

Managing the Environmental Risks from Shale gas Exploitation

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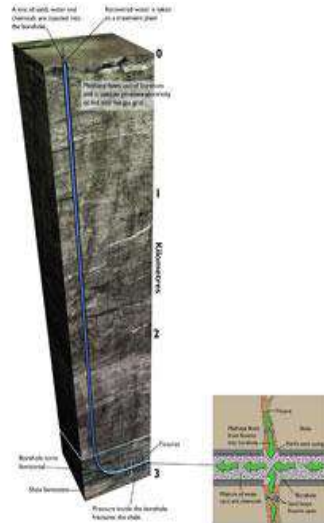
Overview

- ➔ The Environment Agency and our role
- ➔ What are the risks to or Environment from Hydraulic Fracturing, Air, land and water?
- ➔ What is current regulation and are permits required?
- ➔ The Importance of the location, geological setting and well construction in protecting groundwater.

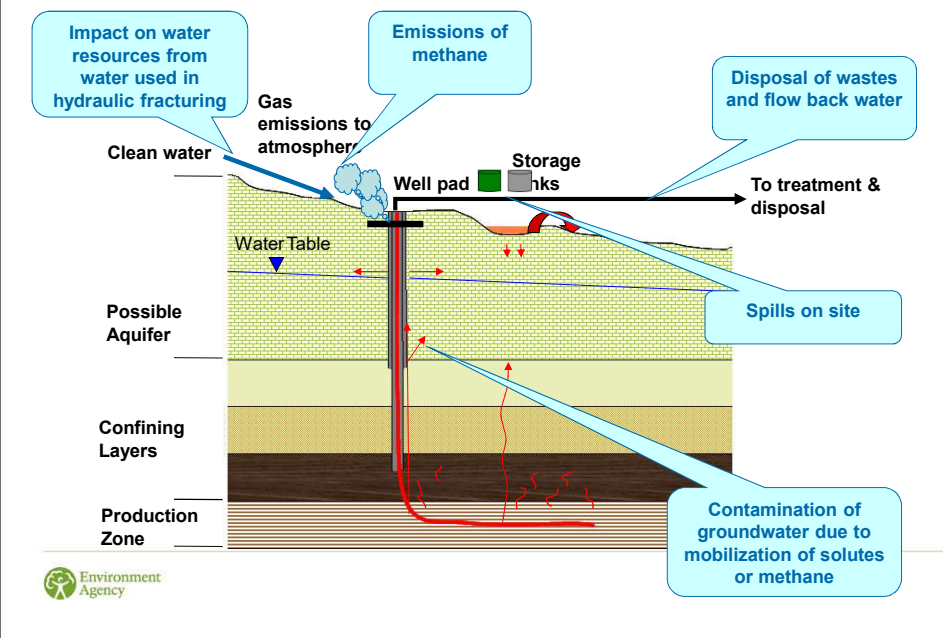
The diagram shows a cross-section of the earth's crust with various geological layers and features. From top to bottom, the layers are: Land surface, Coalbed methane (a dark, wavy layer), Conventional associated gas (a red layer), Seal (a grey layer), Sandstone (a yellow layer), Tight sand gas (a red, irregular shape within the sandstone), and Gas-rich shale (a dark, wavy layer at the bottom). Two oil wells are shown: one on the left labeled 'Conventional non-associated gas' which extends to a red gas reservoir, and another on the right labeled 'Conventional associated gas' which extends to a red gas reservoir. A third well is shown extending from the surface down into the Gas-rich shale layer, where it is connected to a red, irregular shape representing tight sand gas. The U.S. Energy Information Administration logo is in the bottom left corner.



- Developing a well pad & sinking a borehole to the target rock
- Hydraulically fracturing the rock through the pressurised injection of a mixture of water, sand & chemicals to allow gas to come to the surface.
- Flow-back of the used fracturing fluid potentially containing natural gas - predominantly methane) salts, metals and NORM.
- Treatment & disposal of waste flow-back water.
- Suspension or decommissioned.



