

The background of the slide is a solid red color with a pattern of white, five-pointed stars of varying sizes, some of which are slightly blurred, giving it a textured, flag-like appearance.

U.S. Unconventional Gas Technology

March 9, 2010

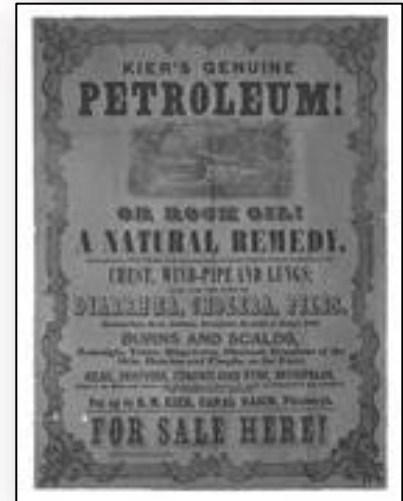
GOVERNMENT AFFAIRS

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Mike Watts – Fracture Stimulation Affairs & Special Projects

Northeast – Birthplace of U.S. Natural Gas

- **First natural gas well**
 - William Hart – 1821
 - Fredonia, New York
- **First natural gas pipeline**
 - E. L. Drake – 1859
 - Titusville, Pennsylvania
- **Early challenges**
 - Funding
 - Commercial quantities
 - Storage and transport
 - Technology

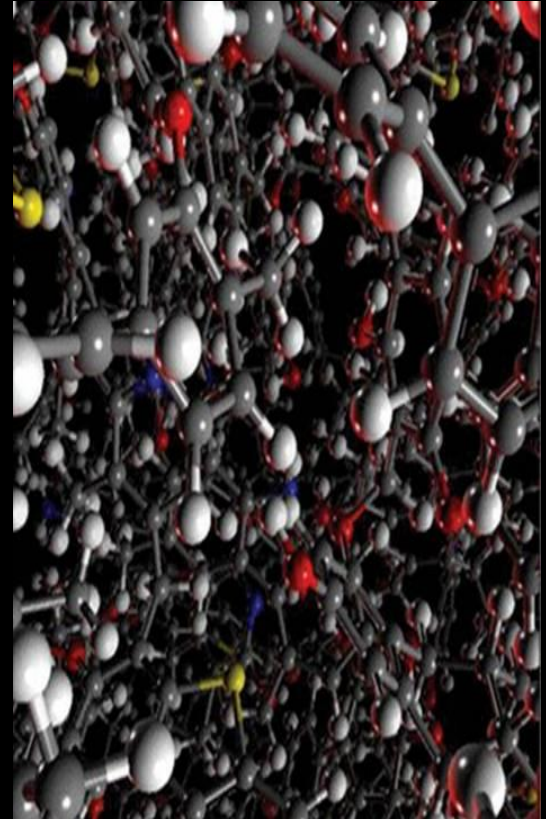
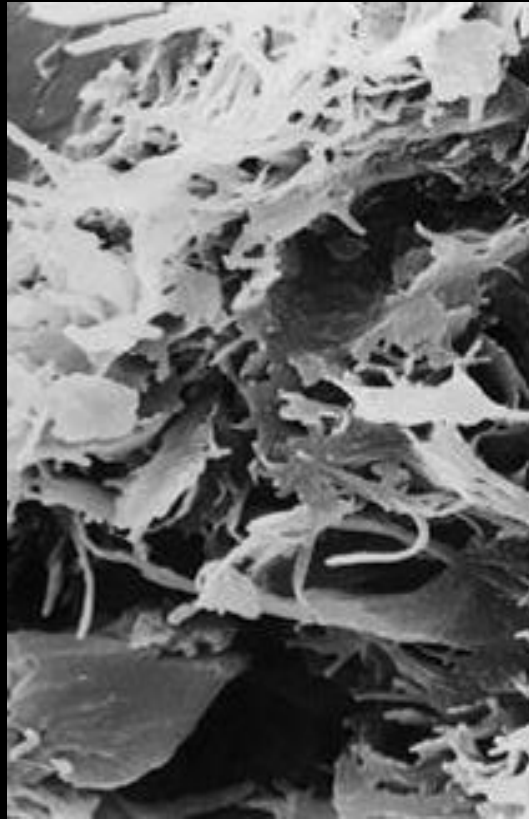
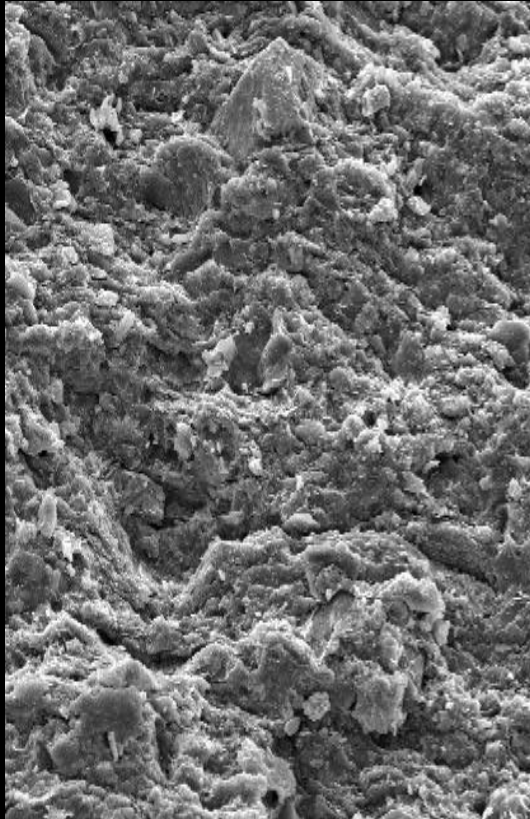


