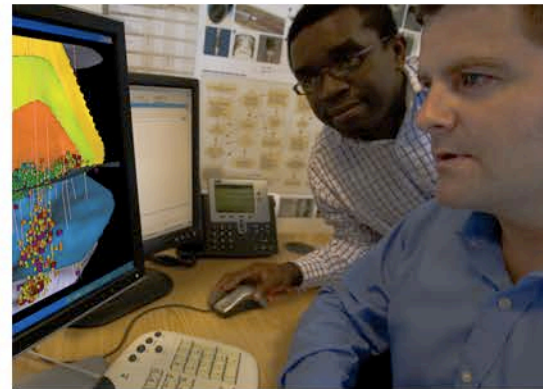
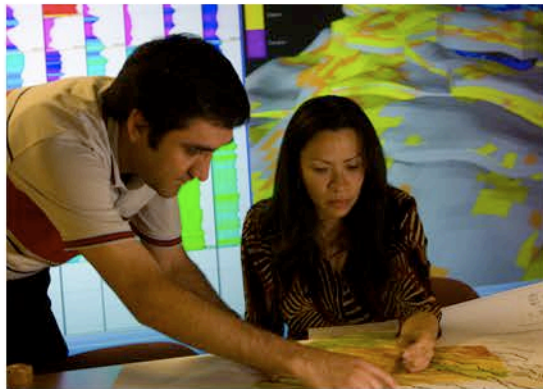


# TeleCoil Real-Time Downhole Communication System

## Insight Through Coiled Tubing



Trevor Sturgeon, Project Leader

Baker Hughes, Coiled Tubing Research & Engineering

# TeleCoil System

- Communication system with real-time downhole data
  - Through a non-intrusive electrical conduit
  - Enables optimization of conventional CT interventions
  - Permits the use of wire line logging tools.
- Comprised of three main components:
  - TeleCoil Conductor
  - Bottom hole assembly
  - Surface hardware & data acquisition system

# Technology Development Drivers

- Accurate BHA depth referencing is critical
  - Perforating,
  - Setting isolation devices,
  - Cleaning completions components, etc.
- Existing depth measurement techniques include:
  - Surface depth counters
  - Tagging known reference depths
  - Profile locators / end of tubing locators
  - Memory CCL tools
  - Braided cable (Stiff-wireline)
- These methods have inherent errors, are un-reliable or operationally impractical

# Braided Cable (Stiff-Wireline) Challenges

- Use of ball operated tools
- Issues with wire termination
  - Time required
  - Unreliable electrical connection
  - Electrical isolation problems
- Frequent slack management
- Fluid compatibility
- Chloride corrosion
- Increased fluid friction
- Increased string weight



7/16" braided  
cable in 2" CT

# TeleCoil Conductor

- 1/8" OD corrosion resistant alloy tube
  - housing insulated electrical conductor
    - Non-intrusive
    - Passage of activation balls
    - Extremely quick head up (<30 minutes)
    - Minimal slack management
    - Compatible with oilfield fluids / slurries
    - No effect on flow rates, friction pressures
    - Minimal weight ( $\approx 1/10^{\text{th}}$  of braided cable)



1/8" TeleCoil  
conductor in 2" CT

# TeleCoil Conductor

- Required new injection system
  - Capstan systems not appropriate
- Suitable for installation in various sizes of coiled tubing
  - 38.1 mm through 73 mm
- Patented engineered process and equipment allows installation in most lengths of coiled tubing
  - Successfully installed in up to 8200 m

# TeleCoil Bottom Hole Assembly

- Head up
  - Connects to tubing end connector
  - Provides rapid wire connection
  - Allows electrical and mechanical quick connect
  - For use with multiple bottom hole assemblies



# TeleCoil Bottom Hole Assembly

- Integrated Sensor BHA

- 2 7/8" OD, 60" Length
- Designed for 114.3 mm to 177.8 mm casing
  - Including 13 Chrome and premium connections

## Sensor package

- Casing Collar Locator (CCL): developed internally
  - Resolution down to 5 m/min
- Two pressure sensors: internal and external
  - Yields BHA difference pressure

## Motor head

- Double flapper check valve
- Ball activation:
  - Wire release
  - BHA disconnect
  - Circulation port
  - Passage of 1/2" ball





