



# Drilling and Hydraulic Fracturing Overview

**December 12, 2001**



# Chesapeake Energy Overview

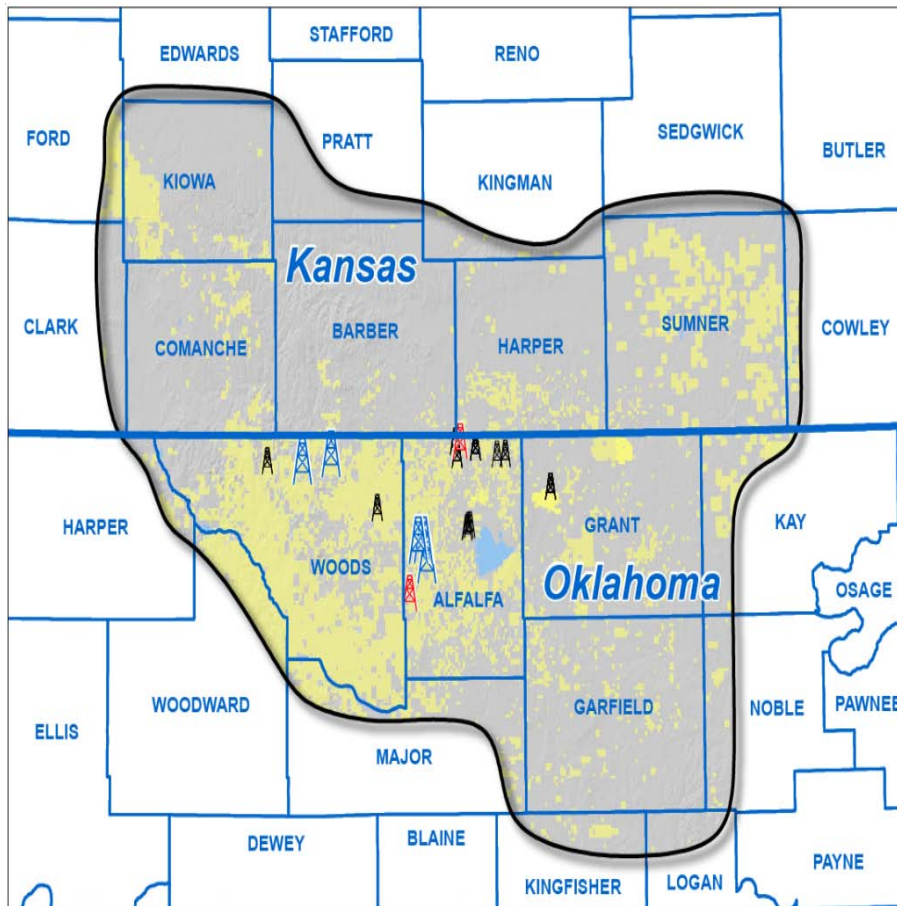


- » Second-largest producer of U.S. natural gas and a Top 15 producer of U.S. liquids
- » Most active explorer for natural gas and liquids with 175 active U.S. drilling rigs
- » Employs over 12,000 people in 16 states
- » Applying unconventional thinking and state of the art technologies, Chesapeake has grown from a \$50,000 startup in 1989 to a \$30 billion enterprise today
- » Chesapeake is leading the industry effort to reduce American dependence on high-cost foreign oil and on higher emitting fuels through the greater use of natural gas in transportation and electricity generation

Just as the 19<sup>th</sup> and 20<sup>th</sup> Centuries were the Age of High-Carbon Coal and Oil, the 21<sup>st</sup> Century will be the Age of Low-Carbon Natural Gas and Natural Gas Liquids



# Kansas Overview



- » Several Kansas counties are located in the Mississippi Lime formation, an unconventional liquids play in northern OK and southern KS.
- » CHK owns 1.5 million net acres in the Mississippi Lime, the most in the industry.
- » Kansas counties of interest include Barber, Comanche, Ford, Harper, Kiowa, Clark and Sumner.
- » ~23,000 Kansans are employed in the natural gas and oil industry with ~44,000 related jobs. The total economic impact is nearly \$3.3 billion.
- » Currently drilling two wells in Sumner and Comanche Counties



