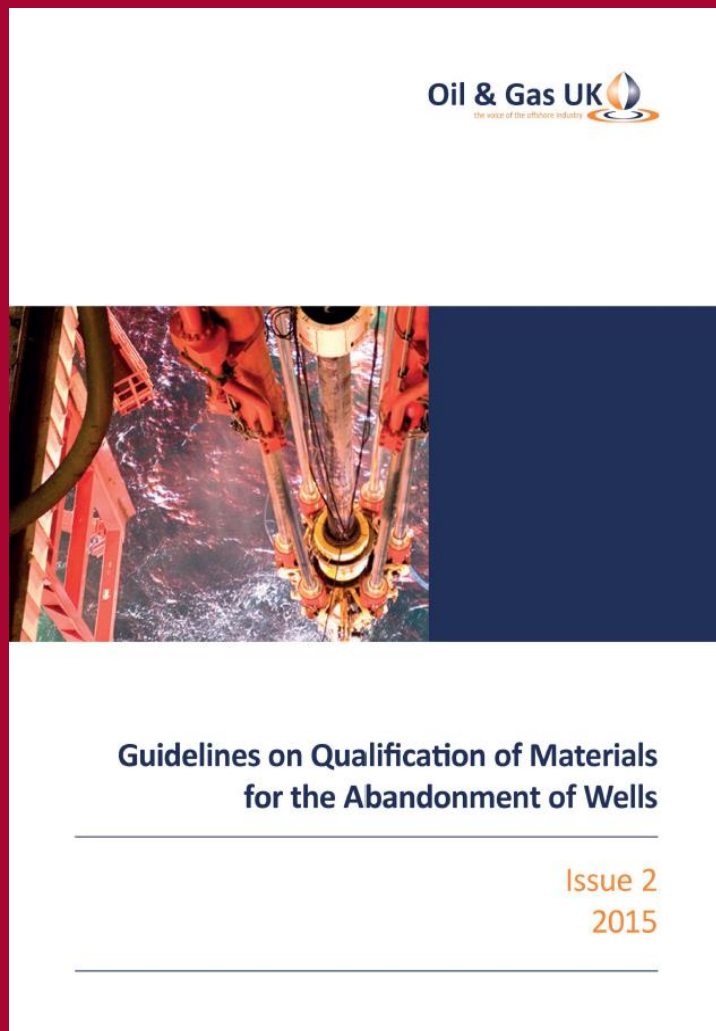
- Powers of entry
- Proportionate approach to seeking compliance
- Improvement Notices
- Prohibition Notices
- Prosecution

Decommissioning and abandonment of the well



- Design takes account of decommissioning
- Further notification and weekly operational reports must be submitted to HSE
- Well to be suspended or abandoned in a safe manner so that there can be no unplanned escape of fluids from the well or its reservoir
- Multiple barriers – Primary/ Secondary Cement plugs 500ft (Combination plugs 800ft), Environmental plug
- Verification – CBL/VDL – Pressure Testing - Tagged

Abandonment Guidelines



UK Oil and Gas Guidelines on Qualification of Materials for Abandonment of Wells – Issue 2, 2015

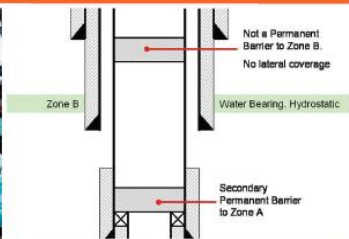
- Requirements of permanent barriers
- Operating conditions
- Functional failure modes
- Material Types

Abandonment Guidelines

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**Guidelines for the Suspension
and Abandonment of Wells**

Issue 3
January 2009



UK Oil and Gas Guidelines for the Suspension and Abandonment of Wells Issue 3, 2009

- Requirements of Permanent Barriers
- Verification of a Permanent Barrier
- Special Considerations (Multi-lateral, H₂S/CO₂, High Angle/ Horiz. Wells)
- Required Standards for Suspension
- Notifications and Record Keeping