Natural Gas Evolution Underway

North American Shale Plays Today

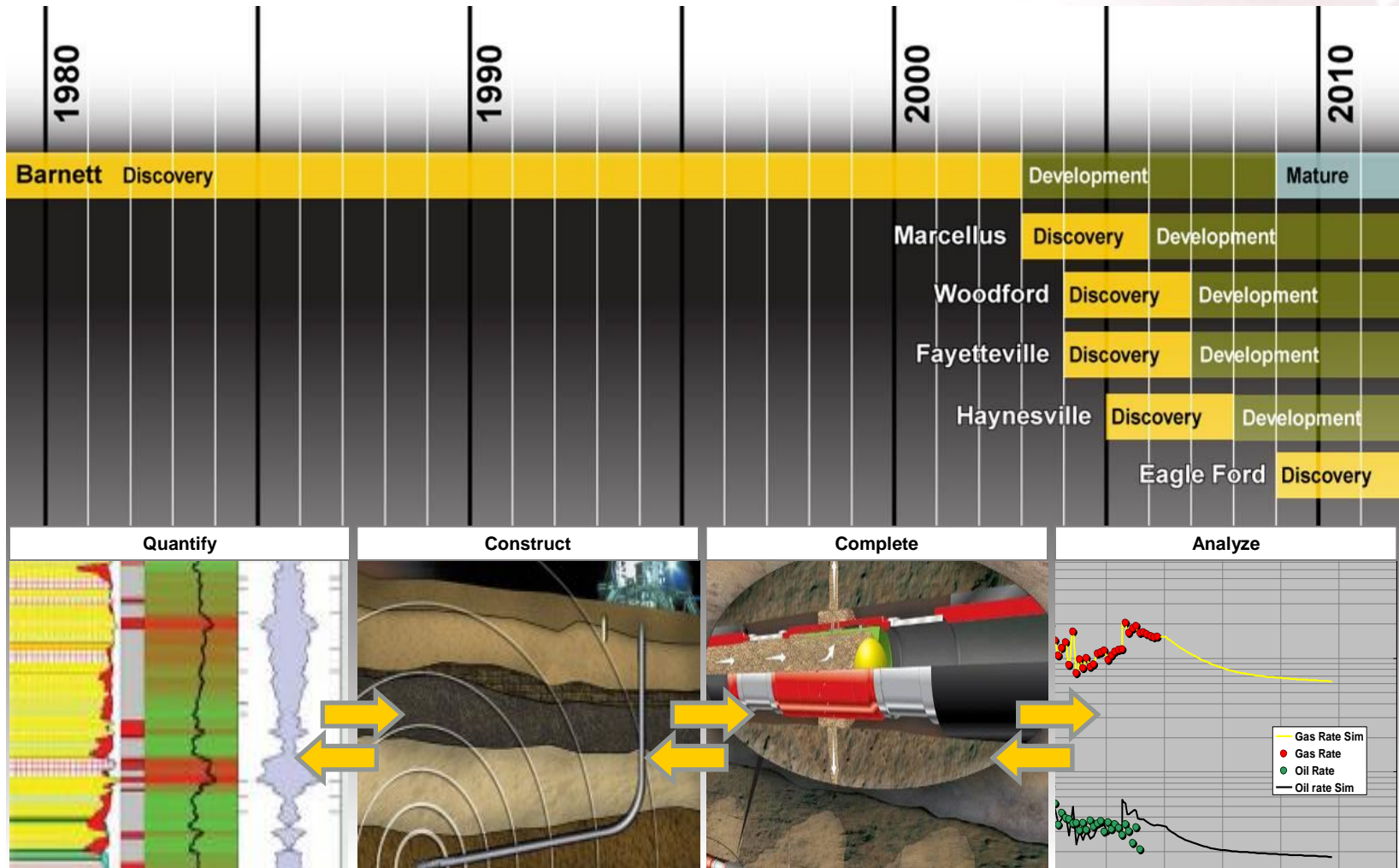


The Unique Challenges of Shale

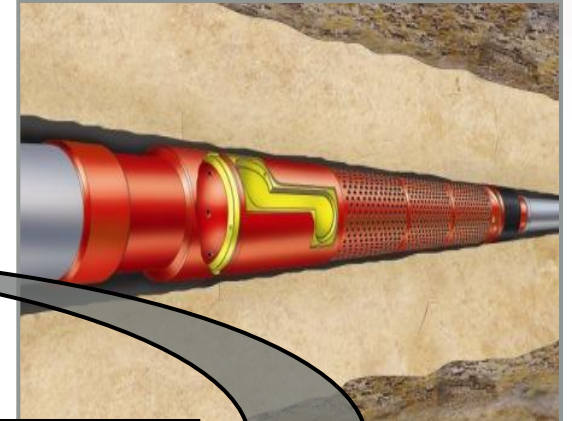
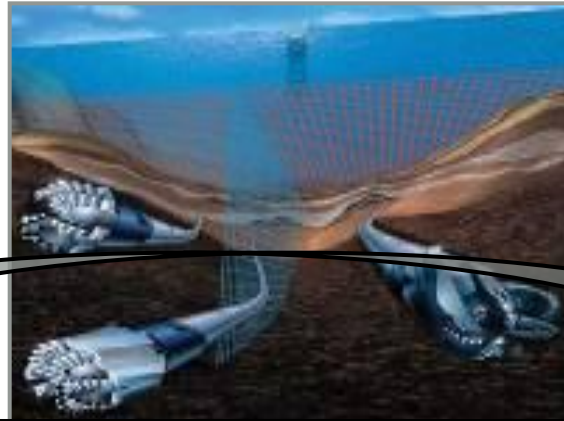
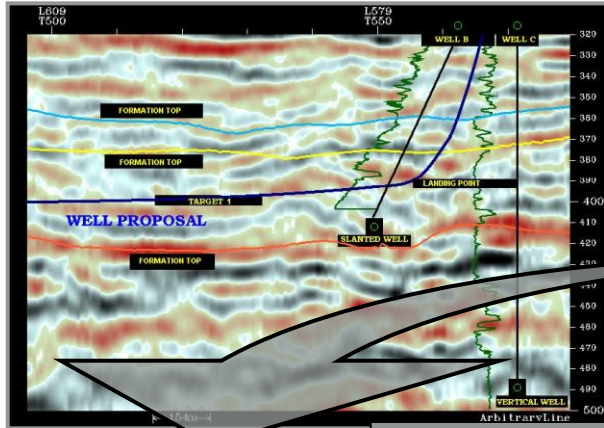


NO TWO SHALE PLAYS ARE ALIKE

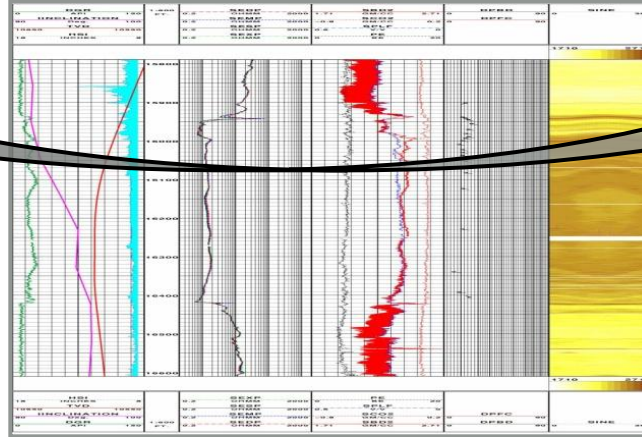
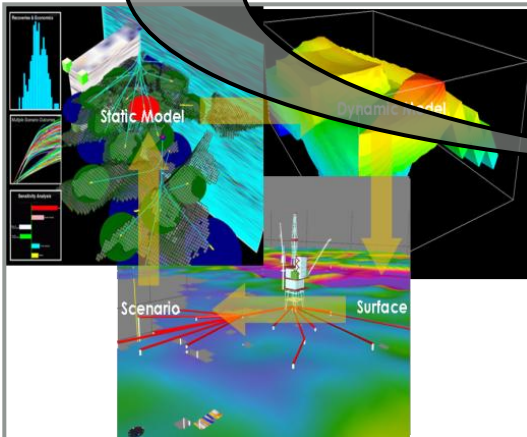
Decades of Technology Applications