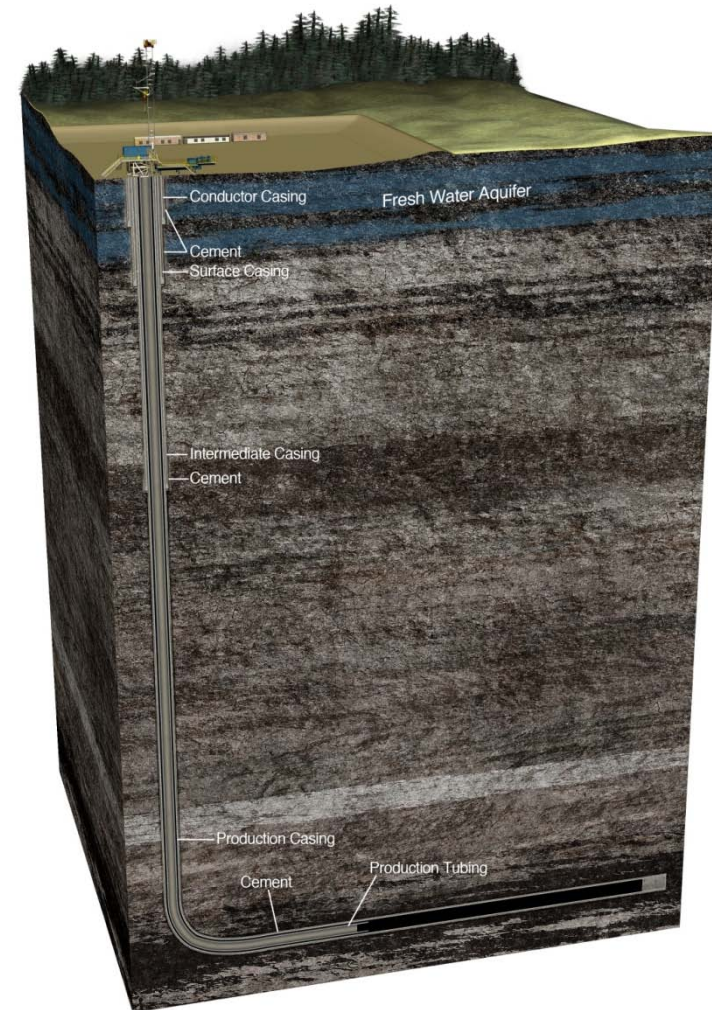
# Drilling



# Horizontal Wells

