

PROJECT facts

U.S. DEPARTMENT OF ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Gas Exploration,
Production and Storage

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EMERGING TECHNOLOGIES FOR THE NATURAL GAS INDUSTRY – DRILLING, COMPLETION, AND STIMULATION

This technology area focuses on the development of new and improved technologies that can increase production from existing fields. Technologies under development can increase the value of producing wells in several ways: by increasing the rate of penetration or extending the drill bit life, by developing new methods for drilling faster, by eliminating formation damage, and by more effectively linking the formation to the borehole.

Advanced drilling systems currently being developed and demonstrated are:

- Advanced mud hammer and hammer engine technologies
- Optimization of mud hammer performance
- High-pressure coiled tubing jet assist drilling system
- High temperature MWD/LWD systems
- Advanced designs for TSP bits
- Hydraulic pulse drilling system
- Microwave processing for advanced diamond composites
- High-power slimhole drilling system
- Advanced underbalanced drilling fluids
- Coiled tubing inspection system
- Underbalanced drilling products
- Downhole seismic source for "look ahead of bit"
- Microdrilling system

Advanced completion and stimulation technologies are focused on the following:

- Carbon dioxide/sand fracturing stimulation
- Non-damaging drill-in and completion fluids
- Downhole fluid analyzer
- Improved (high energy/low damage) perforation system
- Real time fracture diagnostics
- Ultra-lightweight cement
- Ultra-deepwater production system

EMERGING TECHNOLOGIES FOR THE NATURAL GAS INDUSTRY – DRILLING, COMPLETION, AND STIMULATION

Current Activities

- **Conventional Drilling System Efficiency**
 - Advanced Slim-Hole Motor/TSP Bit Drilling System
 - Mud Hammer Drilling System
 - Optimization of Mud Hammer Performance
 - High Temperature (195 C) MWD
 - High Temperature (175 C) LWD
 - Coiled tubing inspection system
- **Under Balanced Drilling Systems**
 - PC-Based Foam Drilling Model
 - Light Weight Solid Additives
- **New Concept Drilling System/Components**
 - Microwave Processed Components and BHA Hardening
 - High Pressure Coiled-Tubing Drilling System
 - Hydraulic Pulse Drilling System
 - Integrated Downhole Hammer Engine
 - New Aggressive TSP Cutter Design
 - Advanced Microdrilling
 - Downhole Seismic Source for Pore Pressure Prediction
- **Advanced Completion and Stimulation Systems**
 - CO₂ Sand Fracturing
 - Ultra-Lightweight Cement
 - Perforation Dynamics Study
 - New Non-Damaging Drill-In and Completion Fluids
 - Downhole Fluid Analyzer
 - Real Time Fracture Diagnostics
 - Ultra-Deepwater Production System
- **Supporting DCS Research**
 - Horizontal Well Technology (DEA-44)
 - Under Balanced Drilling Technology (DEA-101)
 - Coiled Tubing and Slim-Hole Technology (DEA-67)