Exploration and Production Timeline

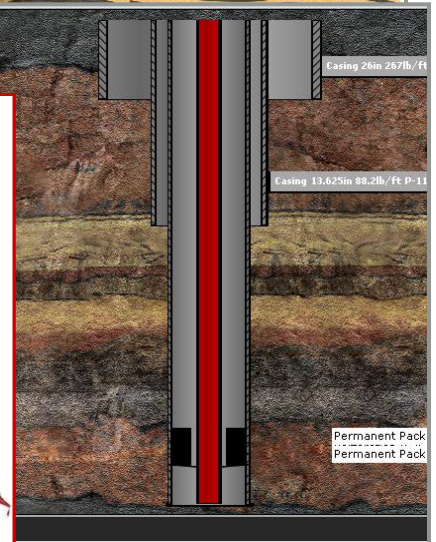
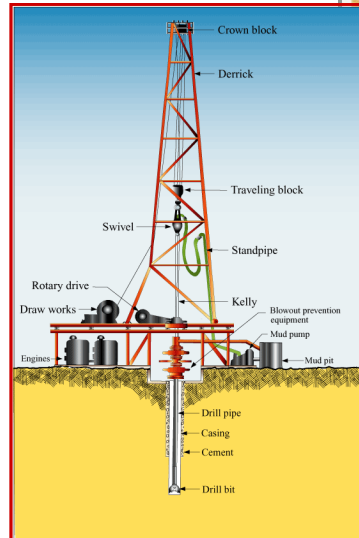
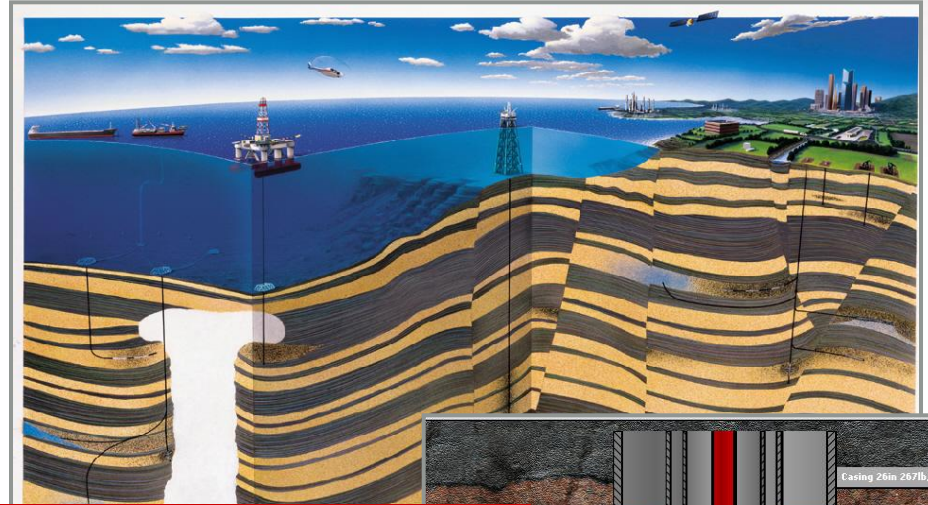