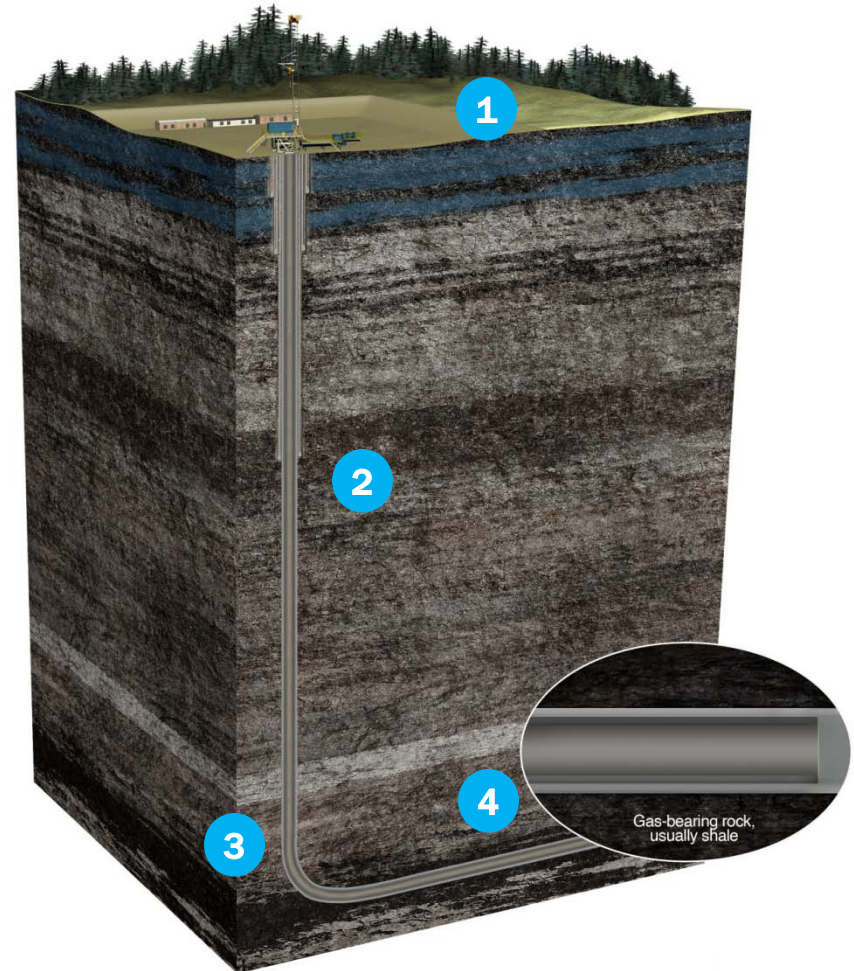
## Computer-driven technology allows for horizontal drilling