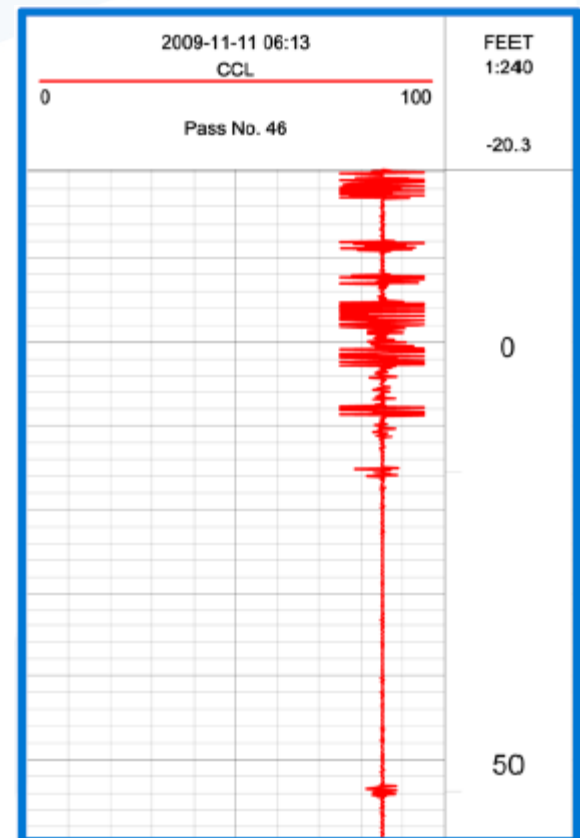
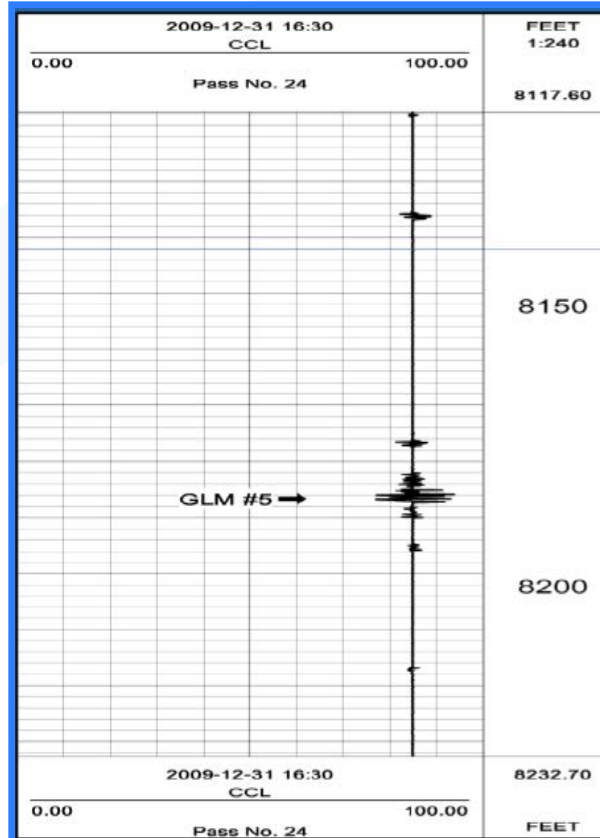
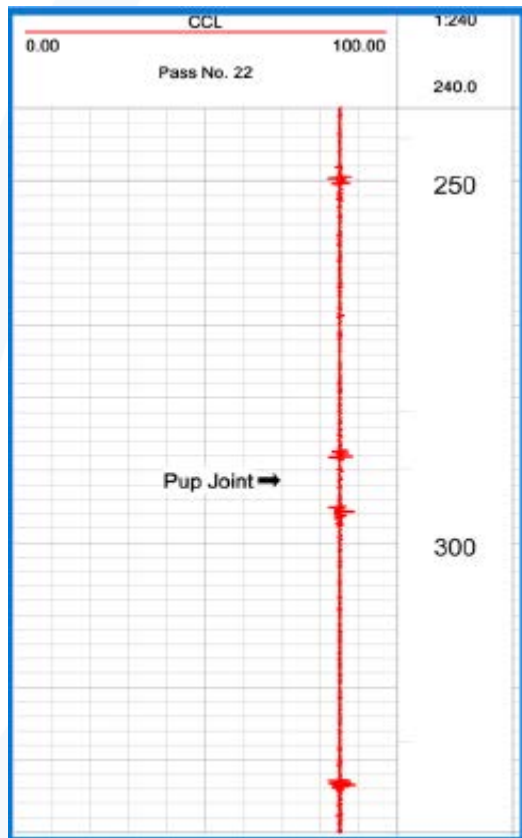
# TeleCoil Bottom Hole Assembly

