Drilling & Developing the Marcellus Shale

Presented by the Independent Oil and Gas Association of Pennsylvania at the Pennsylvania State Association of Township Supervisors Annual Meeting, May 12, 2008, Hershey, PA

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RANGE RESOURCES

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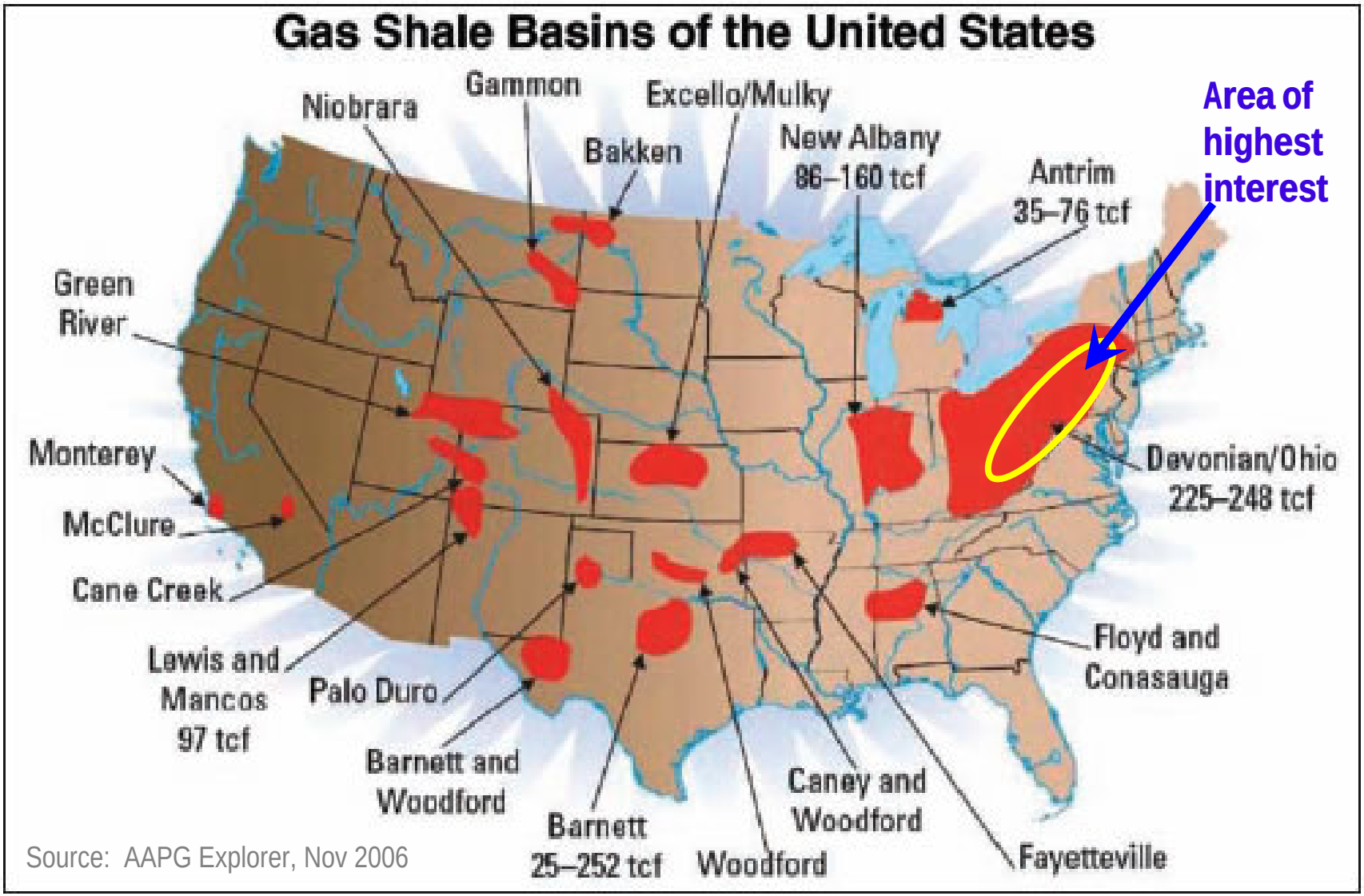
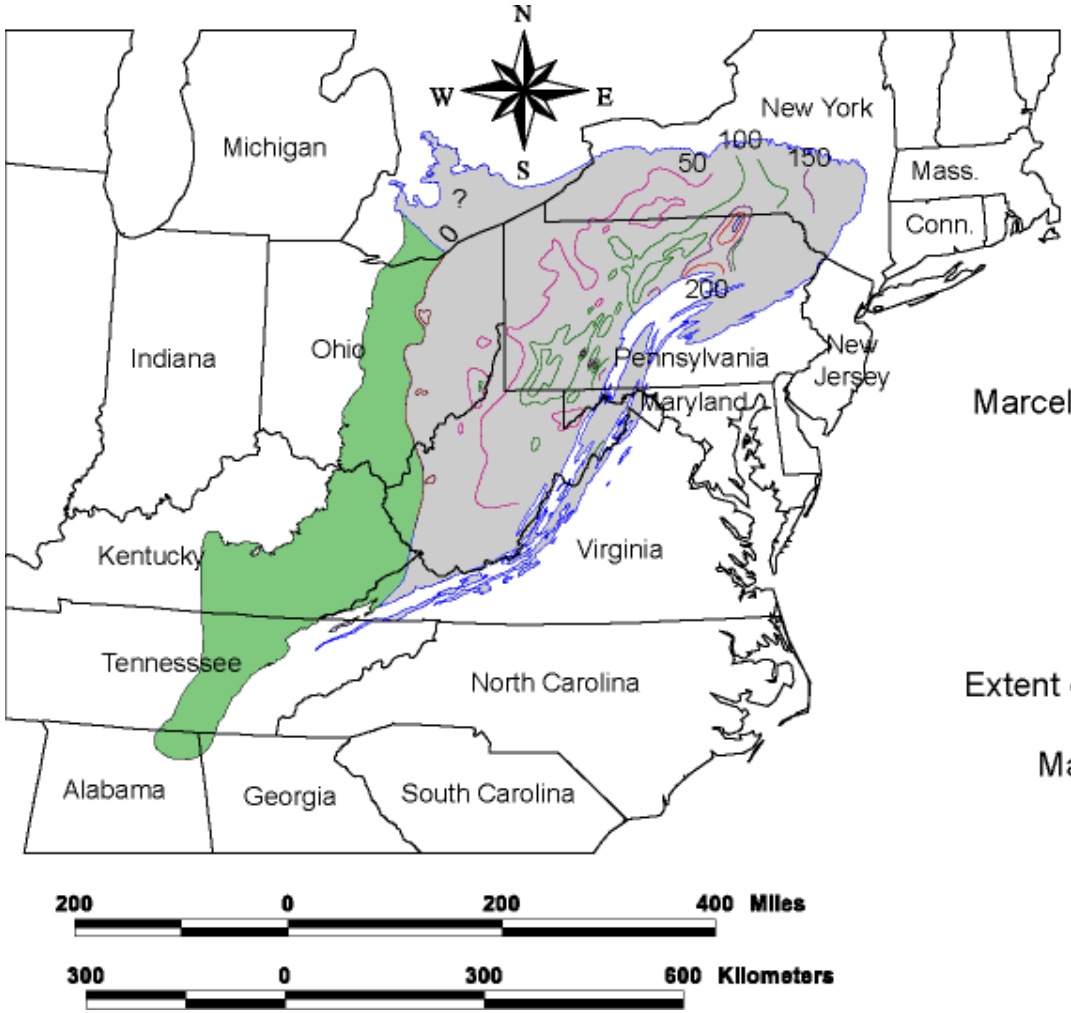
Marcellus Shale – Why Now?

