EXTENDED REACH DRILLING DRL044

COURSE OVERVIEW

This course will focus to improve the participants' understanding of the design and operational aspects of high angle drilling. The practices for complicated highly deviated wells will be covered and participants will receive instructions on planning and evaluating these wells based on the objectives and how to perform the proper planning for an ERD well. In addition, this course will cover which drilling parameters should be focused during both planning and execution for a well with fewer problem well.

COURSE OBJECTIVES

By the end of this course, participant will be able to:

- Recognize the high angle drilling
- Gain confidence in an engineering approach to drilling
- Understand and identify the drilling problems of ERD
- Explain why certain practices worked (or didn't work) on previous wells
- Anticipate when (and why) different techniques may be required on future wells

WHO SHOULD ATTEND

Drilling Engineers, completion engineers, exploration supervisors and managers concerned with advanced drilling technology

COURSE DURATION

5 Working Days

COURSE OUTLINES

1. Pre course evaluation

2. ERD Operations and Achievements
   - Definitions of ERD
   - Critical Technologies for ERD
   - Overview of ERD Applications
   - Examples of ERD Costs and Performance
   - The ERD Learning Curve

3. Trajectory and Directional Drilling Optimization

- Trajectory Design and Planning
  - Optimum Trajectory
  - Choosing Among Classes of Trajectories
  - Influence of Friction Factor (μ)
  - Additional Directional Planning Tips
  - Anti-collision Planning
  - Effect of Build Rate
- Directional Drilling Planning and Implementation
  - Drilling Assemblies
  - Downhole Motor Usage
  - MWD/LWD Considerations
  - Bit Selection
  - Tortuosity Issues
  - Influence of Buckling

4. Completion Issues Related to Extended Reach and Horizontal Wells

- Wellbore Considerations
  - Planning Well Profile
  - Mud Design & Hole Cleaning Issues
  - Drilling Reservoir Section
  - Displacements
- Completion Types
  - Extended Reach / Horizontal Well Completions for Sand Control
  - Gravel Packing / Fracpacking
  - Frac Pack Completions
  - Designing Upper Completion
  - Running Upper Completion
  - Damage Removal in Extended Reach / Horizontal Wells
  - Matrix Stimulation
  - Hydraulic Fracturing
- Well Interventions
  - Open Hole Logs/RFT
  - Cement Evaluation
  - Perforating

- TCP
- Running & Pulling Completions
- Production Logs
- Water/Gas Breakthrough Management
- Coiled Tubing

- Artificial Lift
  - ESPs

5. **Mechanical and Chemical Wellbore Stability**
   - Mechanical Aspects
     - Planning Stage
     - Drilling Stage
   - Chemical Aspects
     - Planning Stage
     - Drilling Stage

6. **Drilling Fluids Optimization**
   - Selection of Fluid Type
     - Environmental Issues
     - Optimization of Fluid Formulation
     - Barite Sag
     - Wellbore Stability/Inhibition
     - Hole Cleaning Capability
     - Mud Lubricity - Torque and Drag Reduction
     - Filtration Control/Differential Sticking
     - Solids Control Management
     - Formation Damage Aspects
   - General Considerations

7. **Tubular Design And Running Guidelines**
   - ERD Well and Casing Program Design Issues
   - Severe ERD Casing Running
     - Critical Casing Pickup Loads
     - Critical Casing Slackoff Weights
   - Liner Running and Rotation

- Casing Wear
  - Wear Modeling
  - Wear Management
  - Wear Monitoring and Measurement
- Casing/Liner Centralization
- Tubular Design and Running Summary

8. Cementing

- Option Selection - Considerations When Selecting ERD Candidates
  - Theory and Introduction
- Pre-Drill Data Package - Required Prospect Information
- Well Planning - Feasibility Through Detailed Drilling Procedures
  - Equipment
- Slurry Design and Testing Requirements
- Implementation - Operational Issues, Rig Practices
  - Cement Placement and Mud Removal
- Centralization
  - Setting Cement Plugs in ERD/Horizontal Sections
- Post Analysis/Performance Measurement
- Case History

9. Drill String Design

- Non-Cyclic Load Trends
  - Torque
  - Tension and Combined Tension/Torsion
  - Estimating Non-cyclic Loads in a Well
  - Handling High Non-cyclic Loads
  - Reduction and Redistribution of Non-cyclic Loads
  - Cyclic Loading and Fatigue
  - Buckling
  - Cyclic Stress Induced by BHA Sag
- Other Drill String Design Issues
  - Annular Velocity and Drill Pipe Size
  - Hydraulics and Drill Pipe Size
  - Casing Wear Issues

- Jar Placement
- Drill String Inspection Practices

10. Drill String Dynamics

- Severe Vibration
  - How To Know Severe Vibration is Occurring
  - Symptomology and Control of Vibration
  - Controlling Severe Vibration
  - Vibration Monitoring Tools
  - Consideration of Geology

11. Torque and Drag Projections

- Torque Projection
  - Torque Components
  - String Torque
- Bit Torque
  - String Torque Prediction
  - Torque Monitoring and Management Measures
- Drag Projections
  - Drag Friction Factors and Monitoring
  - Buckling Behavior During Sliding or Tripping
  - Predicting Drag and Buckling Severity
  - Buckling Impact on the String
  - Drag Monitoring and Management Measures

12. Hole Cleaning and Hydraulics

- Hole Cleaning
  - Well Plan
  - Mud Properties
  - Drilling Practices
  - How Cuttings are Transported
  - Cuttings Transport Models
  - Hydraulics
  - System Pressure Loss
  - Mud Rheology
  - Hydraulics Modeling

13. Rig Sizing and Selection
    - Rig Sizing
        - Well Design
        - Operational Requirements
        - Hydraulic Requirements
        - Torque and Drag Predictions
    - Equipment Sizing and Specifications
        - Efficiencies
    - Evaluation
    - Example

14. Well Control Guidelines for Drilling High Angle or Horizontal Wells
    - Kick Tolerance
    - Kick Prevention and Detection
    - Well Shut-In and Surface Pressures
    - During Well Shut-In Period
    - Well Kill Techniques
    - Trapped Gas in Inverted or Horizontal Hole Section

15. Stuck Pipe Prevention
    - Well Planning - Anticipating Probable Mechanisms
    - Differential Sticking
    - Formation Related
        - Geopressured
        - Reactive
        - Unconsolidated
        - Mobile
        - Fractured/Faulted (tectonic)
        - Inadequate Hole Cleaning
        - Wellbore Geometry / Keyseating
        - Collapsed Casing
        - Cement Blocks
        - Connections Guidelines
    - Reaming and Back-Reaming Guidelines
    - Freeing Stuck Pipe
    - Stuck Pipe Issues

16. Post course evaluation.