- » Access to a greater area of the deep shale natural gas and/or oil reservoir
- » Allows a higher volume of natural gas and/or oil to be produced



# Steps in Horizontal Drilling

1. Select and construct the drillsite and move drilling equipment into place
2. Spud and drill vertical portion of the well
3. Drill kick-off (curved) section to turn the wellbore from vertical to horizontal
4. Drill horizontal wellbore





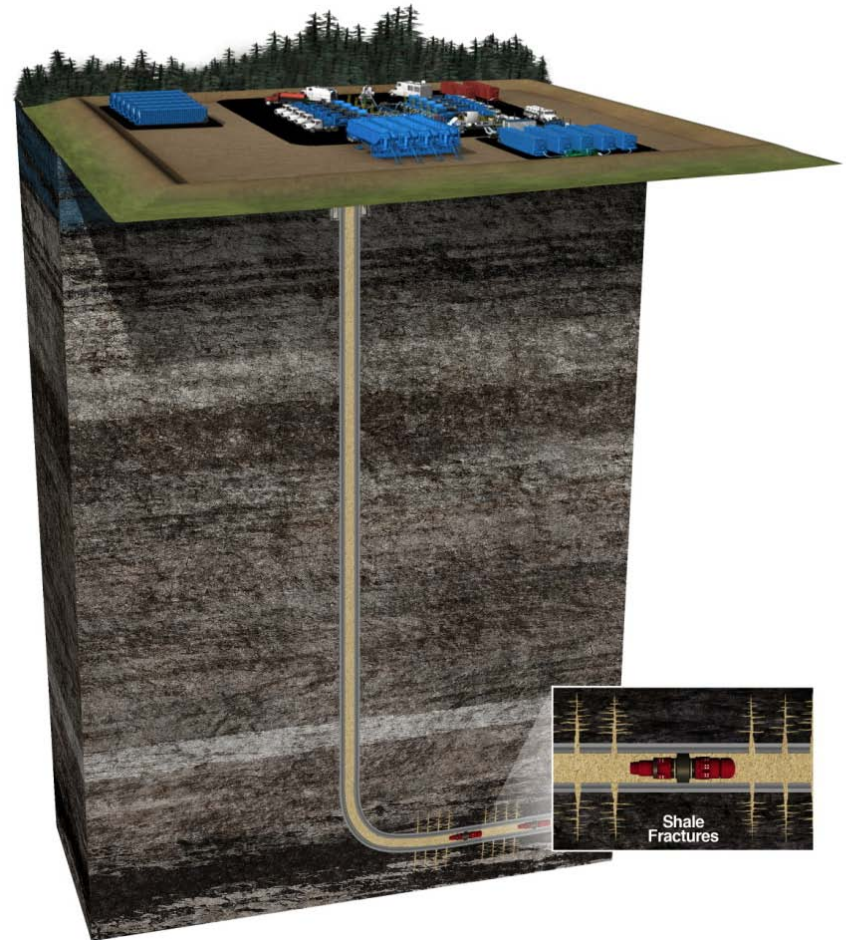
# Completion



# Hydraulic Fracturing

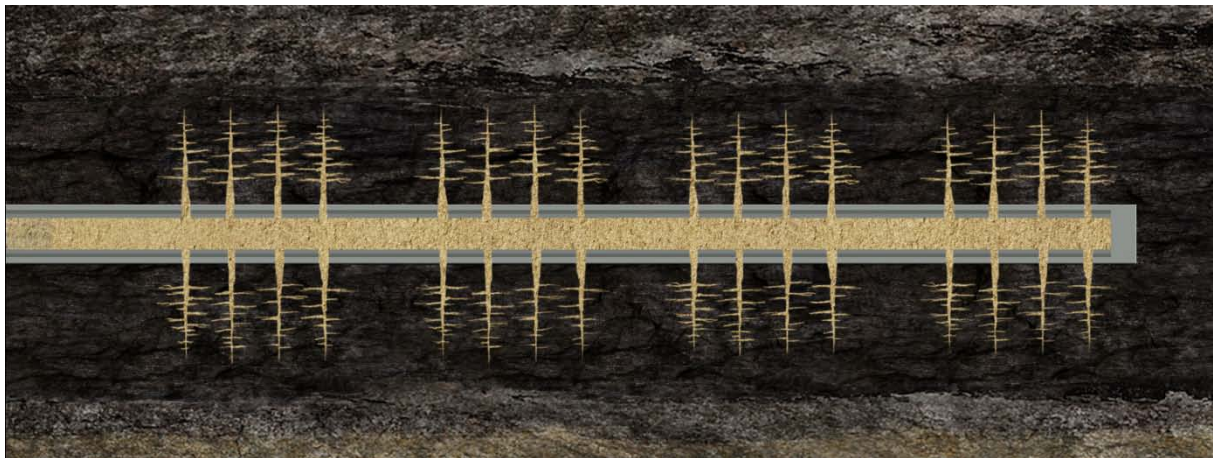
## Once the drilling rig leaves, hydraulic fracturing begins

- » Hydraulic fracturing is an advanced technology that allows the safe and economic removal of natural gas and oil from the deep formations
- » Fracking has been used by the natural gas and oil industry since the 1940s