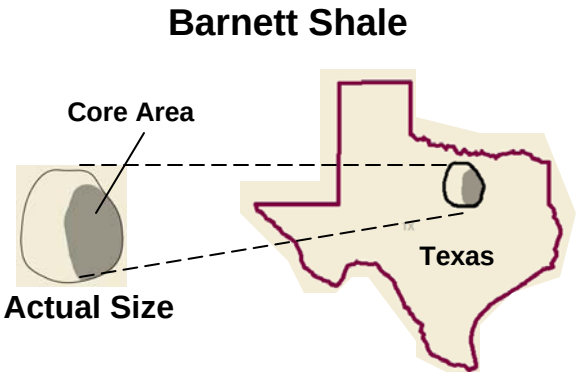
- Geologists have known for many years that natural gas exists in the Marcellus Shale – the problem is getting it out in commercial quantities.
- The Marcellus Shale has been explored for many years uneconomically.
- Recently developed drilling and completion techniques now allow increased gas flow from tight shales like the Marcellus.
- Estimates of recoverable natural gas reserves from the Marcellus Shale are speculative and range from 50 - 200 trillion cubic feet.
- Much additional drilling is necessary to refine these estimates.

U.S. Shale Gas Resources – Organic Shale



Marcellus Shale





Marcellus Isopach (feet)

