

Surface Well Control Equipment Seminar Outline

Overall Course Objective

- Teach the basics of surface drill through equipment operation
- Convey knowledge of lessons learned on surface well control equipment
- Share information on common problems resulting from shortcuts in equipment maintenance
- How to perform inspections to detect and repair potential failures -
 - Reduced down time
 - Increased safety

Workshops: Five workshops will be given

1. **Trouble Shoot a Control System Circuit**
2. **BOP and Choke Manifold Test Procedure Development**
3. **Mud Gas Separator Vent Sizing**
4. **Shearing**
5. **Field Repair and Welding**

Begin day 1 -Introduction, Seminar Basis

- Safety in the Training Center
- Teacher and Student introductions
- Understand WEST's information systems
- ITPs = "Inspection & Testing Procedures" – Information available
- Anomaly Data Base – Lesson's learned, so not to be repeated.
- "RigLore" – Engineering Bulletins and Product Alerts "at your fingers".
- Standards to which we assess

Operational Management

- Basics of planned maintenance: What is a "major survey"?
- Change Control
- Product Performance Reports
- Storage of rubber goods
- Pressure vessels
- Relief valves certification requirements

Information management; how to get needed technical information

Basics of Seal Design and Use

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

BOP Control Systems Part I

- Basic Hydraulics
- Understanding Schematics
- Exercises provided

BOP Control Systems Part II

- Review of exercises from Part I
- Major components of control system
- Accumulator sizing and how to check it
- API accumulator recommendations
- Minimum testing requirements
- Function hoses and the fire resistant requirements
- Quick Disconnect Problems

Trouble Shoot a Control System Circuit Workshop

Begin day 2, Review previous day's presentation

RigLore Demonstration**End Connections, gaskets, grooves – API Specification 6A**

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

Mud Flow Systems Choke Manifold and Diverter

- Choke manifold API/Regulatory recommendations
- Manual and Remote Choke Operation, remote choke 16C acceptance criteria
- QD Problems
- Manifold inspections & checking targets after a kick & fluid washed chokes
- Correct C/M testing procedures (Workshop: Teams create manifold testing procedures, review EM requirements)
- Inspecting shipboard piping and swivels – Mismatched union halves,
- Flexible Hoses and the value of internal inspections. Understand periodic maintenance
- Learn the difference between bonded and non-bonded hose
- KFDJ Diverters, MSP
- Importance of correct wellheads installation.
- Importance of correct wellhead makeup
- Extreme fire hazard

BOP and Choke Manifold Test Procedure Development Workshop

Mud Gas separators

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

Mud Gas Separator Vent Sizing Workshop**Ram BOPs (Basics)**

- Packer pressure and ram block operation
- VBR and shear rams
- Inspection techniques

Hands on Exercises

- Packer condition and visual inspection
- Elastomer Hardness Testing

Begin day 3, Review previous day's presentation**Ram BOPs (rams, hydraulic system, locking systems)**

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

Ram BOPs, continued

- Hydraulic system operation and testing
 - Hinges
 - Booster cylinders
- Closing and Opening Ratios
- Manual locks, safe operating procedures
- Introduction to remote locking devices

- **Shear Workshop**
- Case I - Cameron U BOP 13-5/8" 10K
- Case II - Hydril BOP 13-5/8" 10K
- Case III - Shaffer SL 13-5/8" 10K

Annular BOPs

- Operation for enhanced packer life
- Why you shouldn't rotate with packer closed
- Importance of drift testing & what is it

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- Stripping considerations
 - Hydraulic system operation and testing
 - Typical problems encountered in testing
 - Milling swarf in operating chambers
 - Following manufactures covered:
 - Shaffer Spherical
 - Cameron Type D
 - Hydril GK
 - Hydril diverters MSP

Gate Valves – BOP Stack and Choke Manifold

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

Material Requirements

- Effects of H₂S on equipment
- Equipment requirements for H₂S service
- Material hardness, minimum and maximum
- Use of shear rams in H₂S environments
- DS vs. SBR
- Replaceable shear inserts
- Suitability of repaired equipment with H₂S
- How to inspect/verify

Field Repair and Welding Workshop

BOP Stacking Considerations

What is an acceptable Pressure Test?

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

WEST Services

Closing