

Finding Petroleum

Forum #9

Our Forums - a regular series:

- ✓ *Focussing on the Oil Field Services sector and Exploration – basins and themes*
- ✓ *Allowing companies to explain, and oil & gas professionals to master, the latest developments*

Based on:

- *Presentations by leading, innovative, companies*
- *Networking opportunities (+ a free lunch!)*
- *Video-streaming of presentations through OilVoice*

.....so Welcome....and no need to scribble notes or to draw diagrams – it'll all be on the Net in a few days.....

Exhibit 1: “The Shale Gale”

“American technology to produce shale gas is unleashing a scramble for drilling rights in Poland, where experts believe vast reserves of unconventional gas exist that could help to weaken Russia’s grip on Europe’s energy supplies.”

(The Times – 6th April 2010)

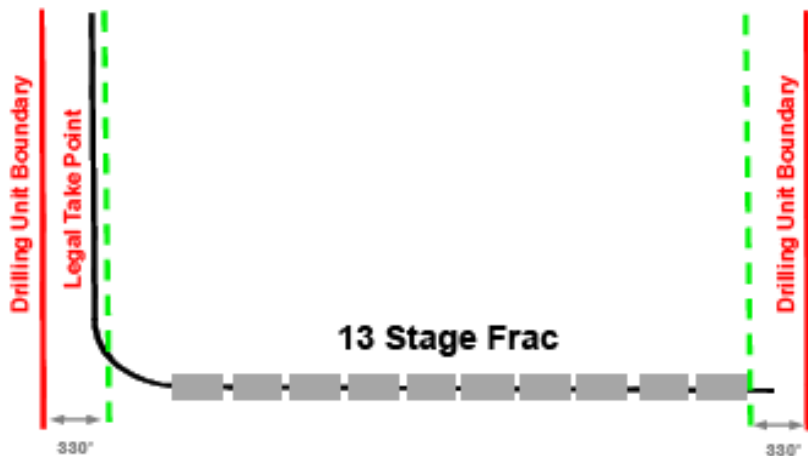
- ✓ *What is this “American technology”?*
- ✓ *What can we say about the USA; where might we find ‘Shale Gas’ close in or close to Europe?*
- ✓ *What are the issues?*

.....in my humble opinion, the technology is merely incremental; the key issue is to find the right rocks.....and deal with the costs and environmental issues

Exhibit 2: Drilling technology

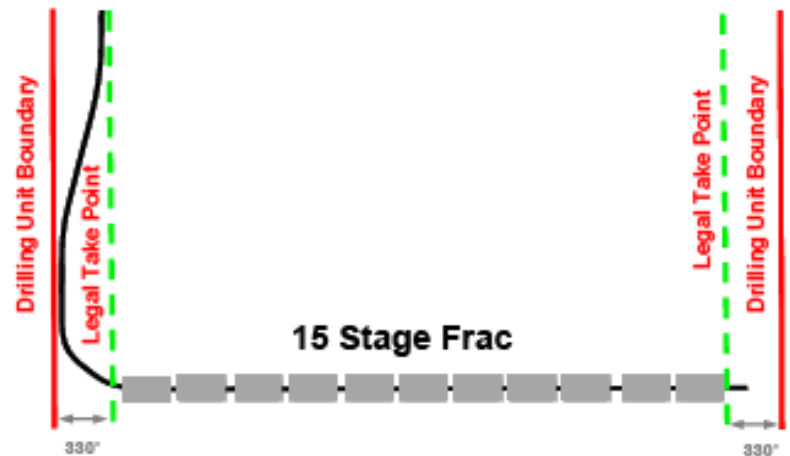
EOG Resources Lateral Length Optimization

Maximum “Legal” Lateral Length Defined by Perforations



- 330' from Unit Lines, 4,620' Effective Length
- CWC \$8.9MM
- Direct FC \$1.32/Mcfe

“S” Shaped Well Bore



- Reserves Increase by 0.5 Bcfe/Stage
- Target CWC \$9.3MM
- Direct FC of Additional Reserves \$0.39/Mcfe
- Cost Reductions and Reserve Adds Reduce FC by 40%

.....optimising multi-lateral wells.....

Exhibit 3: 'Fracking'

EOG Resources

Evolution Of Completion Technology

	<u>Vintage</u>	<u>Area Contacted (Ft²)*</u>	Extractable Perm (md)**	
			<u>Reservoirs</u>	
			<u>Gas</u>	<u>Oil</u>
Vertical				
Open Hole	1800s	200	10	100
Perforating	1920s	500	10	100
Fracturing	1940s	3,200	1	10
Big Fracs	1980s	240,000	0.01	0.1
Horizontal				
Open Hole	1980s	8,000	1	10
Bi-Wing Fracs	2000	1,200,000	0.001	0.01
Complex Fracs	2005	10,000,000	0.0001	0.001
Many-Stage Complex	2009	20,000,000	0.00001	0.0001

.....stretching the technology.....

* Normalized to 100' Height, 4,000' Lateral

** Matrix In-Situ Permeability Extractable for Gas and Oil, md = millidarcy.

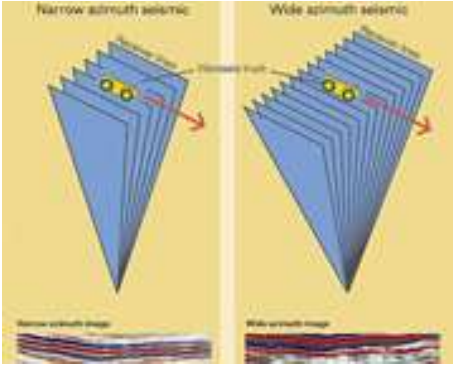
Exhibit 4: 3D Seismic.....



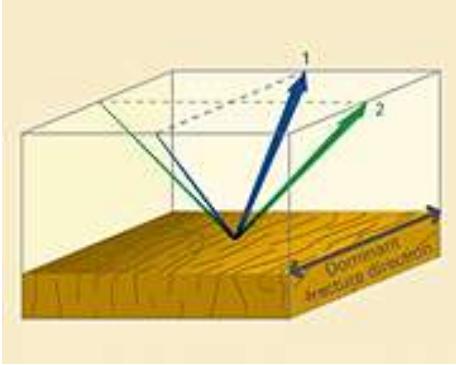
Vibroseis +



Wireless receivers +



Wide-Azimuths +



Seismic Fracture Detection

.....all 'standard' stuff!

Exhibit 5: “The Shale Gale”.....a couple of issues

Costs:

? *Based on experience in the Haynesville Shale, typical drilling + completion costs are \$7.5 – 10m; operating costs are \$2.25/Mcf. Thus, typical producing costs are ~\$7.5/Mcf.*

Environmental Impact:

? *Chesapeake state that “Drilling a typical Chesapeake deep shale gas well requires between 65,000 and 600,000 gallons of water.”...”Hydraulically fracturing a typical Chesapeake horizontal deep shale gas well requires an average of 4.5 million gallons per well.”*

....so a couple of fundamental questions; where does this water come from and where does it go & how does anybody make money out of this anyway?