0 50
100 150
200 250

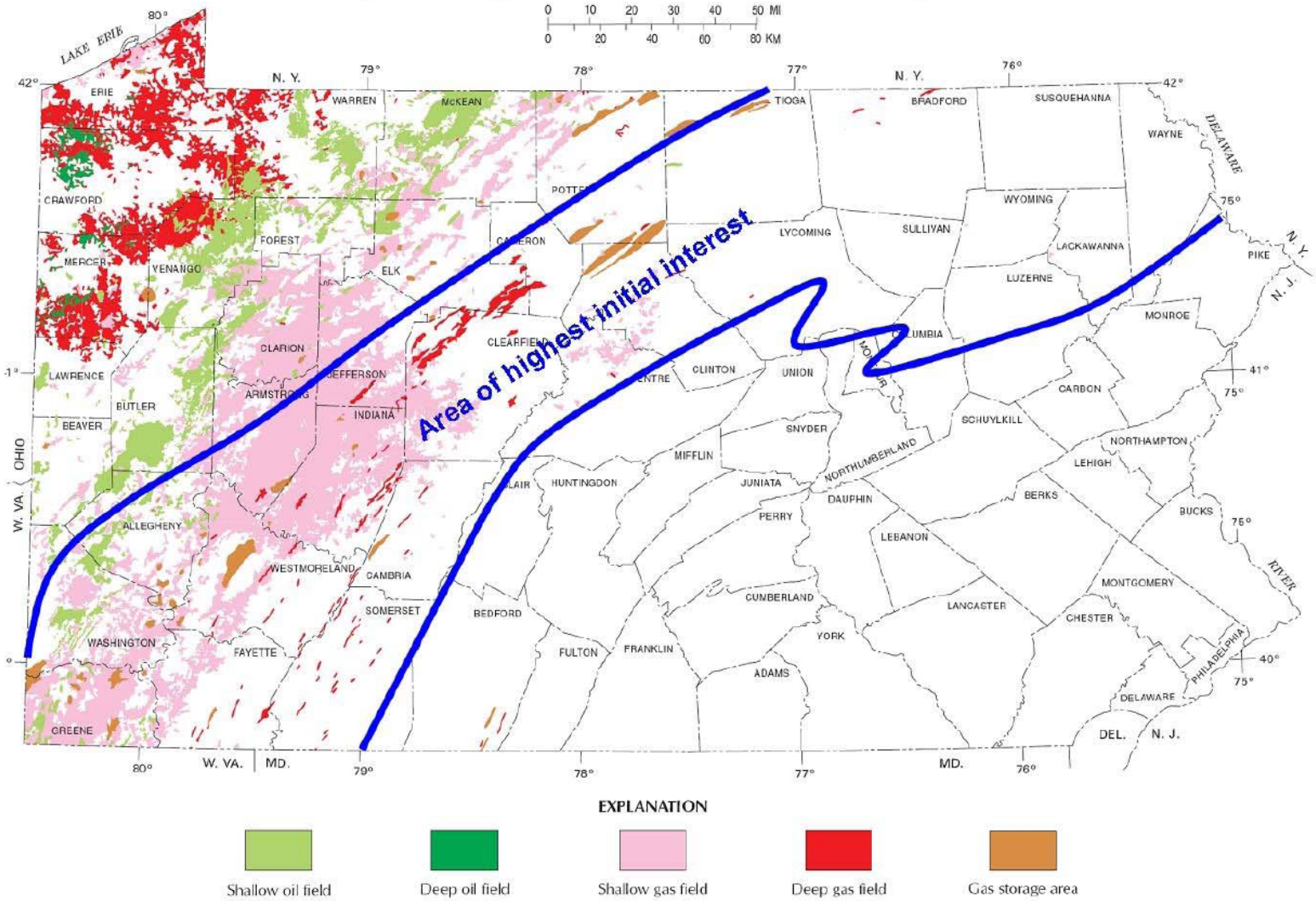
Extent of Devonian shale

Marcellus Shale

*USGS File 2005-1268

Map of Pennsylvania Oil and Gas Fields

Showing area of highest interest for Marcellus Shale exploration

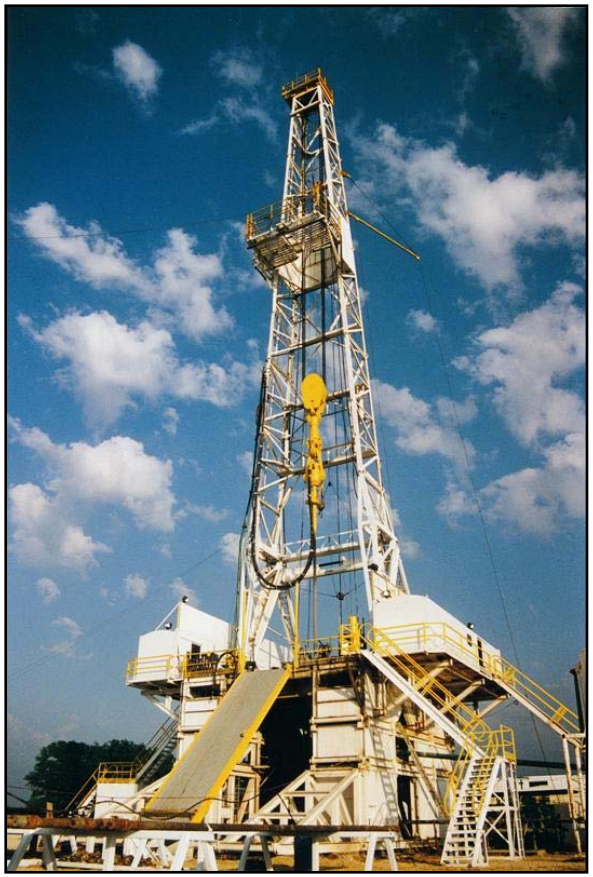


EXPLANATION

Shallow oil field | Deep oil field | Shallow gas field | Deep gas field | Gas storage area