Seismic Simulation & **Integration = Advancement** Production



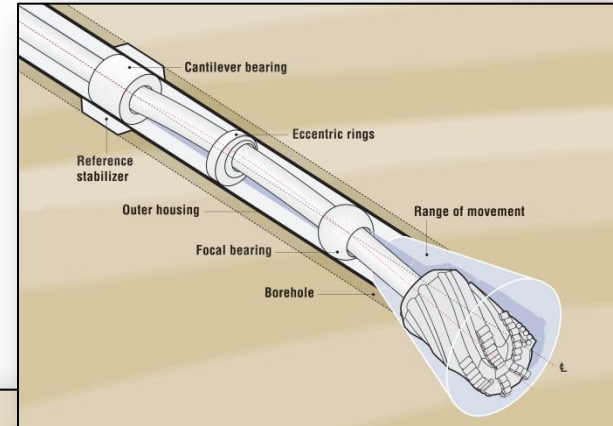
Advancements – Well Construction

- Rig
- Bit
- Fluids
- Drillstring/Bottom-Hole Assembly
- Casing
- Cement



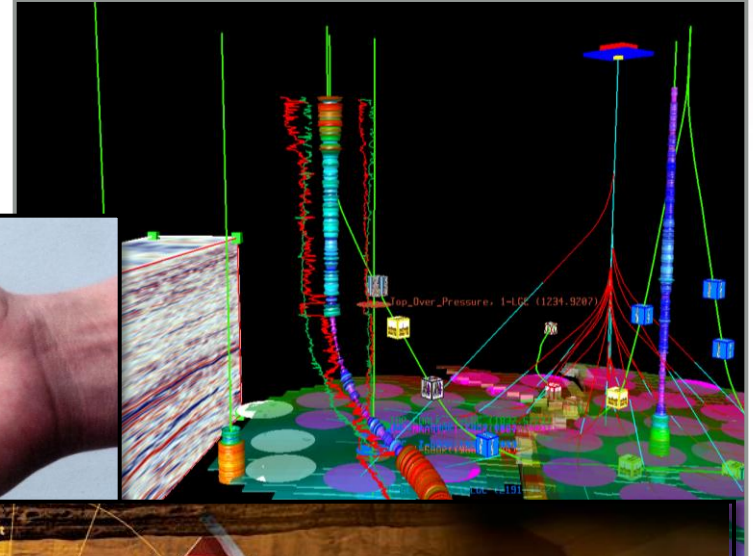
Directional Drilling Control

- Rotary Assembly
