MERCURY

Tubing Conveyed Perforation & Drill Stem Testing

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Introduction

This Tubing Conveyed Perforation & Drill Stem Testing course provides petroleum and drilling professionals with a structured understanding of tubing-conveyed perforation and drill stem testing operations. It explores the technical principles behind well completion, perforation performance, and reservoir evaluation through DST techniques. Participants will gain theoretical knowledge of TCP equipment, operational workflows, and pressure transient interpretation methods used in modern oil and gas wells. The program also highlights risk management practices and safety considerations essential to high-pressure, high-temperature environments. Through carefully structured learning units, the course strengthens analytical capabilities for reservoir performance evaluation. Participants will support efficient and safe well testing and perforation operations.

Targeted Groups

This Tubing Conveyed Perforation & Drill Stem Testing training targets professionals seeking knowledge and skills:

- Drilling engineers are involved in well completion operations.
- Petroleum engineers working in reservoir evaluation.
- Well testing and TCP field specialists.
- Completion and workover supervisors.
- Production engineers supporting perforation design.
- Oil and gas operations engineers seeking advanced well testing knowledge.
- Technical staff responsible for pressure transient analysis.
- Professionals transitioning into TCP and DST operations roles.

Course Objectives

Participants will achieve the following objectives by completing the Tubing Conveyed Perforation & Drill Stem Testing course:

- Understand modern well-completion methods used in oil and gas wells.
- Explain the principles of tubing-conveyed perforation systems.
- Identify TCP equipment components and firing head mechanisms.
- Evaluate formation damage and its impact on productivity.
- Interpret pressure regimes and reservoir behavior during testing.
- Describe the objectives and workflow of drill stem testing operations.
- Analyze DST pressure data using industry-accepted methods.
- Estimate permeability and calculate skin factor from test results.
- Assess operational risks in HPHT and horizontal wells.
- Apply safety practices for well perforation and testing operations.
- Strengthen decision-making in reservoir evaluation activities.

Targeted Competencies

Participants will gain the following competencies during the Tubing Conveyed Perforation & Drill Stem Testing program:

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- Technical understanding of tubing conveyed perforation operations.
- Ability to interpret drill stem test pressure data.
- Proficiency in identifying TCP system components.
- Skills in evaluating formation damage mechanisms.
- Competence in pressure build-up and flow analysis.
- Capability to estimate permeability and skin factor.
- Awareness of HPHT well operational challenges.
- Understanding of safety systems in TCP and DST operations.
- Improved analytical thinking in reservoir performance evaluation.

Studying Scenarios

In this Tubing Conveyed Perforation & Drill Stem Testing training, participants develop skills through the following scenarios:

- Evaluating TCP job design for a deep onshore well.
- Interpreting DST pressure build-up from field data.
- Assessing formation damage after perforation.
- Selecting appropriate firing head configurations.
- Reviewing safety procedures in HPHT environments.
- Analyzing horizontal well testing challenges.

Course Content

Unit 1: Well Completion & Perforation Fundamentals

- Well completion types:
  - Overview of completion strategies in oil and gas wells.
  - Cased-hole vs. open-hole completions.
  - Selection criteria based on reservoir conditions.
- Perforation principles:
  - Fundamentals of perforation mechanics.
  - Charge performance and penetration concepts.
  - Impact on well productivity.
- Formation damage:
  - Causes of near-wellbore damage.
  - Perforation-induced damage mechanisms.
  - Mitigation and cleanup strategies.
- Pressure regimes:
  - Reservoir pressure behavior.
  - Overbalance vs. underbalance conditions.
  - Implications for well testing and perforation.

Unit 2: Tubing Conveyed Perforation TCP

- TCP system components:
  - Surface and downhole TCP equipment.
  - Gun systems and deployment methods.
  - String configuration design.
- Firing heads:
  - Mechanical and hydraulic firing heads.
  - Electronic firing systems.

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    - Selection and reliability considerations.
- Safety systems:
    - Pressure control equipment.
    - Detonation safety barriers.
    - Operational safety protocols.
- Operational procedures:
    - Pre-job planning and verification.
    - Running and firing sequences.
    - Post-perforation evaluation.
- Risk assessment:
    - Hazard identification in TCP jobs.
    - Risk mitigation planning.
    - Contingency procedures.

Unit 3: Drill Stem Testing DST Fundamentals

- DST objectives:
    - Reservoir evaluation goals.
    - Productivity and deliverability assessment.
    - Formation fluid sampling.
- Surface & downhole tools:
    - DST string components.
    - Packers, valves, and gauges.
    - Surface well testing equipment.
- Test sequence:
    - Flow and shut-in periods.
    - Multi-rate testing concepts.
    - Operational timing considerations.
- Pressure measurements:
    - Downhole gauge principles.
    - Data acquisition methods.
    - Pressure transient fundamentals.

Unit 4: DST Data Interpretation

- Pressure build-up analysis:
    - Horner plot fundamentals.
    - Boundary identification.
    - Reservoir behavior indicators.
- Flow period interpretation:
    - Flow regime identification.
    - Rate-pressure relationships.
    - Deliverability insights.
- Permeability estimation:
    - Analytical calculation methods.
    - Influence of reservoir properties.
    - Practical interpretation workflow.
- Skin factor calculation:
    - Skin concept and significance.
    - Calculation techniques.
    - Impact on well performance.

Unit 5: Operational Challenges & Case Studies

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- HPHT wells:
  - High-pressure high-temperature constraints.
  - Tool limitations and design considerations.
  - Operational best practices.
- Horizontal wells:
  - Perforation challenges in extended laterals.
  - DST considerations for horizontal reservoirs.
  - Productivity evaluation methods.
- Safety considerations:
  - Well control during TCP and DST.
  - Pressure containment practices.
  - Emergency response planning.
- Real field case studies:
  - Integrated TCP and DST field examples.
  - Lessons learned from complex wells.
  - Performance optimization insights.

Final Insights & Key Takeaways

This training equips professionals with practical theoretical expertise in tubing-conveyed perforation and drill stem testing to enhance well performance evaluation and operational safety. Participants will support efficient reservoir testing programs and optimize perforation strategies in modern oil and gas environments.