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UNITED KINGDOM
Role of the Oil & Gas Authority in Licensing, Consents and the Regulation of Induced Seismicity

Hydraulic Fracturing Bakken Safety Tour 2016

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Introduction

- Onshore oil and gas in the United Kingdom
- Role of the Oil & Gas Authority
  - Licencing Process
  - Consenting for Operations
- Regulation of Induced Seismicity
  - Hydraulic Fracture Plan
  - Traffic Light System
Crown Ownership
- Petroleum (Production) Act 1934

Over 2,200 wells drilled

Producing fields
- 30 Oil fields
- 8 Gas fields
- 2 Coalbed Methane fields

2014 Onshore Production
- <1% of annual UK production
- 5.9 million barrels of oil
- 1.6 billion cubic feet of gas
• We work with government and industry to make sure that the UK gets the maximum benefit from its oil and gas reserves

• We’re responsible for regulating oil and gas operations in the UK. This includes:
  – oil and gas licensing
  – oil and gas exploration and production
  – oil and gas fields and wells
  – oil and gas infrastructure
  – carbon storage licensing

• We cover both offshore UKCS and onshore operations in England
Responsibilities for the OGA

- Licensing process
- Operator competence
- Seismicity
- Shale geology
- Prospectivity
- Subsidence
- Fracture size and propagation
- Offshore / onshore comparisons
Collaboration between Regulators

Health & Safety Executive
- Well integrity
- Staff safety
- Well design and construction scrutiny
- Decommissioning of wells

Environment Agency
- Impact on aquifers
- Water usage
- Disposal of waste water
- Soil pollution
- Use of chemicals
- Site Restoration
- Methane emissions
- Air quality
- Disposal of Naturally Occurring Radioactive Materials

Central Government
Responsible for policy on:
- Energy security and Energy Mix
- Climate Change
- Economic impacts, jobs and skills
- Oil and Gas legislation
- Oversight of the planning system

Mineral Planning Authority
Focus on whether a development is an acceptable use of land. Issues may include:
- designated wildlife sites, protected habitats and species
- site restoration and aftercare
- noise associated with the operation
- visual impact and landscape character
- archaeological and heritage features
- Traffic

Oil and Gas Authority
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Public Health England
- Impacts on Public Health
Regulatory Process in England

**OGA** award of exclusive licence after open competition

Local Authority
Planning Permission (with public consultation)

Environment Agency statutory consultee

- **OGA** online application for well consent
- Hydraulic Fracture Plan submitted for a planned frac
- **OGA** checks operator competency, insurances and finances

Health & Safety Executive Notification

- **Environment Agency** Notices
  - Mining waste permits
  - Abstraction licences
  - Discharge and radioactive substance permits

Consent
Petroleum Exploration & Development Licence

- A PEDL grants exclusive rights “to search and bore for and get petroleum” in all the various stages of oil and gas exploration, appraisal; production and eventually decommissioning of the wells.

- PEDL licence covers conventional oil and gas, tight gas, coalbed methane (CBM), mine vent gas, oil shale and shale gas. A PEDL licence does not allow for underground coal gasification (UCG) or CO₂ sequestration.

- Licences do not give permission for operations, only grant exclusivity to licensees within a defined area.

- Drilling, fraccing or production require local planning permission, Access agreement(s) with relevant landowner(s), Environment Agency permits, HSE scrutiny and OGA well consent before any operations can commence.
14th Licence Round

- 295 blocks were applied for by 71 applicants.
- Considered **financial viability and capacity**
  - 95 applications
  - 15 rejected
- Interviews held with applicants
- Blocks marked against published Scheme
- Reduced to 159 blocks after evaluation of:
  - environmental sensitivity awareness
  - operator competency
  - decision not to award licences in Scotland and Wales
- Habitats Regulations Assessment (HRA) completed on all the blocks
- After Public consultation, 159 blocks were offered in Dec 2015
Round Results

- Total Work Programme bid:
  - 57 Drill or Drop wells
  - 40 Firm vertical wells
  - 14 Firm hydraulically fractured horizontal wells
  - Over 2,100 km of 2D
  - Over 2,000 km² of 3D

- The award of a Petroleum Exploration and Development Licence (PEDLs) do not automatically give permission for operations to begin.

