Marcellus Shale Drilling

West Virginia Water Resources Training Workshops

Presented by the Interstate Commission on the Potomac River Basin
Sponsored by the West Virginia Department of Environmental Protection
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Image source: http://sevenhillslake.com/stormwater.html
Marcellus Shale Drilling

• Basics (geology, location)
• Drilling procedure
• Concerns
• Resources
Why Marcellus? Why now?

- Oil and gas prices
- Better horizontal drilling and hydrofracking techniques (Barnett Shale in Texas)
- Close to existing pipeline infrastructure
- Water availability

Depth to bottom of Marcellus Shale

Drinking water wells: 100 – 300 feet deep
Drilling Process

- Locate potential site, acquire rights and permits
- Construct drilling pads and roads
- Hydrologic Fracturing (hydrofracking)
- Marcellus Shale Coalition [video]
Pad Site

Vertical wells

Horizontal wells
Drilling

- Vertical well depth: 
  \(~7000\) feet
  - avg 3300 feet (WVGES permit data)

- Horizontal well length: 
  4,000 to 5,000 feet

- Water use
  - Approximately 4 to 7 million gallons for entire drilling and fracturing process
Wells in Marcellus Shale by Year

Legend
- Marcellus Wells
- Hamilton Isopach
  - Thickness (ft)
- Streams
- Onondaga Faults
- County Boundaries

Data from WV Geologic and Economic Survey, accessed June 30, 2010
Concerns

• Large withdrawals
  – Local streams
  – Water utility
  – Trucked in

• Drinking water
  – Effects on surface and groundwater sources
  – Flow back quantity and quality
  – Spills
Concerns

• Roads, traffic, accidents (trucks and spills)
• Stormwater on site
• Noise and air pollution
• Soil compaction
The average depth of a deep shale gas well is about 7,500 feet, which is:

- 1 ½ miles below the Earth’s surface
- More than six Empire State Buildings stacked end to end
- 1 ½ times deeper than the deepest part of the Grand Canyon
- More than 25 football fields laid out goal post to goal post.
Hydrofracking fluid

Figure 5-3 - Sample Fracture Fluid Composition by Weight

More info

- WV Geologic and Economic Survey
- WV Surface Owners’ Rights Association
- Ground Water Protection Council
- Penn State Cooperative Extension
- PA Department of Environmental Protection
- NY Department of Environmental Conservation