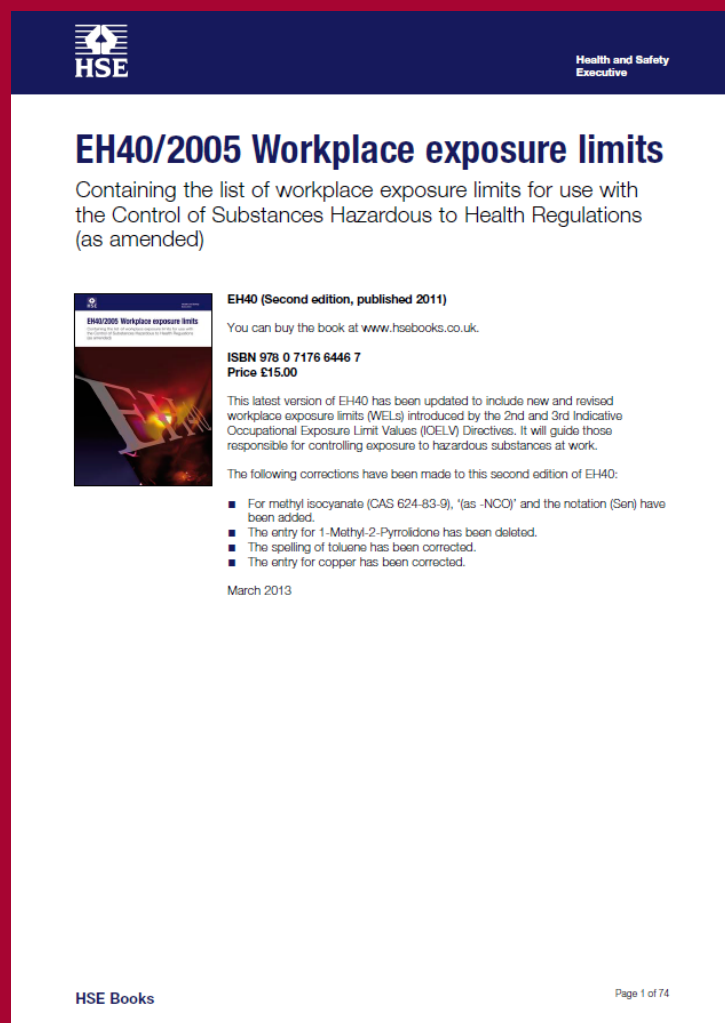
Sand use (respirable crystalline silica)



Preventing exposure

- sealed transport
- storage
- vacuum mixing equipment

HSE Guidance – Exposure Limits



EH40/2005 Workplace exposure limits
Containing the list of workplace exposure limits for use with the Control of Substances Hazardous to Health Regulations (as amended)

EH40 (Second edition, published 2011)
You can buy the book at www.hsebooks.co.uk.
ISBN 978 0 7176 6446 7
Price £15.00

This latest version of EH40 has been updated to include new and revised workplace exposure limits (WELs) introduced by the 2nd and 3rd Indicative Occupational Exposure Limit Values (IOELV) Directives. It will guide those responsible for controlling exposure to hazardous substances at work.

The following corrections have been made to this second edition of EH40:

- For methyl isocyanate (CAS 624-83-9), "(as -NCO)" and the notation (Sen) have been added.
- The entry for 1-Methyl-2-Pyrrolidone has been deleted.
- The spelling of toluene has been corrected.
- The entry for copper has been corrected.

March 2013

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- Based on concentrations of hazardous substances in the air, averaged over a specific period of time. (Time-weighted average)
- Two time periods used:
 - Long-term (8 hours)
 - Short-term (15 minutes)
- Silica, respirable crystalline
LTEL: 0.1 mg/m^3
- Duty for operators to have provisions for Health Surveillance