WellSHARP Drilling & Workover

Workover Course Outline IADC WellCAP

4.5 DAYS - SUPERVISOR

INTERACTIVE STUDY TOOLS

- Provide students with over 600 pages of pre-course study materials at wildwell.com
- Provide students with study guide that covers up to 150 interactive well control questions and answers.
- Provide students with a 50 question test to determine their well control knowledge gaps.

PRELIMINARY ITEMS

- Safety: escape routes, muster points, etc.
- Discussion of special needs
- Introductions
- Class paperwork

DRILLING:

Serious Well Control Problem From the Wild Well Library

- Students form teams
- Team discussion of the potential well control problem
- Simulator exercise demonstrating the well control challenge
- Return to class to discuss the challenge

WELL CONTROL COURSE OBJECTIVES

- Formations, pore pressure, fracture gradients
- Killsheet, kick detection, flow checks, well shut-in, and gas behavior
- Well control methods
- Well control equipment (barriers, BOPs, manifolds, accumulator, etc.)
- Completing the well and post-completion activity
- Final well control simulation: from kick to kill, with complication
- Assessments: skills and written

FORMATIONS, PORE PRESSURE, FRACTURE GRADIENT

- Formation structure
  - Porosity
  - Permeability
- Fracture gradients, kick tolerance, pore pressures
  - Related formulas/math (hydrostatic pressure, the U tube,
  - Force, MAASP, etc.)
  - Equivalent mud weight
  - Kick tolerance
  - Pore pressure vs. fracture gradient (drilling margin/window)
- Simulator exercise demonstrating a FIT; discussion of LOT (if needed, depending upon class knowledge level)
- Discuss casing and cementing program
- Discuss drilling fluids program

BARRIERS

- Philosophy and operation of barrier systems
- Number of barriers for safe operation
- Testing barriers

SHALLOW GAS, WATER FLOWS AND TOP-HOLE DRILLING

- Definitions and causes of pressure in top-hole formations
- Causes of underbalance top-hole
- Diverting practices
- Top-hole drilling practices and causes of kicks

ABNORMAL PRESSURE WARNING SIGNS

- Abnormal pressure
- Shaker evidence
- Changes in mud properties
- Changes in drilling data/parameters

WellSHARP Drilling & Workover

Workover Course Outline IADC WellCAP

4.5 DAYS - SUPERVISOR

KILLSHEET, KICK DETECTION, FLOW CHECKS, WELL SHUT-IN, AND GAS BEHAVIOr

- Related formulas/math (capacities/volumes, strokes, circulation times, etc.)
- Causes of kicks
- Kick signs
  - Overt kick signs
  - Pre-kick signs
- Flow-check procedures
- Shut-in procedures
  - Hard shut-in
  - Soft shut-in
  - Shut-in challenges
- Paper killsheet with preliminary well data
  - Well data, volume calculations
  - Discuss the importance of a killsheet
- Simulator exercises demonstrating hard and soft shut-in
  - Kick detection and shut-in
  - Students complete killsheet with simulator well data (or instructor-given data)
  - Discussion of killsheet calculations:
  - What do they mean? (if needed) Discussion of IADC WellSharp rounding rules
- Gas behavior
  - While drilling
  - In horizontal wells
  - While shut-in

WELL CONTROL METHODS

- Review of related formulas/math (capacities/volumes, strokes, circulation times, kill mud, MAASP, ICP, FCP, etc.)
- Wait and Weight Method
  - Discussion of Wait and Weight
  - Techniques
  - Skills (pump startup, step-down chart, gauge use, lag time, etc.)
  - Simulator exercise
- Driller's Method
  - Discussion of Driller's Method
  - Techniques
  - Skills (pump startup, capturing pressure after first circulation, lag time, etc.)
  - Simulator exercise
- Volumetric and Lube and Bleed
  - Discussion of Volumetric Method
  - Formulas
  - Understanding the process and technique
  - Skills (use of electronic killsheet or paper graph, managing gas migration)
  - Simulator exercise
  - Discussion of Lube and Bleed

STRIPPING PIPE UNDER PRESSURE

- Discussion of technique
- Skills (annular pressure, speed of strip, managing wellbore pressures via volumetric method)
- Simulator exercise

BULLHEAD METHOD – DISCUSSION AND SIMULATOR EXERCISE IF TIME ALLOWS

Discussion of study guide questions

WELL CONTROL DRILLS

- Pit drills
- Trip drills
- Stripping drills
- Choke drills
- Early response and empowerment to act

WellSHARP Drilling & Workover

Workover Course Outline IADC WellCAP

4.5 DAYS - SUPERVISOR

COMPLETING THE WELL AND POST-COMPLETION ACTIVITY: SHORT DISCUSSION

- Completions
- Differences between drilling and workover

FINAL SIMULATOR EXERCISE (IF TIME ALLOWS)

- Abnormal lateral well and kick detection
- Kill the well with Wait and Weight Method

DISCUSSION

- Ballooning wells vs. kicking wells
- Fingerprinting Tension

DISCUSSION OF STUDY GUIDE QUESTIONS

SKILLS ASSESSMENT

WORKOVER:

Learning objectives

- Operations
- Barriers
- Bullhead Method
- Complications
- Reverse Circulation Method
- Unconventional well control
- Lube and Bleed Method

OPERATIONS

- Completion design
  - Reservoir considerations
  - Production methods
- Workover operations
  - Drilling vs. workover well control considerations
  - Equipment considerations

BARRIERS

- Fluids
- Mechanical

BULLHEAD METHOD

- Calculations
  - Kill fluid
  - Volumes
  - Pressure considerations
- Graphing a bullhead method
- Bullhead simulation exercise
- Bullhead method killsheet
- Bullhead simulation exercise with a killsheet

COMPLICATIONS

- Surface
- Downhole
- Bullhead complications simulation

REVERSE CIRCULATION METHOD

- Effects of friction
- Complications
- Reverse Circulation simulation

UNCONVENTIONAL WELL CONTROL

- Pill and Kill
- Top kill
- Rolling the Hole
- Volumetric Method

LUBE AND BLEED METHOD

- Discussion of the process
- Lube and Bleed simulation

COMPUTER-BASED WELLSHARP EXAM