- Steerable
 - Mud Motor
 - Rotary Steerable



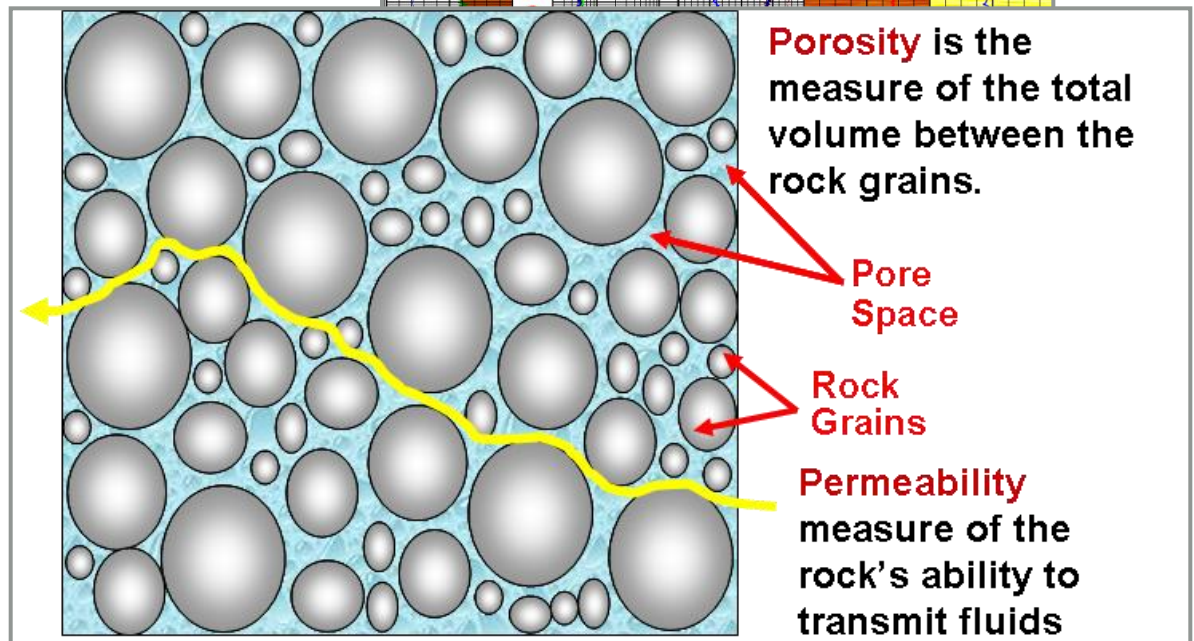
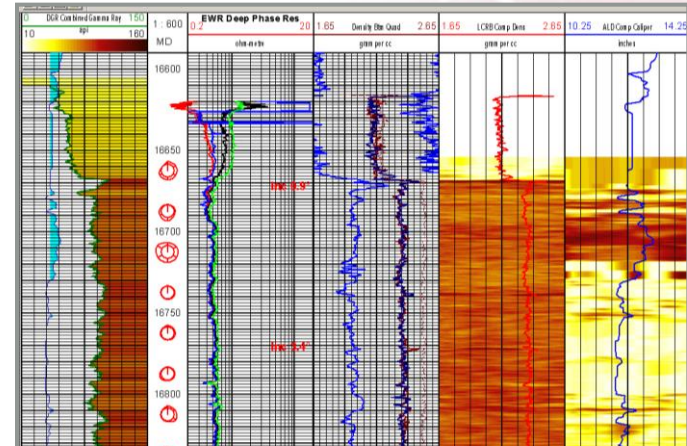
Advancements - Evaluation

- Logging While Drilling
- Mud Logging
- Wireline

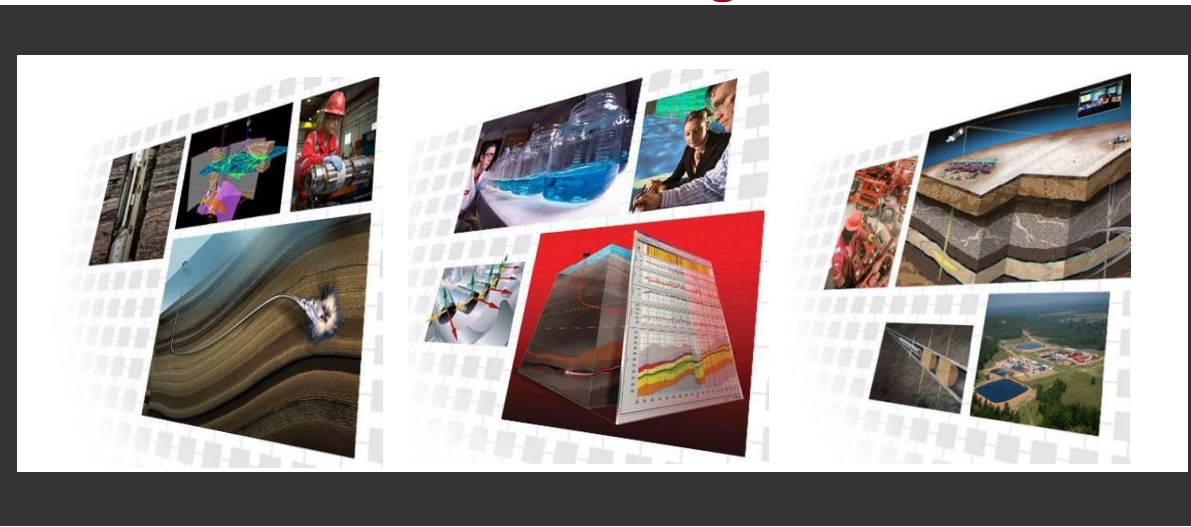
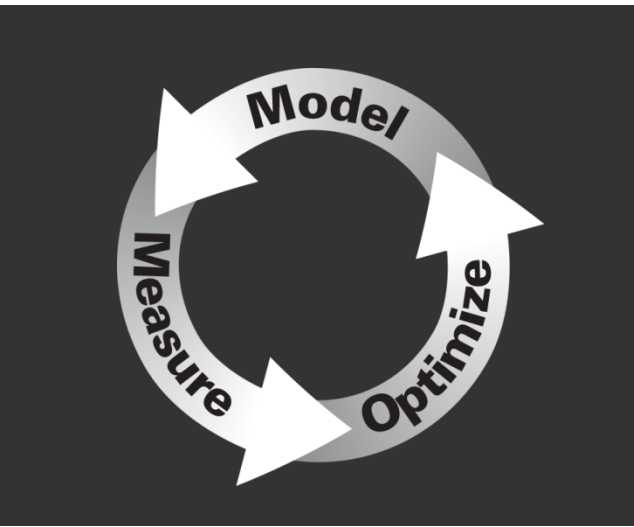