Environmental risks from shale gas extraction



Open and transparent regulation

- ➔ Principal Environmental Regulator (England)
- ➔ Environmental permits are needed before drilling
- ➔ Risk based & Site specific – one size doesn't fit all
- ➔ Permits are consulted upon and public interest may be important
- ➔ Inspection and check monitoring in line with national standards & open to scrutiny

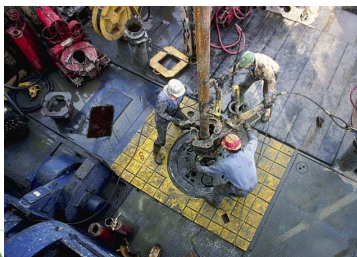
Applying regulation

- ➔ Approval of components of fracturing fluids
- ➔ Permit requirements where a groundwater resource is at risk
- ➔ Management of drilling waste, flow back water and flared gases require agreed waste management plan.
- ➔ Management plans required where dissolved Naturally Occurring Radioactive Material in Flow back
- ➔ Flaring standards and methods set out under the Industrial Emissions Directive



Applying Regulation

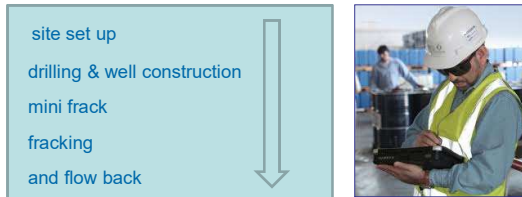
- ➔ Site conditioning and permit surrender
- ➔ Use of water: abstraction licence needed if take in excess of 20m³ per day.
- ➔ Planning advice and flood Risk assessment



