TAFT COLLEGE
West Kern Community College District

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Petroleum Technology (PETC) 1104 Basic Drilling and Workover Sub-sea (1.5 Units)
[formerly Petroleum Technology 94Y]

Prerequisite: None

Total Hours: 16 hours lecture; 24 hours lab (40 hours total)

Catalog Description: This course is designed to provide a working understanding of well control and the problems normally associated with pressure control as related to Basic Drilling and Workover Sub-sea. This course is offered on a Pass/No Pass basis only.

Type of Class/Course: Degree Credit

Textbook: WESTEC. *Well Control Workbook*. WESTEC Energy Publications.

Additional Required Materials: None

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. recognize and discuss sub-sea equipment use.

Course Scope and Content:

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 Blowout Prevention 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

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 workover fluids
- C. Fluid type

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

Unit XII Kill Sheets
- 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 in more than one reservoir

Unit XXV Live Well Operations
- A. Killing a producing well
- B. Volumetric kill
- C. Top kill

Unit XXVI Small Tubing Operations
- A. Applications
- B. Equipment descriptions
- C. BOP equipment
- D. Flow string systems

Unit XXVII Well Equipment
- A. Surface equipment
- B. Downhole tools and tubulars
- C. Packers

Unit XXVIII Workover Test
- A. Written examination

Unit XXIX Minerals Management Services Regulations – Subparts C, D, E, & F
- A. Pollution

B. Drilling
C. Completion
D. Workover

Unit XXX Sub-Sea Equipment
A. Design Criteria
B. Risers
C. Sub-sea stack arrangement
D. Choke and kill lines

Unit XXXI Sub-Sea Well Control Considerations
A. Kick detection
B. Riser collapse
C. Lower fracture gradients
D. Choke line friction pressure

Unit XXXII Sub-Sea Shut-in Procedures
A. Sub-sea stack while drilling
B. Sub-sea stack while tripping

Unit XXXIII Sub-Sea Kill Procedure Considerations
A. Wait and weight method
B. Drillers' method

Lab Content:

1. Practices evaluating well conditions using simulator
2. Kill wells exercises using simulator
3. Simulated kill sheet calculations using simulator

Learning Activities Required Outside of Class: None

Methods of Instruction:

1. Lecture/Discussion
2. Exercises
2. Demonstration on WESTEC Drilling Rig Computer Simulator
3. Application on WESTEC Drilling Rig Computer Simulator

Methods of Evaluation:

1. Written exam
2. Performance observation of student operation