Detailed Formation Analysis

- Rock Characteristics
- Pressure
- Temperature
- Gas, Oil or Water
- Porosity
- Permeability
- Fluid Sample



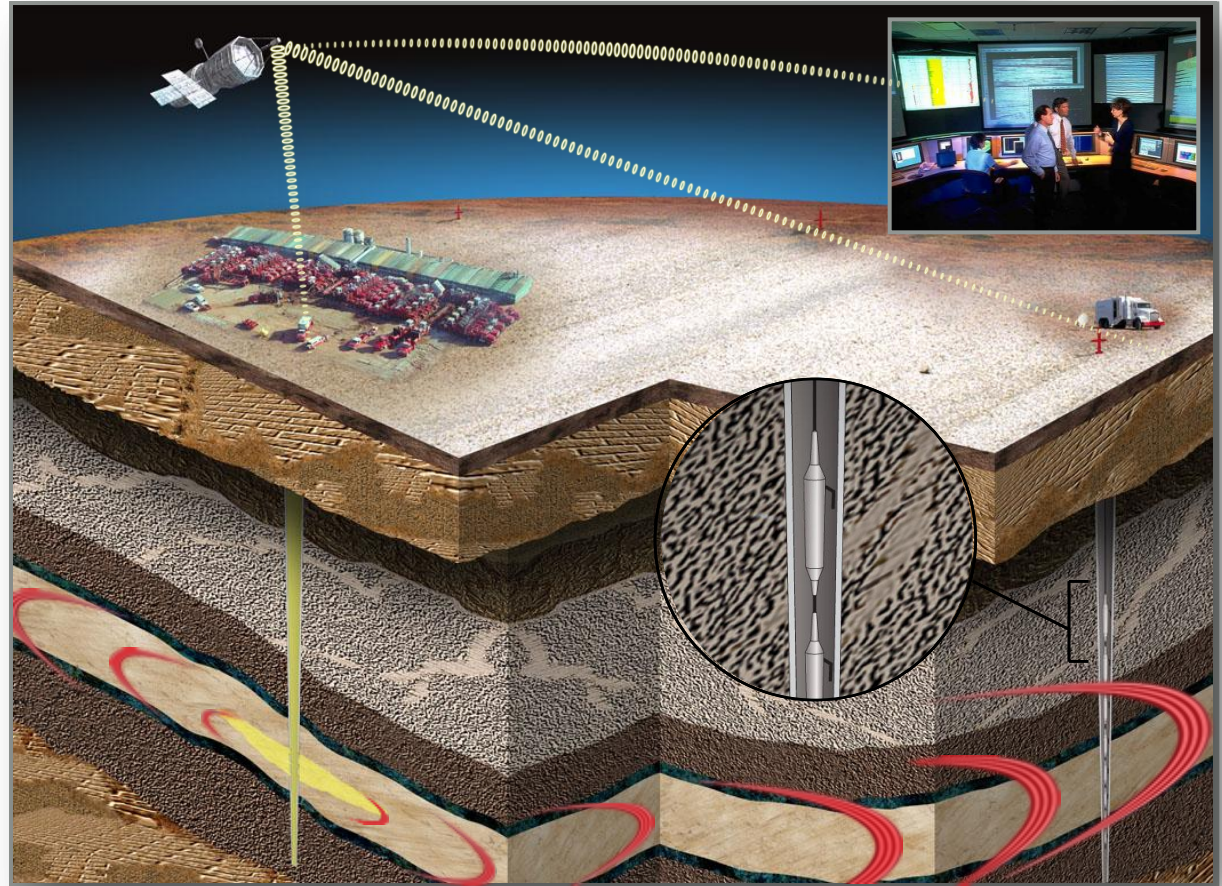