Marcellus Shale Drilling

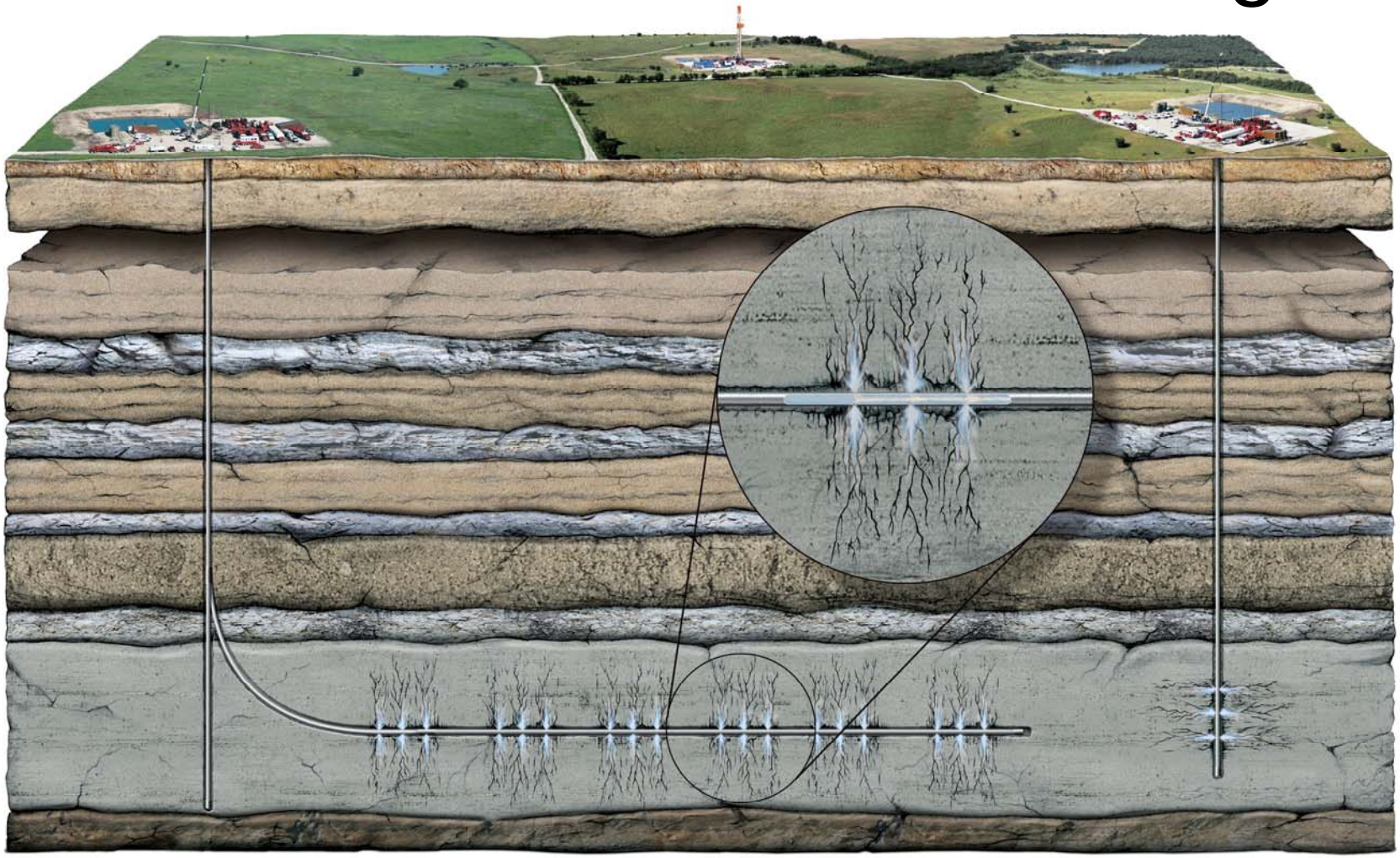
- Drilling is different than what has taken place in the Appalachian Basin over the last 150 years
- Marcellus Shale located at depths of 5,000 – 8,000 ft
- Larger drilling rigs
- Advanced technology



Technology

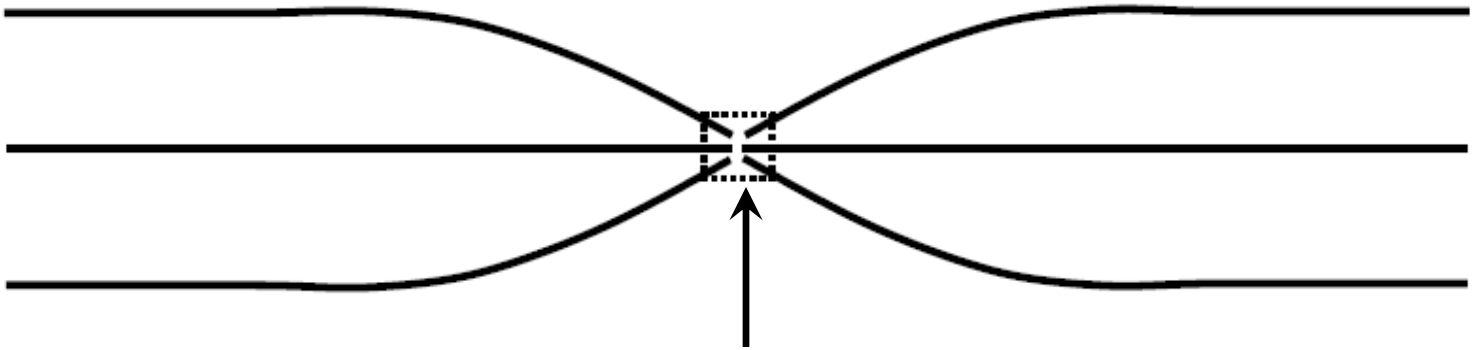
- Geoscience to decide locations for drilling
- 3-D Seismic
- Coring
- Horizontal drilling
- Fracture stimulation design

Vertical vs. Horizontal Drilling



Horizontal drilling can provide greater access with a smaller footprint

Multiple horizontal wells from a single drilling pad could drain 200 – 400 acres



Fracture Stimulation

- When drilling for natural gas in shale, the shale must be fracture stimulated (fraced) to release the gas. The well does not produce commercial quantities of gas until it is fraced.

