

WELL DESIGN AND ENGINEERING

DRL034

COURSE DESCRIPTION

This course integrates all major well design technologies from pre-spud to TD. Participants are actively engaged in every aspect of the technical activities required to deliver a cost-effective well plan while also gaining valuable perspective on how the overall process should be managed in a dynamic team environment. The course content is customized to address technologies and practices that may be specific to a project or operational situation. The course delivery is carefully balanced to integrate technical lectures and group discussion with roughly half of each day allotted for the teams to apply what they have learned on the project well design. A scientific calculator is required and a laptop computer is strongly recommended.

COURSE GOAL

To enhance the participants' knowledge, skills, and ability necessary to draw the linkages between the design topics and to understand that each decision has influence on those that follow.

COURSE OBJECTIVES

By the end of this course, participant will have covered:

- Understand the responsibilities of a well planner as a designer and project manager.
- Review offset analysis and data gathering.
- Understand the influence of completion design and production requirements on well design.
- Identify trajectory design issues and their influence on torque and drag, wellbore stability, and future intervention.
- Develop specific casing design skills.
- Perform cement slurry and displacement volume calculations.
- Complete drill string and BHA designs and failure prevention assessment for each hole section, and review for directional well applications.
- Understand different bit types and applications, and perform calculations to support bit run economics.
- Optimize hydraulics for each hole interval based upon wellbore, fluids and drill string configurations.
- Compile risks to well delivery, and develop mitigations and contingency plans.
- Develop minimum rig capability specifications to deliver well requirements.
- Present and defend a well plan to management.

WHO SHOULD ATTEND

- Drilling Engineers.
- Completion Engineers.
- Drilling Supervisors Involved with Drilling Operations and Well Planning.

COURSE DURATION

5 Working Days

COURSE OUTLINES

- 1. Well Planning (for Drilling Safe Wellbore)**
- 2. Pore & Wellbore Pressures and Stability Management**
 - Geological & Geophysical Aspects of Abnormal Pressures
 - Pore Pressure predictions
 - Wellbore Stability Fundamentals:
 - Drilling in Unusual Stress Regimes – Overpressured Zones
- 3. Casing Setting Depth Selection**
 - Differential Sticking Considerations
 - Kick Considerations
 - Surface & Intermediate Casing String Setting Depth
 - Production Casing String Setting Depth
- 4. Casing Size Selection**
- 5. Casing Design**
 - Casing Design Policies
 - Casing Design Guidance
 - Surface Casing Design (Case Study)
 - Intermediate Casing Design (Case Study)
 - Casing Liner Design (Case Study)
 - Production casing design: tubing leak approach
 - Conductor Casing Design (Case Study)
- 6. Bit Technology**
 - Drilling Bit Types
 - Drilling Bit Design

- Drill Bit Grading
- Bit Handling and Make-up Procedures
- Bit Running Procedures
- Factors affecting penetration rate
- Selecting optimum bit weight and rotary speed
- Drill bit selections based on:
- Bit Performance analysis & Drill Bit Hydraulics

7. Hydraulics & Hole Cleaning

- Considerations For Hydraulics Planning
- Factors That Affect Hydraulics
- General Rules of Thumb
- Hydraulic Calculations
- Annular Hydraulics and Hole Cleaning
- Hole Cleaning Guidelines

8. Drilling Fluid And Solids Control

- Functions, Properties, Design/Selection of Various Types of Drilling Fluid.
- Clay Chemistry
- Products and Systems
- Mud Rheology
- Drilling Fluid Contamination And Treatment
- Well Site Tests Performed on Drilling Fluids.
- Drilling Fluid Calculations
- Solids Control System.
- Pressure Losses in the Drilling System.
- Hole Problems

9. Cementing Practices

- Major functions of casing and casing cementing accessories
- Functions and properties of cement, single and multistage, squeeze and plug cementing operations.
- Primary and plug cementing calculations
- Selection of cement type and additives
- Cement quality Evaluation

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10. Drill String and BHA Design

- Drill String Standards
 - Drill Stem Components
 - Basic Drill String Standards
- Drill String Design
 - Objectives
 - Assumptions
 - Design Factors
 - Design for Vertical to Moderate Angle Wellbores
 - Design for Extended Reach Wellbores
- BHA Assembly Selections

11. Directional Drilling

- Designing the trajectory for a directional well
- Directional drilling tools and BHAs
- Introduction to wellbore surveying
- Calculating the trajectory of a directional well based on survey data
- Directional surveying tools
- Measurement While Drilling and Subsea Drilling
- Introduction to MWD and the value of real time data
- MWD data collection and transmission techniques

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