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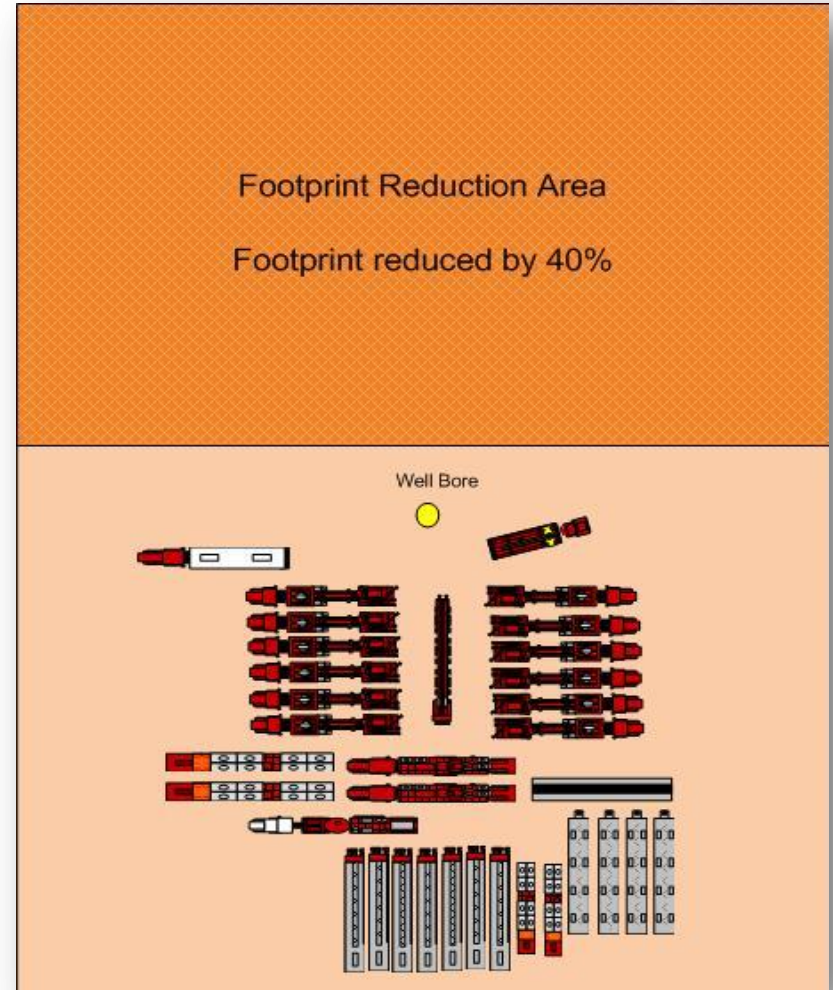
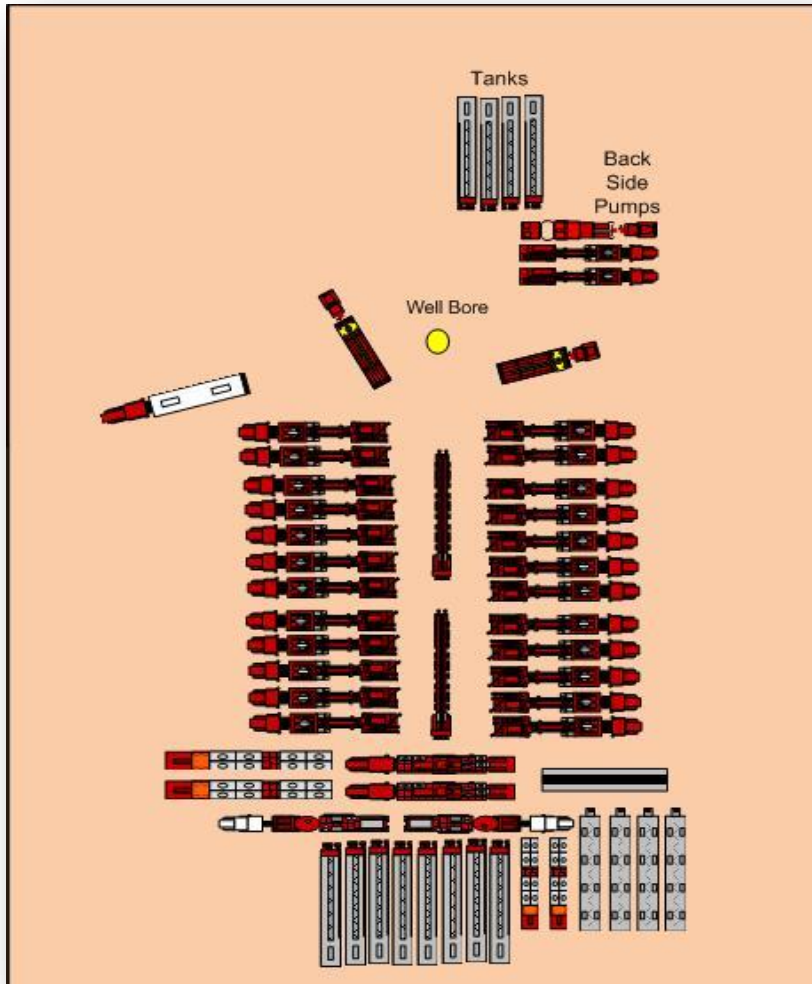
“A real-time collaborative environment to model, measure and optimize the asset”