- Fracing a well involves placing a mixture of water and sand down the well at high pressures to fracture the shale.

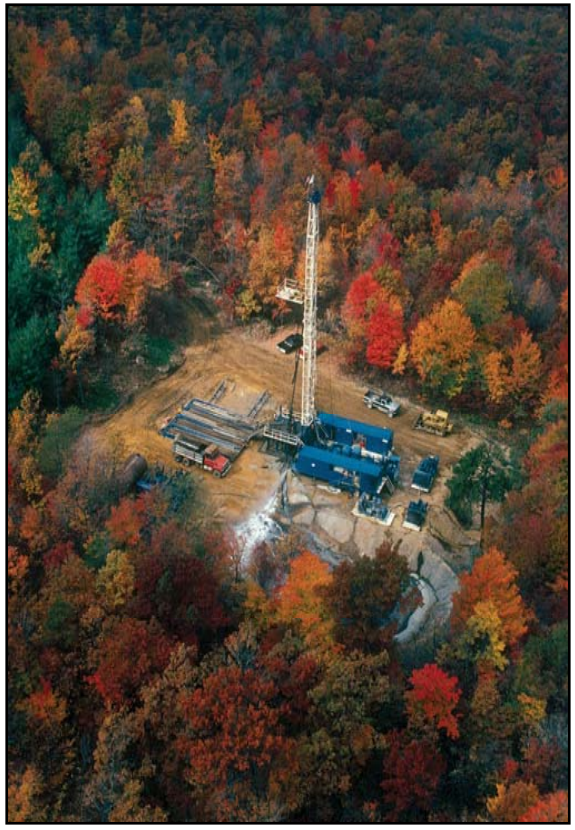
Fracture Stimulation

- Frac sites involve multiple trucks to haul water and oil field equipment.
- Fracing occurs mainly in daytime hours, but operations can continue 24/7 and may last for several days.