Permit compliance & inspection

➔ On site inspection throughout operations

Focus on



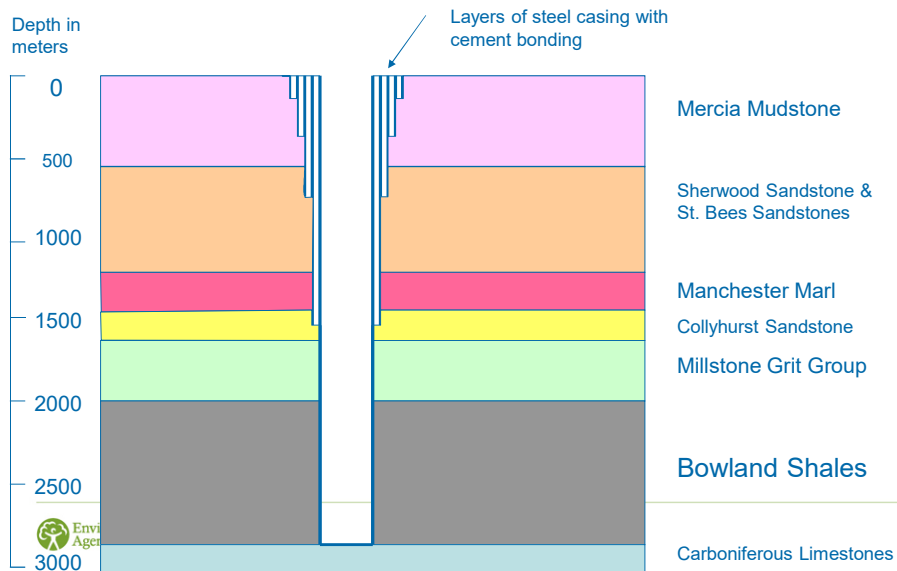
➔ Joint inspection with HSE

➔ Compliance records open to the public

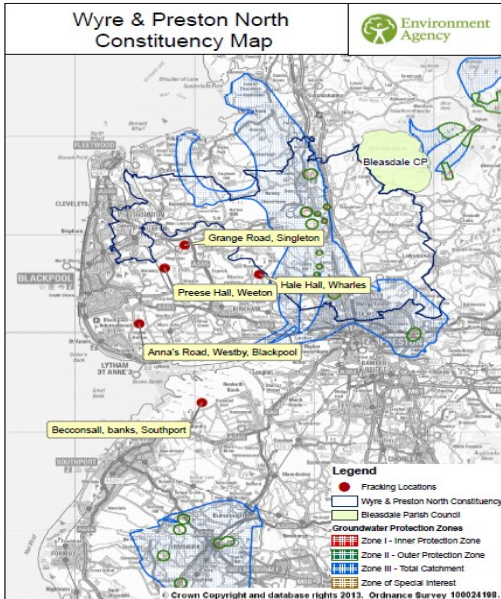
➔ Powers to prosecute & enforce suspension of operations



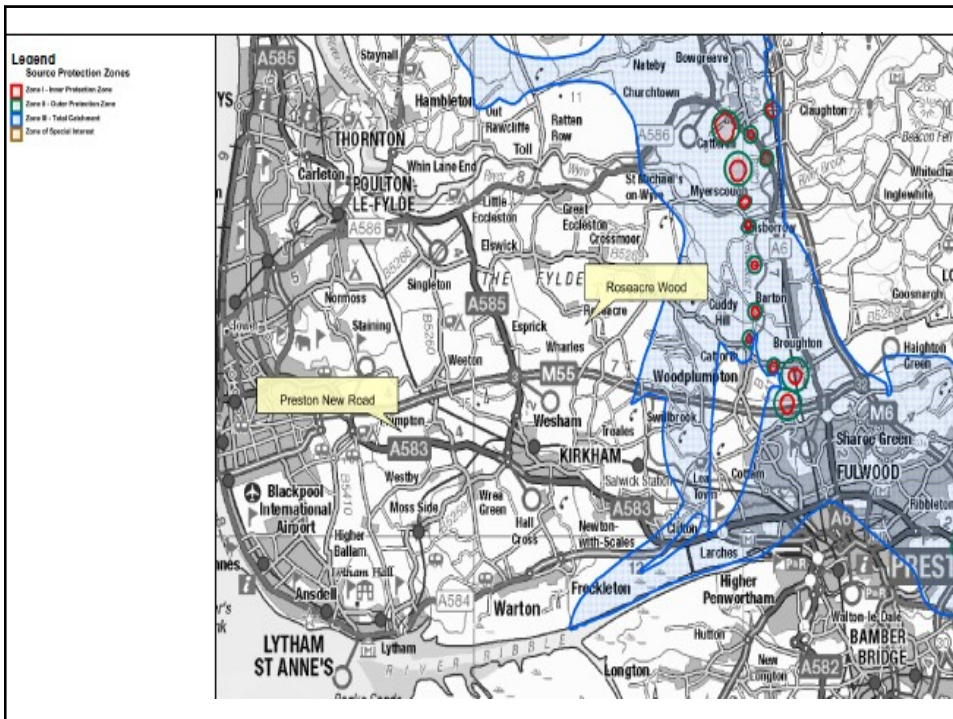
Schematic Diagram of Shale Gas Exploration Preese Hall site in Lancashire



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Groundwater Source Protection Zones and Location of Lancashire Shale Gas Drill Sites



Slide 11

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Do we need this map?

apool02, 08/07/2014

Environment Agency Position

- ➔ Shale gas in the UK is at a the early stage of development
- ➔ The environmental risks are taken seriously and they can be managed effectively
- ➔ All shale gas operations will require environmental permits
- ➔ We have the necessary regulatory controls in place for this exploration stage with a robust inspection regime.
- ➔ We continue to work closely with the Government, other regulators and the new Office of Unconventional Gas and Oil (OUGO)
- ➔ Examining best practice in environmental regulation in Europe (via EU technical working group)



Permit consultations now closed

Preston New Road

➔ 5 August 2014

Roseacre Wood

➔ 19 August 2014

Permits being determined, prior to further public consultation if the EA believe permits can be issued.