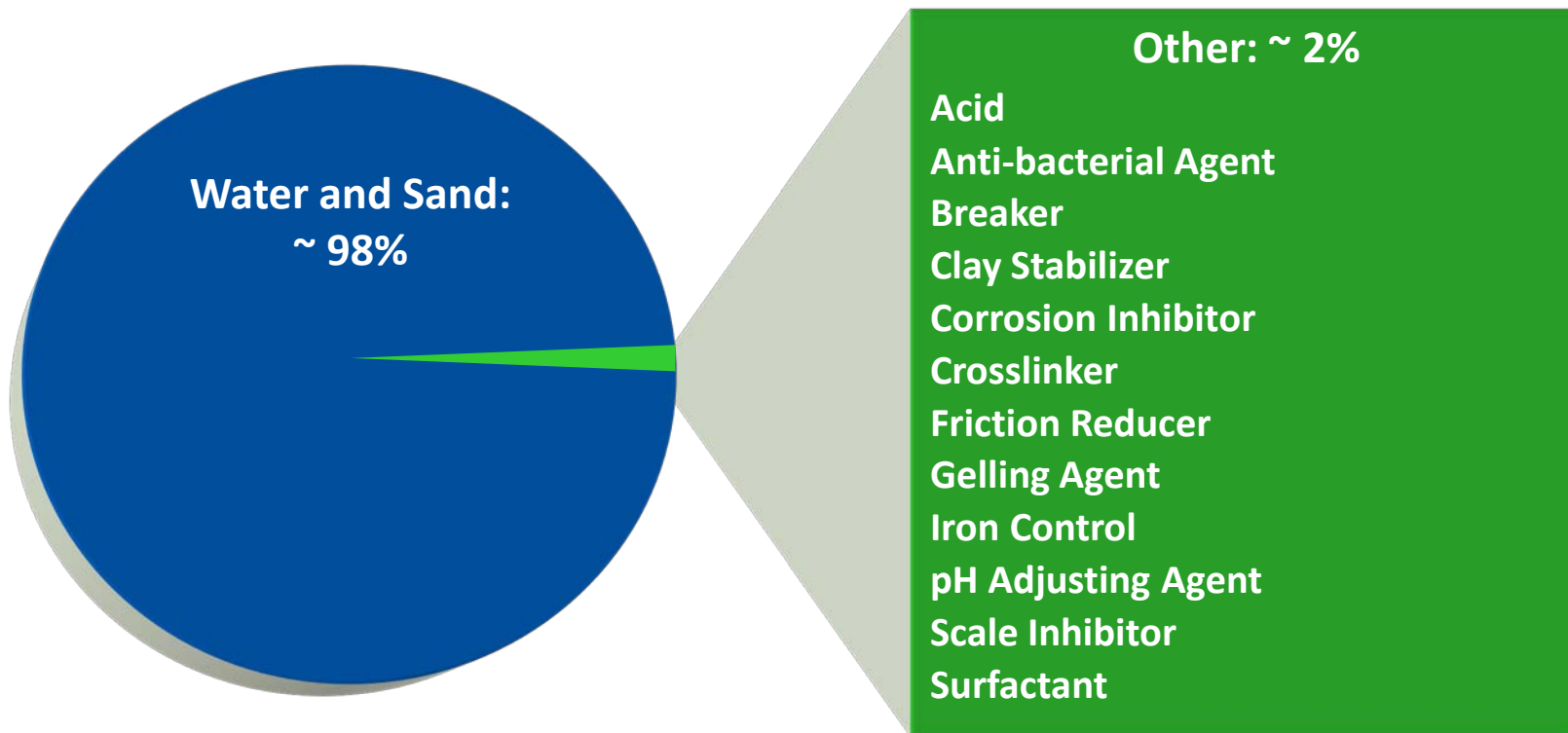
# Hydraulic Fracturing Process

- » It is the process of “stimulating” natural gas from the producing formation by creating small fractures
- » Water mixed with sand and additives is pumped into the reservoir at high pressures
- » Fractures are “propped” open by the sand to allow the natural gas and oil to flow
- » The hydraulic fracturing process is completed in a matter of days