Fracture Stimulation

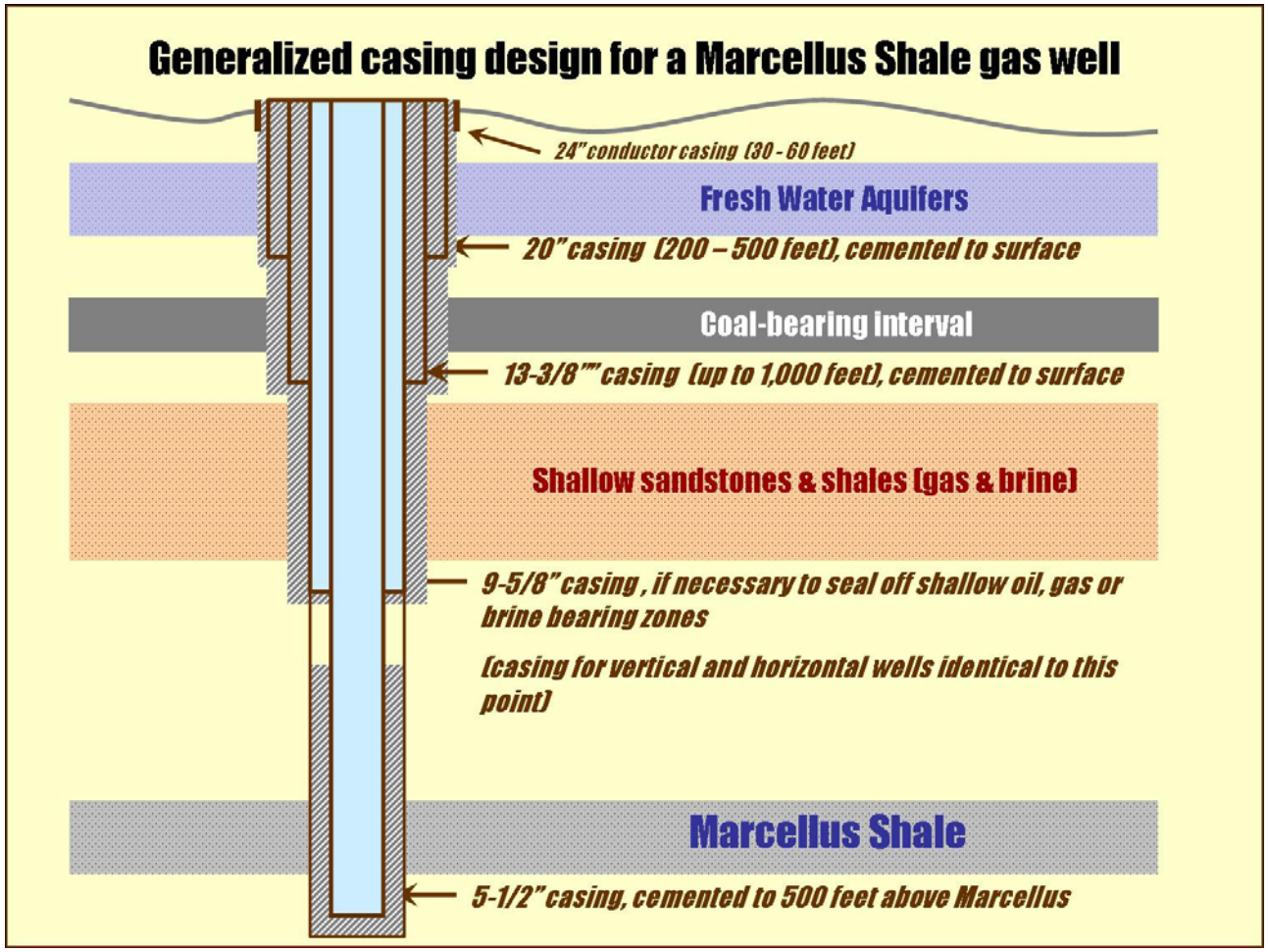
Stages of Development

- Drilling
- Completion & Production
- Reclamation



Drilling – Protecting the Environment

- Multiple steel casings protect fresh water zones and coal seams
- All casing and cementing in accordance with DEP regulations



Drilling – What to Expect

- Wells typically take 15 - 30 days to drill
- Drilling operations are 24/7
- Trucks moving equipment in and out
- Rig crews on-site all times until drilled
- Temporary inconvenience of noise and lights
- Some damage to local roads – that we will repair at the earliest opportunity

Completion & Production

- Fracing
- Get well ready for production
- Infrastructure

Reclamation

- Minimize footprint to the environment
- On-site equipment/operation
- Landscaped

Oil and Gas Lease

- Matter of bargaining between oil and gas owner and the oil and gas company
- Each company has its own preferred form
- Most follow a common pattern
- Some common terms:
  - Grant of an exclusive right to explore, drill, produce and market
  - Grant of necessary incidental rights to use the surface
  - Definition of a “primary” term in which to explore and drill

Oil and Gas Lease

- During the primary term rentals are paid –usually $$/acre – either periodically or in one check for a “paid up” lease
- The industry standard 1/8th royalty has been recognized by the Pa legislature
- The definition of a “secondary” term in which oil or gas will be produced
  - Usually with language such as:

    “and for so long thereafter as oil or gas or either of them is produced in paying quantities”

Oil and Gas Lease

- Special clauses extending the lease in case of lack of market, well maintenance, ongoing drilling, etc.
- Unitization / Pooling clauses
  - Promote efficient production of reserves
  - Promote proper sharing of proceeds of production among owners of oil and gas tracts affected by production
- Special provisions may be negotiated to meet specific owner issues

Impact for 2008

- Leasing Initiatives – bonus payments
- New jobs
- Service companies
- Investment by producers
- Initial royalty payments
- Corporate taxes

Long Term Economic Benefits

- New jobs, including higher paying high tech jobs
- Multi-billion dollar investments by producers
  - Land Acquisition
  - Drilling
  - Infrastructure development
  - Community contributions
- Community real estate – support businesses
- Increasing amounts in royalty payments
- Increasing amount of corporate tax paid

Information in this presentation provided by:

CHIEF OIL & GAS LLC

RANGE RESOURCES

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