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C & G Ed approval: Oct. 14, 2013
Board approval: Nov. 13, 2013

Petroleum Technology (PETC 1105) Coiled Tubing for Supervisors (1.25)

Prerequisite: None

Total Hours: 18 hours lecture; 18 hours lab (36 hours total)

Catalog Description: This course is designed to provide a working understanding of coiled tubing and the problems normally associated with pressure control as related to coiled tubing. This course is offered on a Pass/No Pass basis only.

Type of Class/Course: Degree Credit

Textbook: None.

Additional Required Instructional Materials:

WESTEC *Coil Tubing Workbook*. WESTEC Energy Publications
WESTEC. *Well Control Workbook*. WESTEC Energy Publications.

Course Objectives:

By the end of the course, a successful student will be able to:

1. Perform hydrostatic pressure calculations,
2. Discuss formation pressure and sources,
3. Perform shut-in procedures,
4. Correctly operate blowout prevention (BOP) equipment,
5. Identify and mitigate potential circumstances,
6. Control formation pressure,
7. Use a "kill sheet," and
8. Supervise coiled tubing operations

Course Scope and Content: Lecture

- Unit I Minerals Management Services Regulations – Subpart O
- A. Recordkeeping requirements
 - B. Certification requirements
- Unit II Basic Well Control Pressures
- A. Hydrostatic pressures
 - B. Pressure gradient
 - C. Formation pressures
- Unit III BOP Equipment, Design, and Use
- A. Basic stack design criteria
 - B. Types of BOP equipment

- C. Chokes
- D. Safety valves

- Unit IV Kick and Blowout Definitions
 - A. Kick definition
 - B. Conditions necessary for a kick
 - C. Causes of kick while drilling and tripping
 - D. Blowout definition – Reasons for occurrence

- Unit V Shut-in Procedures
 - A. Diverters
 - B. Shut-in procedures while drilling and tripping
 - C. Shut-in drill pipe pressures
 - D. Shut-in casing pressure

- Unit VI Simulator Exercise: Orientation and Shut-in Procedures
 - A. Each team plans and executes a shut-in procedure

- Unit VII Minerals Management Services Regulations – Subpart D
 - A. 30 CFR, Part 250, Subpart D – Oil and Gas Drilling Operations
 - B. Field rules and how they may modify other requirements

- Unit VIII Volume Calculations
 - A. Single string capacity
 - B. Pipe between pipe
 - C. Displacement
 - D. Tripping pipe for the loss of hydrostatic pressure
 - E. Coiled tubing capacity

- Unit IX Fracture Gradient
 - A. Definition
 - B. Methods of determination – Before and while drilling

- Unit X Drilling, Completion, Workover and Packer Fluids
 - A. Functions of drilling fluids
 - B. Functions of completion and work over fluids
 - C. Fluid type

- Unit XI Kill Procedures - Workover Surface
 - A. Kick definition
 - B. Conditions necessary for a kick
 - C. Causes of kick while drilling
 - D. Causes of kick while tripping

- Unit XII Kill Sheets - Workover Surface
 - A. Explanation and examples
 - B. Practice problems

- Unit XIII Simulator Exercise: Kill Procedures
 - A. Student participation in two practice kill operations

- Unit XIV Workbook Session: Calculations
 - A. Workbook exercises for covered subjects

- Unit XV Minerals Management Services Regulations – Subparts C, E, G, H, & O
 - A. Pollution
 - B. Completion

- C. Abandonment
- D. Safety systems

- Unit XVI BOP Testing Procedures
 - A. BOP control
- Unit XVII Abnormal Pressure
 - A. Causes
 - B. Detection methods – Rig hands
 - C. Detection methods – Mud loggers
- Unit XVIII Well Completion and Well Control Problems
 - A. Multiple completions
 - B. Running a drill string test
 - C. Other completion operations
- Unit XIX Special Problems -
 - A. Excessive casing pressure
 - B. Out-of-hole well kick
 - C. Plugged bit
 - D. Drill string washout
- Unit XX Simulator Exercise: Work through Multiple Well and Pressure Problems
 - A. Execute resolution of multiple problems on the simulator
- Unit XXI Workbook Review Session
 - A. Review workbooks
- Unit XXII Training for Drilling
 - A. Testing on material covered
- Unit XXIII Minerals Management Services Regulations – Subpart F
 - A. Work over
 - B. Field rules and how they may modify other requirements
- Unit XXIV Reasons for Workover Operations
 - A. Repair mechanical failure
 - B. Stimulation to increase production
 - C. Completing into more than one reservoir
- Unit XXV Live Well Operations
 - A. Killing a producing well
 - B. Volumetric kill
 - C. Top kill
 - D. Coil tubing unit
 - E. Snubbing unit
- Unit XXVI Small Tubing Operations
 - A. Applications
 - B. Equipment descriptions
 - C. BOP equipment
 - D. Flow string systems
- Unit XXVII Well Equipment – Workover Surface
 - A. Surface equipment
 - B. Downhole tools and tubulars

C. Packers

UNIT XXVIII Coiled Tubing

- A. Definition of coil tubing
- B. Reasons for coil tubing operations
- C. Coil tubing equipment
- D. Coil tubing pressures and calculations
- E. Coil tubing string
- F. Pressure control equipment

UNIT XXIX Simulator Exercise

- A. Practice Kill Operations Utilizing The Drillers Method

Course Scope and Content: (Laboratory)

- 1. Practical hands-on exercises including assessment of well conditions using simulator
- 2. Kill wells practical hands-on exercises using simulator
- 3. Simulated kill sheet calculations using simulator

Unit I Kill Sheets

- A. hydrostatic pressure loss sheets
- B. bottom hole pressure calculations
- C. barite requirements
- D. maximum allowable casing pressure
- E. drill string volumes
- F. angular volumes
- G. pump output calculations
- H. pump schedule

Unit II Hands on Simulator

- A. Hydrostatic pressures
- B. Pressure gradient
- C. Formation pressures
- D. Drillers Method
- E. Wait and Weight Method, or Concurrent Method

Learning Activities Required Outside of Class: None

Methods of Instruction:

- 1. Lecture/discussion
- 2. Exercises
- 3. Lab
- 4. Demonstration on WESTEC Drilling Rig Computer Simulator
- 3. Application on WESTEC Drilling Rig Computer Simulator

Methods of Evaluation:

- 1. Written examinations
- 2. Performance observation of student operation