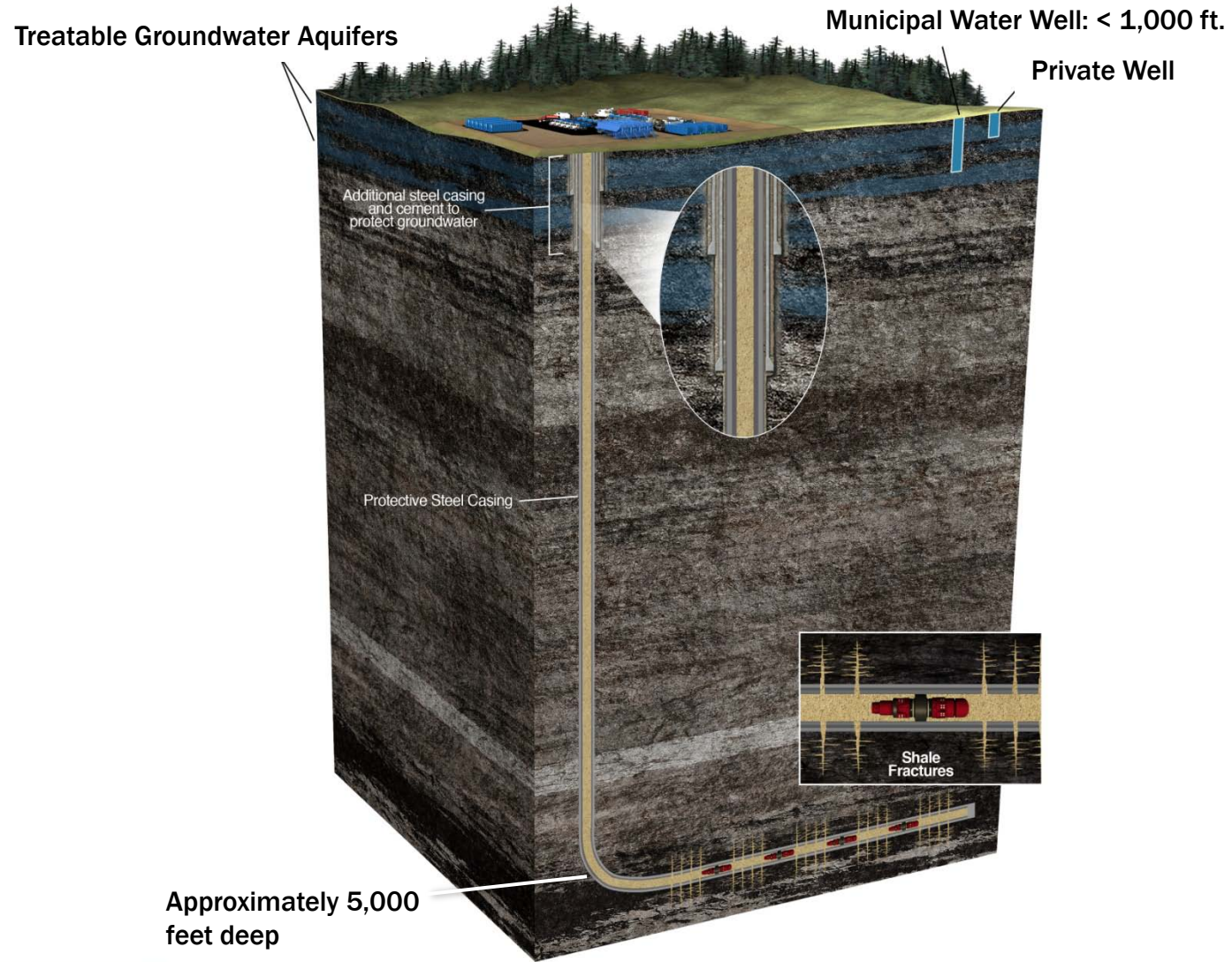
# Typical Deep Fracturing Products

Products are rarely all used in one play



For more information, visit [HydraulicFracturing.com](http://HydraulicFracturing.com) and [FracFocus.org](http://FracFocus.org) or see our fact sheet on Hydraulic Fracturing

# Separation of Hydraulic Fracturing from Freshwater Aquifer



# Chemical Management

## » Disclosure of Chemical Additives

- ▶ Chesapeake is actively participating in a national publicly accessible web-based registry developed by the Ground Water Protection Council and the Interstate Oil and Gas Compact Commission and supplying data on all of its new wells being drilled. For details visit: [www.fracfocus.org](http://www.fracfocus.org)

## » Surface Management of Chemicals

- ▶ Chemicals received follow Department of Transportation (DOT) shipping guidelines with material safety data sheets (MSDS)
  - Employees and emergency responders have access to the MSDS so they can work and respond appropriately
  - This system with industry BMPs and appropriate site construction, minimize potential impacts



- » Chesapeake initiative focused on improving the environmental footprint of fracturing additives
  - ▶ Can eliminate up to **25%** of the additives used in most of our shale plays
  - ▶ Continue to search additional environmentally benign alternatives to the necessary additives
- » Establishing guidelines for Chesapeake and our vendors to provide safe and proper handling of additives