- The necessary planning and regulatory consents will be required before any activities can take place.
Detailed Consent Process

**Licence Round Application**
- OGA reviews finances and competencies
- OGA assesses technical evaluation and work programme
- OGA awards PEDL Licence

**Hydraulic Fracture Plan Approval** (Seismicity and Monitoring Plan)
- Operator submits draft HFP
- Review with regulators: Operator, HSE, EA, OGA
- Operator resolves EA issues
- Operator resolves HSE issues
- Operator resolves OGA issues
- Operator revises HFP

**Collect and make data available**
- OGA: Seismicity & Geological Data
- EA: Emissions & groundwater monitoring

**Operator submits Environmental Risk Assessment**
- Landowner Permissions
- Statutory Consultees Inc. Env. Agency
- Mining Waste
- Abstraction
- Radioactive Substances

**WONS: Application for Consent to Drill**
- "Is the Environment Agency content for the OGA to issue Consent?"
- "Is the Health & Safety Executive content for the OGA to issue Consent?"
- OGA checks Planning Permission
- OGA reviews Finances, Competencies and technical plans for operations
- OGA issues Consent to Drill

**WONS: Application for Consent to test / complete Well with HVHF**
- "Is the Secretary of State content for the OGA to issue Consent?"
- "Is the Environment Agency content for the OGA to issue Consent?"
- OGA checks Planning Permission
- OGA checks S50 conditions
- Operator provides evidence to meet all 13 Section 50 Conditions
- DECC check S50 conditions
- OGA issues Consent to Complete Well
- OGA issues Consent to Test Well
- OGA issues formal EWT Consent

**Operator performs Extended Well Test**
- Operator hydraulically fractures Well

**Permissions & Permits to Drill Well and/or Hydraulically Fracture Well**
- Local Planning Authority
- Environment Agency Permits Including:
  - Mining Waste
  - Abstraction
  - Radioactive Substances

**OGA checks** Planning Permission
- OGA reviews Finances, Competencies and technical plans for operations
- OGA issues Consent to Drill
- OGA issues Consent to Test Well
- OGA issues formal EWT Consent

**HSE well design scrutiny**
Regulating induced seismicity:
The Hydraulic Fracture Plan (HFP) and Traffic Light System
• Preese Hall-1 was the first HVHF test in the United Kingdom
• Two small earthquakes were recorded in the Blackpool area in Spring 2011 during frac operations
  – Tremors measured Magnitude 2.3 and 1.5 on the Richter scale
• Moratorium on Hydraulic Fracturing imposed by government until 2012
• Report by the Royal Society recommended the introduction of new regulatory requirements
Figure 24: Overview of injection volume and seismicity of all treatment stages in well PH1. More small events were recorded in May because the monitoring system was improved with local stations.

Geomechanical Study of Bowland Shale Seismicity, C.J. de Pater and S Baisch, 2011
Log scale – a whole number increase represents a tenfold increase in seismic energy
### Historical seismicity in Britain

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**Latest News**

- MAGNITUDE 2.8 ML OAKHAM, RUTLAND, EARTHQUAKE 22 SEPTEMBER 2015
- MAGNITUDE 4.1 ML SOUTHERN NORTH SEA EARTHQUAKE 6 AUGUST 2015
- MAGNITUDE 4.2 ML RAMSGATE, KENT, EARTHQUAKE 22 MAY 2015
- NEW OLLERTON EARTHQUAKES

[http://www.earthquakes.bgs.ac.uk/earthquakes/UKsignificant/index.html](http://www.earthquakes.bgs.ac.uk/earthquakes/UKsignificant/index.html)
Basis for Traffic Light System

From Styles et al 2015, Schatzalp Workshop
Hydraulic Fracture Plan: Seismicity & Monitoring Plan

HFP must be agreed for operations, including stages, pumping rates, pressures and volumes to mitigate induced seismicity.

Monitor background seismicity and model injection extent and effect on stress field.

BGS long term earthquake monitoring.

Evaluation of location, orientation and extent of the induced fractures.

3D seismic to map the subsurface & identify faults.

Traffic Light System real time earthquake monitoring during fracking.
1) A depth structure map showing **mapped 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 operations could reactivate existing faults.

2) Information on the local background seismicity and assessment of the risk of induced seismicity.

3) Summary of the **planned operation**, including perforation stages, pumping pressures and volumes and predicted extent at each stage.
4) Proposed method for monitoring fracture height to **identify where the fractures are** within the target formation and ensure that they are not near the EA permitted boundary.
5) A description of proposed real-time traffic light scheme for seismicity
The OGA is responsible for both offshore UKCS and **onshore** operations in England.

OGA make checks at key **consent** stages i.e. Drilling, Fraccing, Field Development.

Regulators work closely together in evaluating applications for hydraulic fracturing.