

Monthly Archives: December 2014

Nick Riley starry-eyed about UK shale geology

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Dr Nick Riley, ex BGS, gets about. He spoke at the European Shale Gas and Oil Summit 2014 (ESGOS 2014), held in London 29-30 September 2014. But more circumspect and measured comments about UK shale gas prospects came from Dr Paul Choate, a drilling engineer, than from Dr Riley.

The blurb for the conference stated:

"With support from the Environmental Industries Commission (EIC (<http://www.eic-uk.co.uk/home/386>)), ESGOS 2014 will include a strong focus on overcoming environmental concerns within the UK and across Europe."

EIC is an industry lobby aiming to reduce or remove legislation that may impede profit-making in the 'environmental market' (curious phrase – I didn't know that the environment was for sale). Its website states who they are:

"founded in 1995, [EIC] represents the businesses which provide the technology and services that deliver environmental performance across the economy. In short, we are the voice of the green economy."

One of its new initiatives is a member forum *"on shale gas exploration to enable firms to assess the market and get involved over debates over best practice in minimising environmental impacts of fracking"*.

Nick Riley (<http://www.davidsmythe.org/professional/insolence.html#Riley>), who now runs a consultancy, Carboniferous Limited, was reported as saying at the conference:

"our geology is much more complicated than the US. It's not a simple layer cake, as is the case in the US."

The report of the conference went on:

"However, the nature of the UK shale deposits could be good news for those concerned about the visual impact drilling rigs on the countryside, said Riley. If you have a thick shale pool, the surface development could be a lot less," said Riley, explaining that the thick concentrated basins might require just one well pad with multiple horizontal wells, rather than the shallow continuous "layer cake" with multiple pads that typically characterises most of the US shale resource and its development."

So while conceding that UK geology is complex, Dr Riley only perceives this as a good thing. He makes no mention of the fact that the Bowland Basin in Lancashire, on which he is an expert, and other potential unconventional shale basins such as the Weald Basin (SE England) and the Midland Valley Graben in Scotland, are riddled with faults.

One of the **comments on the report** (<http://processengineering.theengineer.co.uk/oil-and-gas/uk-shale-far-more-complex-than-us/1019273.article>) came from a drilling engineer, **Dr Paul Choate** (<http://www.choate.co.uk/index.html>):

"In such thick shales it is essential to perform dedicated microfrac tests in order to measure the horizontal in situ stresses over the full height of the formation at all drilling centres so as to mitigate against potential loss of upwards fracture containment and to validate likely production performance. Possibilities for encountering deep overpressured free gas also need to be carefully evaluated so as to avoid potential for internal blowouts with potentially disastrous consequences. In situ stress anisotropy may favour non-dendritic fracture growth that could significantly reduce production performance, as could absence of horizontal in situ stress contrasts resulting in predominantly upwards fracture growth and hence poor lateral reservoir connectivity. Microseismic monitoring of fracture growth should be applied consistently and in majority of wells (as opposed to just 5% in US presently) and fracture design models of questionable validity developed originally 30 years ago for conventional bi-wing fracturing and nowadays in widespread use for US shale gas dendritic fracturing need careful scientific scrutiny before permitting application to UK shales. Microseismic data should also not be treated as gospel, as it generally only records shear events and may not be sufficiently sensitive to detect uncontained upwards tensile fracture growth. A series of staged field experiments aimed at careful scientific evaluation of all of these (and other) important factors should be given priority and should be driven by government in collaboration with industry, with academia providing support where appropriate and required. Without such a dedicated programme to evaluate and certify this technology for UK conditions, I sense it may prove hard to convince a sceptical and well informed British public. The expertise does exist here in the UK to undertake such a collaborative investigation, but a coordinated approach seems to be somewhat lacking thus far. 2/3 of US shale wells are failing to perform above the economic threshold. The figure could be higher here in the UK, meaning that many communities could be needlessly affected. Collaboration to pool our skills, as

opposed to the present competitive approach, is what is really needed for socially and economically responsible development of this vitally important national resource in my view."

Dr Choate runs a consultancy, CTS Limited, in Cambridge. He wrote this [comment](http://www.oilgaspost.com/2012/12/13/environmental-concerns-fracking/) (http://www.oilgaspost.com/2012/12/13/environmental-concerns-fracking/) two years ago:

" The concerns of the environmental groups are understandable from a professional engineering perspective as long as the industry is not able to make a convincing enough case that hydraulic fractures are indeed vertically contained within the target production interval to within an acceptable level of risk weighed against the consequence of non-containment in any particular case. The problem the industry has is that it has adopted more of a promotional than a strictly investigative scientific approach to making its case. Microseismic evidence has often been used in the past few years to support the case for containment, but has the industry really done enough to prove beyond reasonable doubt that this evidence alone is sufficient? And how convincingly is the industry able to prove that computer models that are used to design hydraulic fractures and predict their containment are a) rigorously consistent with their claimed underlying assumptions, b) based of physical assumptions that are both correct and not overly simplistic and c) able to make use of readily available and sufficient field and laboratory data, especially information about in stress profiles in the affected formations? It also needs to be asked if changed priorities and severe reductions in R&D funding in this area in the 1990s may have led to important inconsistencies and gaps in the application of knowledge gained on massive hydraulic fracturing in the past or, worse, the unchallenged use of legacy technology of an inferior quality remaining from that same era. This is how I see the attention of not only environmental groups, but also government and the industry itself needs to be focused in order to move forward on this important issue."

Now while he is clearly not against shale gas exploitation in principle, **Dr Choate sees many failures in the UK approach to date**, in matters of: legislation, technology, the attitude of exploration companies, the underlying theory behind fracking, and the lack of research and development (R&D) funding to improve knowledge.

In contrast **Dr Riley seems to be blind to the obvious geological problems inherent in drilling through and adjacent to fault zones**. He refuses to reveal his client list; my suspicion is that it includes companies currently prospecting in the UK for unconventional oil and gas.

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