# Groundwater Protection



# Multiple Layers of Protection

## » Knowing where fresh water is located

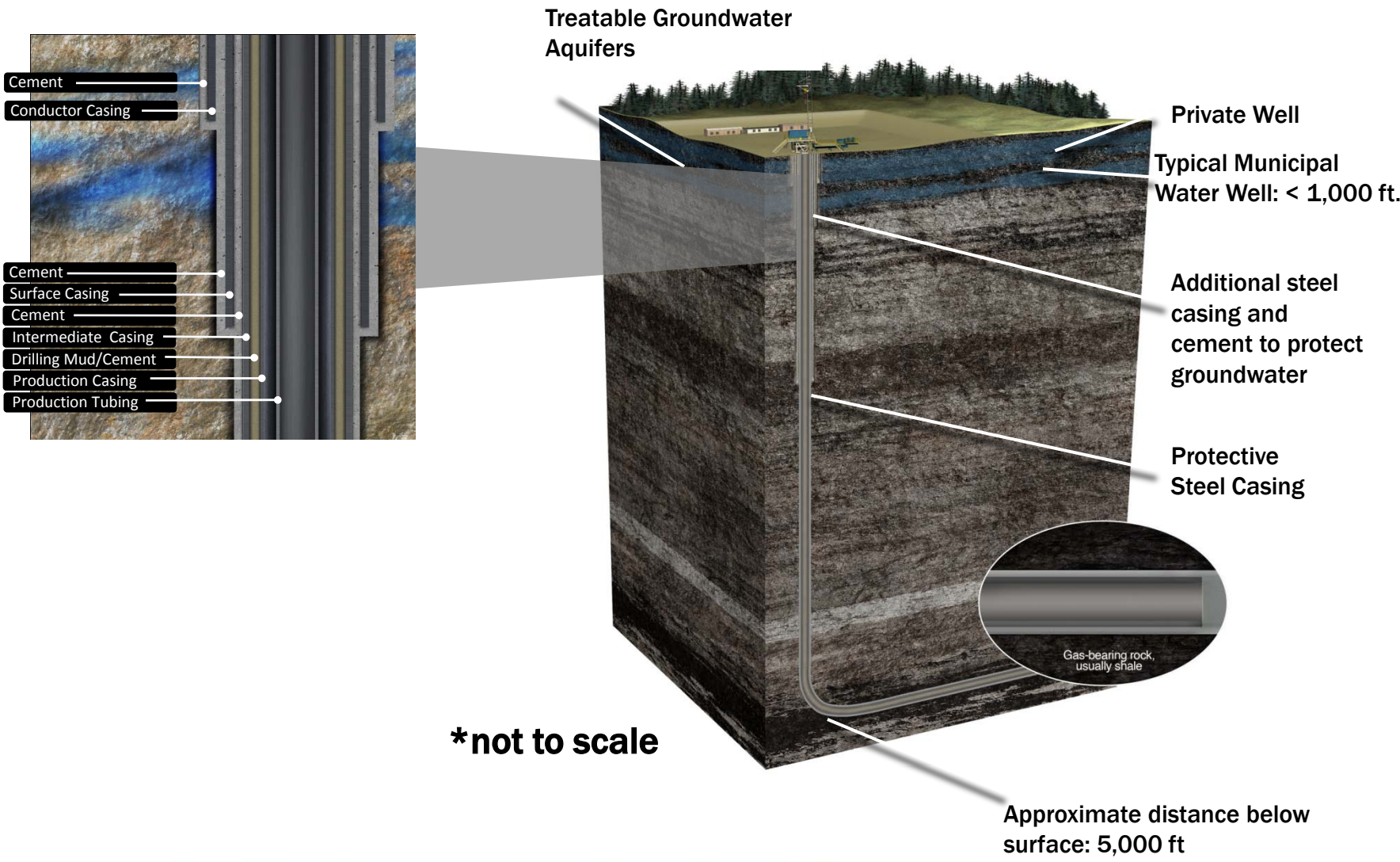
- ▶ Established by state water protection agencies

## » Protective well design

- ▶ Consist of multiple layers of steel casing



# Groundwater Protection





# Best Management Practices



# Best Management Practices

**Best management practices (BMPs)** are advanced, modern protective measures applied to natural gas and oil drilling and production activities to help ensure energy development is conducted in a safe and environmentally responsible manner.

# Best Management Practices

## » Chesapeake's BMPs:

- ▶ Employed from planning stage through wellsite reclamation
- ▶ Reasonable and Prudent Practices for Stabilization (RAPPS) Training conducted for field personnel
- ▶ Civil Engineering based practices
- ▶ Supported by senior management
- ▶ Personnel who visit sites on a regular basis are required to report observations and/or deficiencies
- ▶ Continuous improvement with lessons learned





Questions?