- Logging Adapter
  - Electrical feed through for logging tools
  - Quick connect with motorhead
    - Ball activation:
      - Wire release,
      - BHA disconnect
    - Check valves
    - Flow ports
  - HS&E risk reduction
    - Eliminates need to rig down coiled tubing and rig up wireline unit for logging run



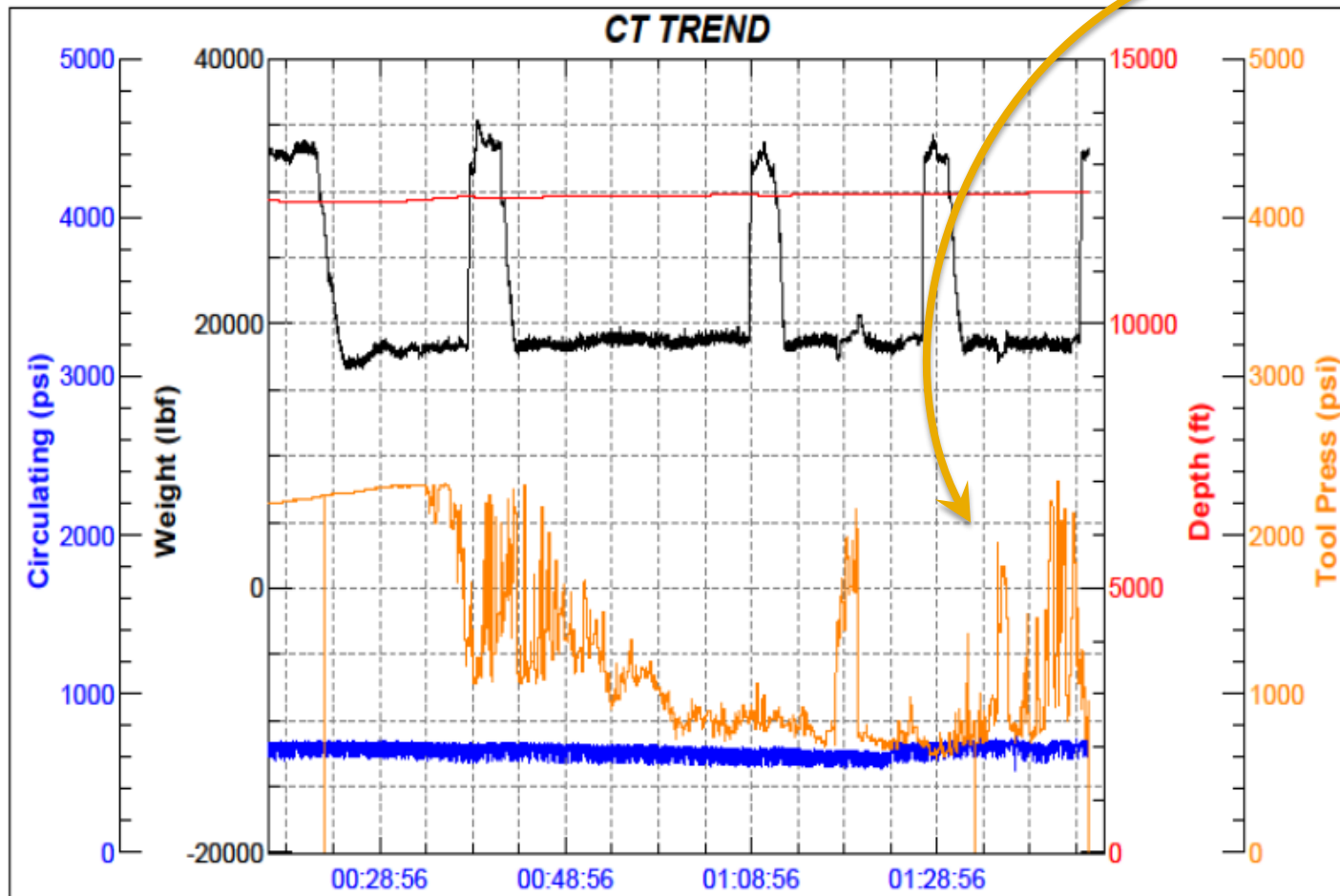
# Depth Correlation

- Provides accurate depth reference
- Identification of various hardware within wellbore
  - Increased safety when pulling out of hole



