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"Meeting the Challenges for Asia's Growth"

Panel Session 9

Surface BOP – Subsea Equipment

1030 – 1200 hours • Friday, 28 March 2014

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Subsea Topics to be Covered

Seafloor Hardware Conduit to the Surface BOP

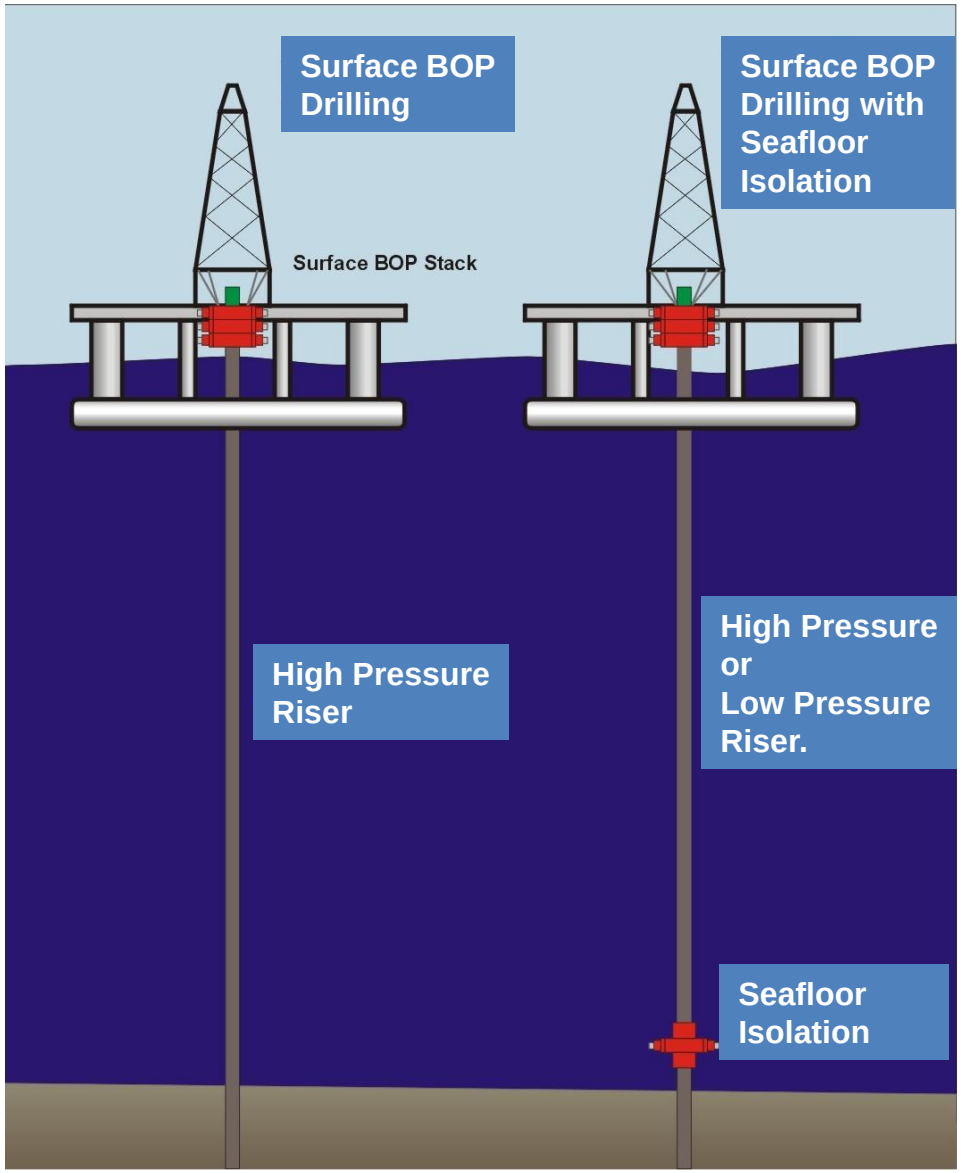
Configuration of Seafloor Isolation Systems

Comments on Seafloor Equipment Control Systems

Well Casing Designs

Riser Pressure Containment Requirements

Without Seafloor Isolation, the Riser Has to be Capable Of all Well Control Pressures at the Surface BOP



With Seafloor Isolation, the Riser can be Rated at a Lower Pressure With Normal Well Control until the Pressures at the Surface BOP begin To Increase, the Well is then shut in And a High Pressure Riser is Installed And Well Control Continues

Seafloor Isolation Connector Arrangements

Riser Disconnect Connector Down

Riser Disconnect Connector Up

Wellhead Connector

Surface BOP Control Systems

Surface

Discrete Hydraulic Control Rigs < 5000 ft Water Depth
- **Use one of Subsea BOP's Control Pod mounted on Female Receptacle**
- **Hose from Female Receptacle to SBOP**

Multiplex Electro-Hydraulic Control System
- **Can use Mux Controls from one pod to hydraulically activate SBOP**

Subsea

If well is less than 5000 Ft WD straight hydraulic
If well > 5000 Ft elrctro-hydraulic or mux electro-hydraulic
Some regulators may allow acoustic control, acoustic back-up is desirable
ROV Intervention is definitely a must.

Well Casing Design

The limiting issues with well design is:

- **Number of casing strings required**
- **Mud weight**
- **Maximum Anticipated Shut-in Pressure of the Well**

These Issues Influence Riser Tension Requirements which Works Against Older Rigs

Changing Risers to Reduce Weight or Increase Pressure Takes Time

Reduced Time is the Advantage of SBOP Drilling

SBOP has a Unique Application in Reducing Offshore Drilling Costs

But, It has to be Applied Smartly