Hydraulic Fracturing in the U.S.
Prestige World Wide
Overview

Hydraulic Fracturing – “Fracking”

1. The Process & Origins – What daily operations are performed during a frack job?
   John Ryan Davis

2. Ingredients – What is being pumped into the ground?
   Rachael Solari

3. Why is fracking necessary?
   JR Norton

4. Shale Gas Reserves – Where is all this natural gas coming from?
   Brandon Merrill

5. Controversy – Does fracking have a negative impact on our environment?
   Paige Guilbeaux
The Process & Origins of Fracking
John Ryan Davis
Origins of U.S. Shale Gas Revolution

- Technological breakthroughs in the 20th century granted access to shale gas reserves which were previously unreachable.

- Hydraulic Fracturing
  - Fracking experimentation – early 1900’s
  - Rapid growth in production applications – 1950’s

- Horizontal Drilling
  - Early 1980’s became commercially viable

- Mitchell Energy & Development Corp.
  - First success in Barnett Shale in 90’s
Post-drilling operations the “frack-crew” will set up onsite.
The Fracking Process

Daily Operations

Pre-Frack Operations:
1. Drill
2. Lay casing
3. Pump cement
4. Perforate casing and cement

Post-Frack Operations:
1. Mill-out/remove plugs
2. Well tests
3. Gas flow begins (Production)

Stage 1
- Pump water down-hole, through perforations and fracture the formation.

Stage 2
- Sand and proppants are added to the fluid at an increasing rate as the job continues.

Stage 3
- After the fracture is complete this area of the well bore is plugged to allow for a new area to be fracked.

Stage 4
- Water pressure reduced, fluid travels back up-hole, leaving sand holding in the cracks to allow gas to flow.
The Ingredients Used During a Frack Job
Rachael Solari
Typical Ingredients Used in Fracking

Water and Sand make up the majority

- Water and Sand: ~98%
- Other: ~2%
  - Acid
  - Anti-Bacterial Agent
  - Breaker
  - Clay Stabilizer
  - Corrosion Inhibitor
  - Crosslinker
  - Friction Reducer
  - Gelling Agent
  - Iron Control
  - pH Adjusting Agent
  - Scale Inhibitor
  - Surfactant
Other Additives used in Fracking
Makes up about 2% of Ingredients

- Gelling Agent
  - Thickens water to suspend sand

- Breaker
  - Allows delayed breakdown of gel

- Friction Reducer
  - “Slicks” the water

- Acid
  - Dissolves minerals
• Odd/Questionable Ingredients

Full Public Disclosure

• Instant Coffee
• Walnut shells
• Carcinogens
  • Benzene
  • Methanol
• Anti-bacterial Agent
Why Frack?
JR Norton
Why is Fracking Necessary?

- Formation
  - Porosity
  - Permeability

- Improves Flow
  - Increased surface area of well head
  - Lowers formation resistance
• **Production and Reserves**

- 17%/yr 2000-2006
- 48%/yr 2006-2010
- 45% of total natural gas by 2035
- Shale plays are 16% of reserves
- U.S. has gas for 110 years
Natural Gas Energy

- Buses
- Fleets
- Industrial
- Rig conversions
- Electricity Generation
- Transportation

Electricity Generation Capacity Additions by Fuel Type

[Gigawatts]
Shale Gas Reserves in the United States
Brandon Merrill
Operating areas across the US
• **Barnett Shale**
  North Texas & Permian Basin

  - First well 1981
  - Tight Gas Reservoir
    - Need for advanced techniques
  - Underlies city of Fort Worth
  - Drilling expanded in 1990’s with new techniques
  - Drilling Depths:
    - 5,000-8,000 feet in North TX [9]
    - 6,000-10,000 feet in Permian Basin [10]
• **Haynesville Shale**
  East Texas/Louisiana

  • Discovered in 2008
  • Drilling Depths:
    • 10,000-13,000 feet
  • Estimated largest natural gas field in contiguous 48 states [12].
• **Eagle Ford Shale**
  South Texas

  - Discovered in 2008
    - Petrohawk exploration well in La Salle County [14]
  - Both Oil & Gas rich regions of the field
  - Drilling Depths:
    - Up to 12,000 feet
Other Prevalent U.S. Shale Gas Reserves

- Marcellus Shale
  - Ohio/Pennsylvania/WV
  - One of most active plays
  - Significant use of fracking
- Bakken Shale
  - North Dakota/Montana
- Fayetteville Shale
  - Arkansas/Oklahoma
- Woodford Shale
  - Texas/Oklahoma
Controversy Over Fracking
Paige Guilbeaux
• Earthquakes

• Fluid injection changes seismic dynamics underground
• Fracking can cause minor quakes
• Could lead to larger and more dangerous earthquakes
• Waste of Water

• Millions of gallons of water are being pumped into the ground
• Estimated 13.5 billion gallons were used in Texas in 2010
• Only 20 to 25 percent of water used can be recovered
• Water Contamination

Fracking fluid contains chemical additives

GasLand Documentary
• Man lights faucet water on fire
• Blamed it on fracking
Questions?
Prestige World Wide
References