# Optimizing BHA Functions

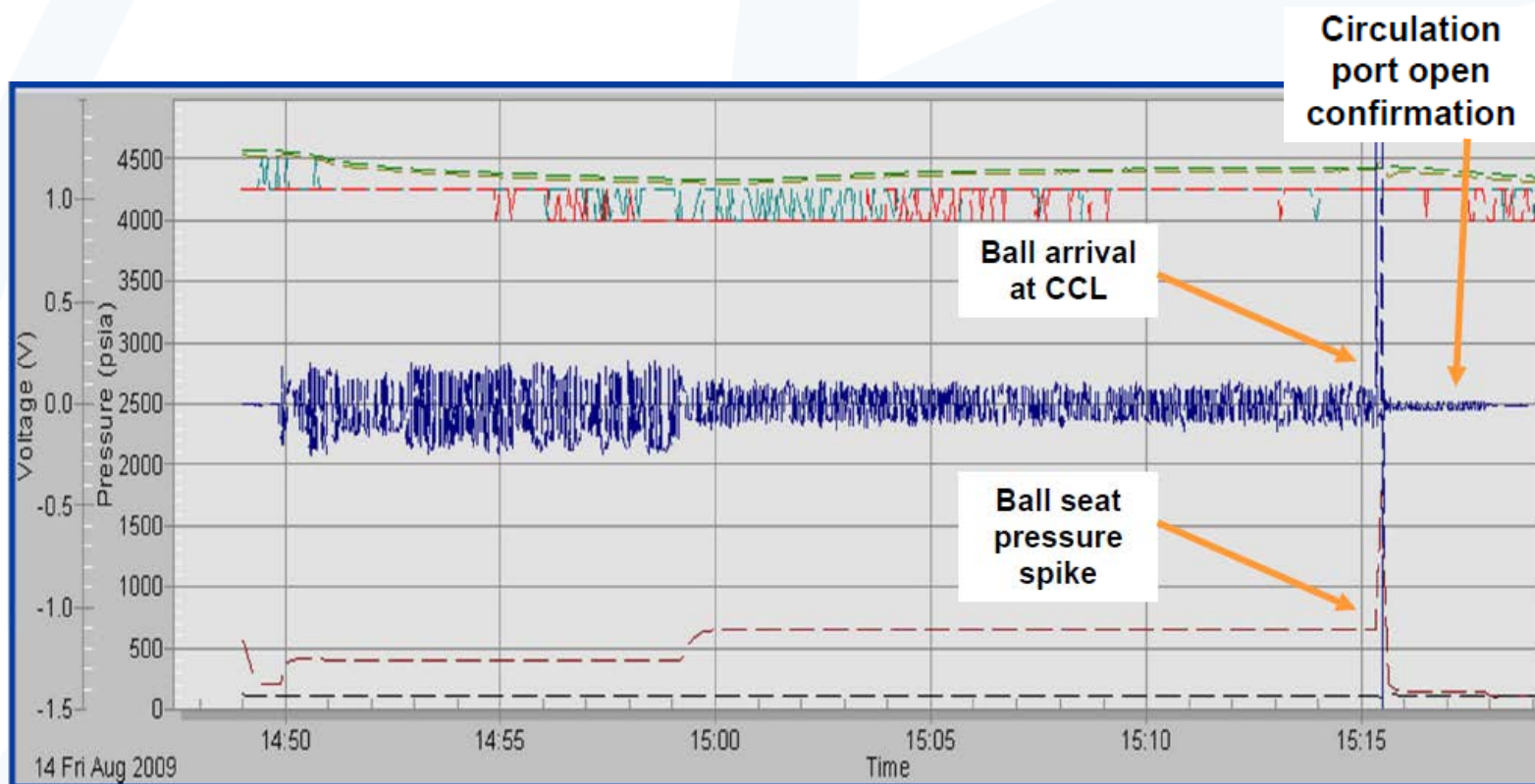
- PDM Milling operations



Real-time  
DH Pressure  
=  
Improved  
Performance

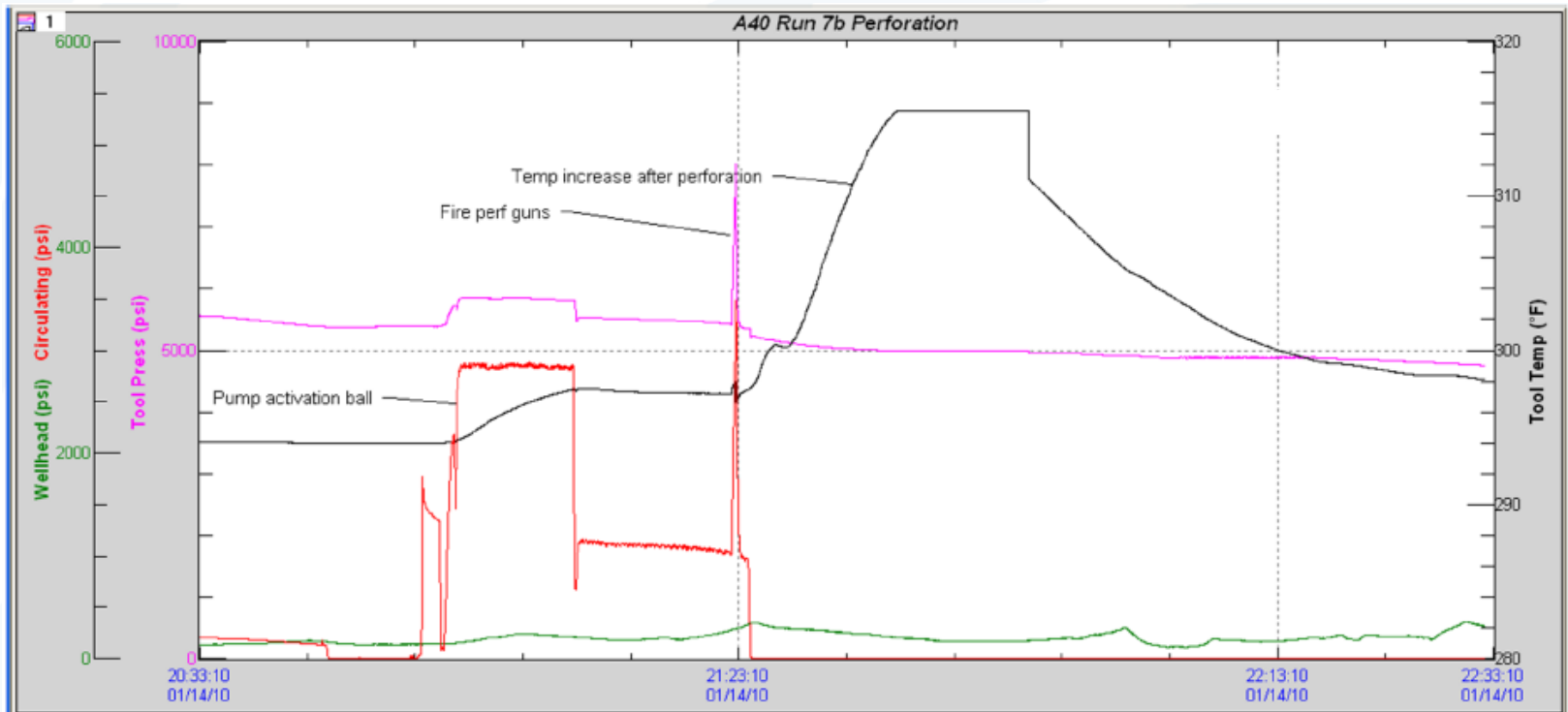
# BHA Function Confirmation

- Opening circulation port above PDM



# BHA Function Confirmation

- TCP Operation
  - CCL confirms accurate depth
  - Pressure confirms ball activation
  - Temperature confirms detonation – Reduced surface hazard





# TeleCoil Deployments

- First installation in Aberdeen, UK
  - First run January, 2010
- Over 200 runs, 725k running metres
  - Cleanouts, milling, jetting, acidizing, fracturing, fishing , gas lifting, perforating, PLT, Caliper, Sand detection, plug setting
- Currently operational in:
  - Azerbaijan
  - India
  - Netherlands
  - New Zealand
  - Norway
  - UK
- Increased demand for job optimization and successful execution
  - Frequent requests for TeleCoil Technology



# Summary

- New technology providing non-intrusive real time data and operational flexibility
- **Decreases HS&E risk exposure**
  - Decreased rig up/down
  - Temperature confirms perforating gun detonation
- **Increases operational efficiency and reliability**
  - Reduces job time through better BHA control & performance
  - Reduces mis-runs due to depth errors or uncertainty of BHA operations
  - Real time logging ensures accurate data in one run
- **Provides customers single solution**
  - for data gathering and required intervention



# TeleCoil Downhole Communication System



Thank you for your time.  
Questions?