Integrating Microseismic Monitoring

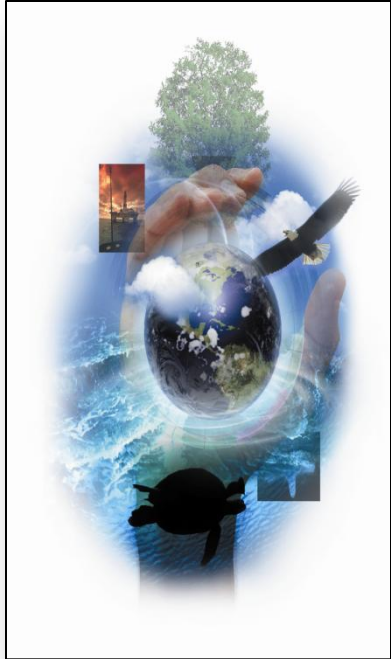
- Well stimulation generates nano-level events
- Geophones in monitor well identify and map precise location of events



Changing the Environmental Footprint



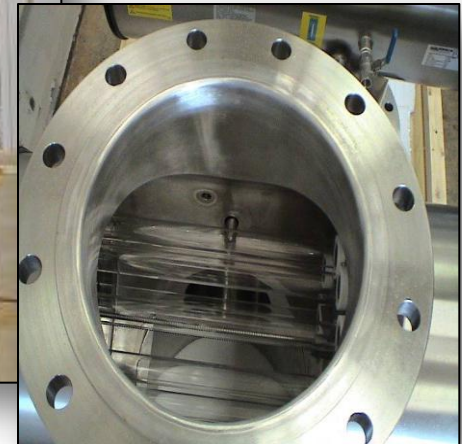
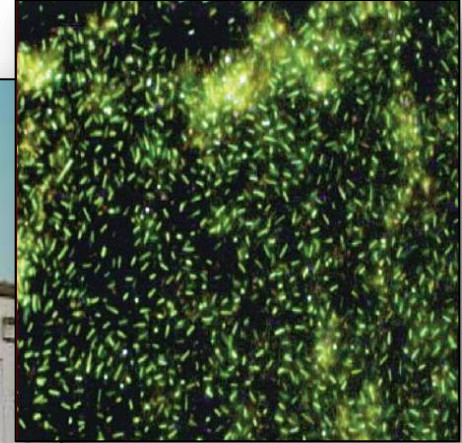
Environmental Advancements



- **Process integration minimizing footprint**
- **Technology enabling produced water recycling**
- **ENVIRO-FLOC[®] drilling fluid dewatering**
- **ENVIRO-FIX[™] solids stabilization**
- **CleanStream[®] UV light bacteria control**

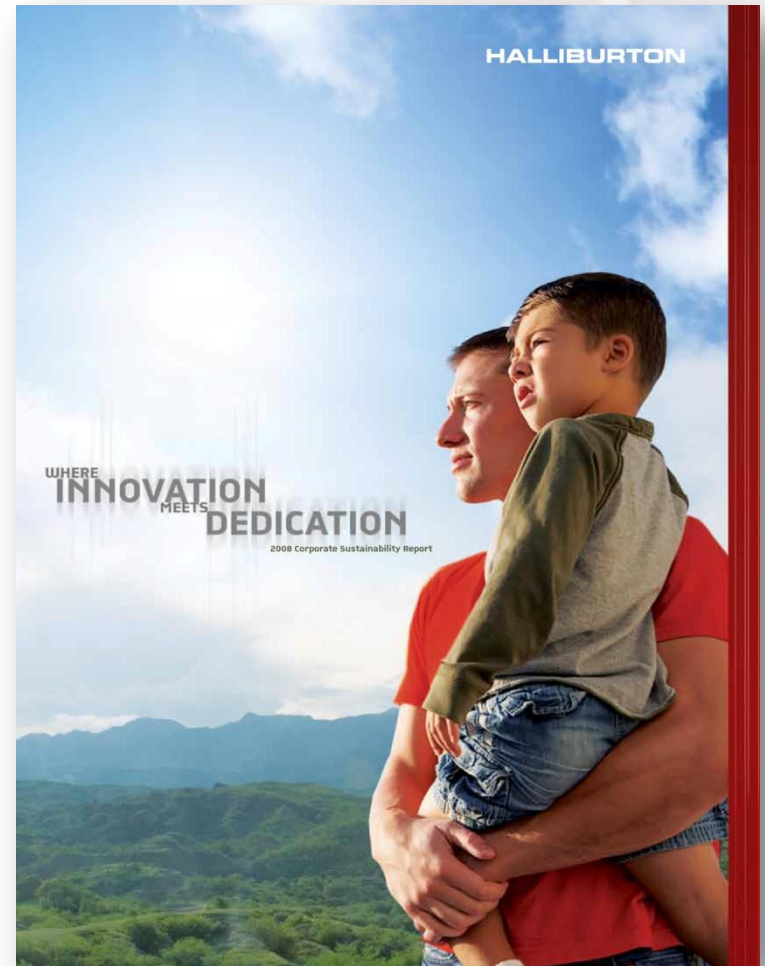


CleanStream® Trailer – UV Fracture Stimulation Fluid Treatment



Key to Continued Evolution – Sustainability

- Sustainable relationships
- Sustainable technologies
- Creating opportunity through supplier diversity
- Life-enriching community relations





GOVERNMENT AFFAIRS

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Thank You!