



## Surface Well Control Equipment Seminar Detailed Daily Seminar Outline



### Overall Course Objectives

- Teach the basics of surface drill-through equipment operation
- Review lessons learned on surface well control equipment
- Share common problems resulting from shortcuts in equipment maintenance
- Show how to perform inspections to detect and repair potential failures -
  - Reduce downtime, environmental risks and NPT
  - Increase safety and efficiency

### Introduction

- Safety in the training center
- Teacher and student introductions
- Understand WEST's information systems
- ITPs = "Inspection & Testing Procedures" – information available
- Anomaly database – lesson's learned, so not to be repeated.
- "RigLore" – engineering bulletins and product alerts "at your finger tips".
- Standards to which we assess

### Operational Management

- A. Basics of planned maintenance: What is a "major survey"?
- B. Change control
- C. Product performance reports
- D. Storage of rubber goods
- E. Pressure vessels
- F. Relief valves certification requirements
- G. Information Management; How to Get Needed Technical Information

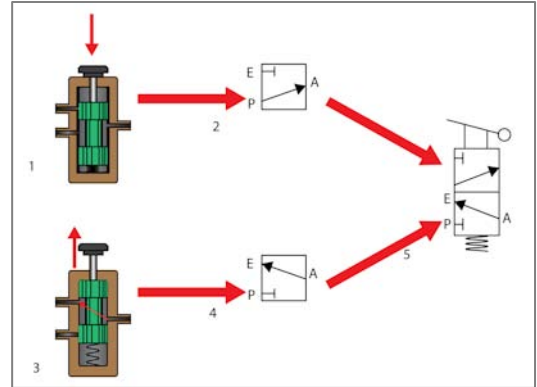


## BOP Control Systems Part I

- A. Basic hydraulics
- B. Understanding schematics
- C. Exercises provided

## BOP Control Systems Part II

- A. Review of exercises from Part I
- B. Major components of control system
- C. Accumulator sizing and how to check it
- D. API accumulator recommendations
- E. Minimum testing requirements
- F. Function hoses and the fire resistant requirements
- G. Quick disconnect problems



## End Connections, Gaskets, Grooves – API Specification 6A

- A. Comparison of gasket types - do we get face to face contact?
- B. Ring gasket selection & where to find the information
- C. Torque requirements: torque tool vs. hammer wrench, hammer up - hammer down
- D. Effects of lubricant on bolt torque
- E. Design and behavior of bolted joints, John Bickford
- F. Introduction to seal materials and design
- G. Introduce hubbed or clamped connections
- H. Reuse of gaskets, RP#53

## Basics of Seal Design and Use

- A. Introduction to seal materials and design
- B. Static and dynamic sealing techniques
- C. Pitting – what's OK, what's not

## Mud Gas Separators

- A. Learn the types: horizontal, vertical, atmospheric and pressurized.
- B. Review capacities and calculations
- C. Vent line sizing for mud gas separators



## Mud Flow Systems Choke Manifold and Diverter

- A. Choke manifold API/regulatory recommendations
- B. Manual and remote choke operation, remote choke 16C acceptance criteria
- C. QD problems
- D. Manifold inspections & checking targets after a kick & fluid washed chokes
- E. Correct C/M testing procedures



- F. Inspecting shipboard piping and swivels – mismatched union halves,
- G. Flexible hoses and the value of internal inspections. Understand periodic maintenance
- H. Learn the difference between bonded and non-bonded hose
- I. KFDJ diverters, MSP
- J. Importance of correct wellhead installation
- K. Importance of correct wellhead makeup
- L. Extreme fire hazard

## Ram BOPs (Basics)

- A. Packer pressure and ram block operation
- B. VBR and shear rams
- C. Inspection techniques



## Ram BOPs (Rams, Hydraulic System, Locking Systems)

- A. Following manufactures covered:
  1. Cameron Type U
  2. Shaffer SL and LWS
  3. Hydril
- B. DS vs. SBR – shearing capacity
- C. How to do a ram cavity inspection
  1. With and without power availability
  2. Typical problems encountered in ram cavity

## Ram BOPs - Continued

- A. Hydraulic system operation and testing
  1. Hinges
  2. Booster cylinders
- B. Closing and opening ratios
- C. Manual locks, safe operating procedures
- D. Introduction to remote locking devices

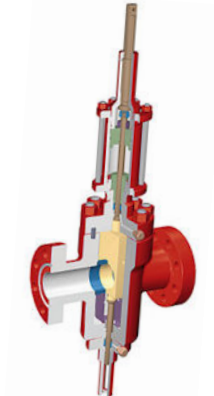


## Annular BOPs

- A. Operation for enhanced packer life
- B. Why you shouldn't rotate with packer closed
- C. Importance of drift testing & what is it
- D. Stripping considerations
- E. Hydraulic system operation and testing
- F. Typical problems encountered in testing
  1. Milling swarf in operating chambers
- G. Following manufactures covered:
  1. Shaffer Spherical
  2. Cameron Type D
  3. Hydril GK
  4. Hydril diverters MSP

## Gate Valves – BOP Stack and Choke Manifold

- A. Metal-to-metal sealing in the gate valve
- B. When to test from the top
- C. Seat rings, seal rings and body bushings
- D. Balancing stems and gate valve operating ratios
- E. WOM “Magnum” valves and the upstream seal
- F. What to inspect on valve teardown to anticipate potential problems
- G. Hydraulic valve operators
- H. Understand gate valve trim and how it relates to sour gas
- I. Correct lubrication – oil-base mud. Understand types of lubricants available



## Material Requirements

- A. Effects of H<sub>2</sub>S on equipment
- B. Equipment requirements for H<sub>2</sub>S service
- C. Material hardness, minimum and maximum
- D. Use of shear rams in H<sub>2</sub>S environments
- E. DS vs. SBR
- F. Replaceable shear inserts
- G. Suitability of repaired equipment with H<sub>2</sub>S
- H. How to inspect/verify

## BOP Stacking Considerations

### What Is An Acceptable Pressure Test?

- A. Importance of hydraulic operator testing
- B. Proper well bore testing technique
  1. Testing problems associated with oil-based mud
  2. Define low and high pressure testing durations
- C. Temperature effects on wellbore testing VBRs

## WEST Services

### Shear Workshop

- A. Case I - Cameron U BOP 13-5/8" 10K
- B. Case II - Hydril BOP 13-5/8" 10K
- C. Case III - Shaffer SL 13-5/8" 10K

