Operational Perspective: Managing Environmental Risks Associated with Unconventional Oil and Gas Exploration and Production

Examining the Environmental & Hydrogeological Impacts of Shale Gas Exploration & Production

THURSDAY 29th January 2015

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1. About UKOOG
   - Onshore Oil and Gas - A very brief history!
   - Driving Industry Best Practice

2. Operating in sensitive areas & managing the environment

3. Establishing Transparency
   a. Environmental Baselines
   b. Well Integrity – A Key Issue!
   c. Integrated Water Management
   d. Challenges and Benefits
About UKOOG

- Enhance the profile of the whole onshore industry (both conventional and unconventional);
- Promote better and more open dialogue with key stakeholders;
- Deliver industry-wide initiatives and programmes;
- Ensure the highest possible standards in safety, environmental management and operations.

To act safely and with environmental sensitivity
To engage openly with local communities
To provide a UK based solution to our energy needs
To create jobs and economic growth
UK Onshore – building on history

- Long history
- >2100 wells drilled
- Largest onshore oilfield in Western Europe
- c120 sites in c30 fields
- Current oil & gas prod- c25,000 (barrels of oil equivalent per day)
- BGS - Shales
  - Bowland estimates gas in place of 1,300 tcf
  - Weald oil in place of 4.4 billion barrels
  - Central Belt of Scotland estimates: gas in place of 80 tcf & oil in place 6 billion barrels
UKOOG – Environment – Driving Best Practice

**Environment (Example)**
- Adherence to 17 EU Directives through 8/9 permits
- All sites involving hydraulic fracturing
  - Early stage environmental risk assessment (ERA)
  - Environmental impact assessment (EIA)
- Public disclosure of Fracture Fluid Composition
- Public disclosure of Flow-back Fluids
- Public disclosure of water sourcing and use/re-use
- Monitoring system before, during and after operations

- UKOOG Well Guidelines ‘Jan 13’ – driving consistently applied best practice
- Establishment of BAT (Best Available Techniques)
- Environmental Baselines Guidelines - Commitment to Disclosure and Transparency
- Setting industry standards
Referring to the “industrialisation of the north!” …

“A two-hectare site could potentially support a 10-well pad and a production phase of 100 such pads would require just 200 hectares, or two square kilometres”
(Source: IOD Report April 2013)

The onshore industry has a long established track record of developing oil and gas fields in sensitive areas, examples include:

- Site located in the South Downs National Park
- In the middle of a golf course
- In the middle of housing developments
- Adjacent to a local school
- Europe’s largest onshore field- Wytch Farm- is located in and around the highly sensitive Poole Harbour area
- Pad drilling will help reduce the environmental impact
Managing the environment

- A critical element in any operation is returning the environment to its original contours and biodiversity
- Operating with minimal impact – regulatory regimes in place are significantly robust to ensure risks are mitigated
- A measured approach to site development – minimising land-take and disturbance
- No ‘one size fits all’ methodology
Establishing Transparency
Establishing Environmental Baselines

A number of Drivers!

- Building the Social Licence to Operate
- Supporting Permitting & Consenting
- Laying Foundations - Culture of Transparency and Disclosure
- Facilitating the Reinstatement of sites
- Managing Politics!
- Addressing Future Challenges
UKOOG – Baselines Guidelines

Context
- Risk Based – Science led
- Conceptual Site Model
- Source – Pathway - Receptor
- Draws on Best Practice from other sectors
- Avoid a ‘blanket approaches’
- Covers all Onshore Oil and Gas
- Covers Exploration and Production
- Aimed for 12 pages – got 25!

Receptors
In Scope –
- Soil, Air, Groundwater, Surface water, Ground Gases, NORM and Ecology

Outside Scope –
- Nuisance (Dust, Noise etc)

Baseline Guidance - Published on 7th January 2015
Decommissioning ‘Technical Assessment’ current underway
Well Integrity is Key in Protecting the Environment

Key elements:
- Good well design
- Effective cementing (CBL)
- Pressure testing
- Good Operational Management and Maintenance
- Making data available to 3rd parties
- Inspection at key stages – proportionate to risk

Must recognise that well integrity consists of a number of elements

How much transparency is needed?
### Integrated Water Management – Inputs & Outputs

<table>
<thead>
<tr>
<th>Water Supply/Delivery</th>
<th>Site Management and Operational Prep</th>
<th>Operational Use and re-use</th>
<th>Waste Management</th>
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<tbody>
<tr>
<td>Source</td>
<td>Fresh water storage</td>
<td>Drilling</td>
<td>Waste water Storage</td>
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<td>Quality</td>
<td>Site management best practice</td>
<td>Well Stimulation</td>
<td>Mgt of Solids</td>
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<tr>
<td>Connection</td>
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<td>Produced water Mgt</td>
<td>NORM</td>
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<td>Re-injection</td>
<td>Mgt of Solids</td>
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<td>Re-cycling</td>
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<td>Waste flow back fluid transportation</td>
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<td>Surface Water waste</td>
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**Cross Cutting Areas**

- Analysis Suites - Monitoring
- Best Available Techniques – All areas
- Drawing on International Experiences
- Innovation – eg Waste water as a resource for the industry
What is the Industry Doing?

Governance
- UKOOG led Steering Board: 3 times a year
  - O&G Operators
  - Academics
  - O&G Supply Chain
  - Water and O&G ‘Technical’ Experts
  - Water Industry

Current Position
- Discussion Paper circulated – Autumn 14
- Initial meeting hosted – early December 14
- Terms of Reference established
- Sub-groups to be identified and 6 month plan formulated

Priorities
- Cross-cutting quick wins – eg analysis suites, BAT for Monitoring ...
- ‘Sectoral’ groups to be established – networks/leadership
- Task and Finish activities by ‘sectoral’ area
Challenges and Benefits

- Transparency is Critical in Establishing the Social Licence
  - Environment Data - Baselines through to Permit Relinquishment
  - Data on Well Design and Management
  - Management of Water as a Resource

- We must determine just how much Information should be publically available? (Interpretation of data is a major challenge)

- A ‘One Stop Shop’ or a ‘Shop Window’ approach!

- Bringing ‘Independent Monitoring’ into the debate
  - Lancashire Monitoring - BGS

- Enhanced research programme - groundwater, regional air quality, seismicity and ground movements will be independently monitored at two proposed hydraulic fracturing sites in Lancashire. This will be carried out by a UK consortium led by the BGS with university partners (Birmingham, Bristol, Liverpool, Loughborough and Manchester).