A Field Development Solution with a Riser Well Systems Focus

S. Hatton

Energy Wise, West Africa Workshop
Oct. 2001
Technology Options for Deepwater West Africa

A Field Development Solution

with a

Riser & Wellsystems Focus

By

Stephen Hatton

Presentation Objectives

☐ Explain why ‘Dry Trees’ are not good for deepwater

☐ Present a new solution that is!

☐ Describe how it could be configured for West Africa
Technology Options for Deepwater West Africa

**Dry Tree Systems (DTU)**

**Dry Tree Benefits**

- Efficient Drilling and Major WO
  - Surface BOP
- Efficient Production
  - Valve and choke access
  - Wireline logging
  - Wireline and Coiled Tube access
  - No commingling of well fluids

- Reduced drilling time
- Reduced production downtime
- Higher production rates

Learn more at www.2hoffshore.com
Summary Of Existing and Planned Dry Tree Units

- Spars (Planned)
- TLPs (Actual)
- TLPs Planned
- Spar/TLP TBCTBC
- Spars (Actual)

Deepwater DTU
Riser Issues

- Increased riser steel weight
- Increased tension requirement
- Increased riser stroke
- Increased deflections
- Increased interface loads
- Reduced relative spacing
- Process flow issues
- Isolation safety concerns
- Cost

Learn more at www.2hoffshore.com
**Dry Tree Technology**

- Medium depth solution extrapolated to deepwater
- Incorrect focus on vessel rather than well systems
- DTU Riser complexity being ignored or accepted

**DTU ‘The Wrong Solution for Deepwater’**

**How ? Why ?**

- Industry conservatism
- System approach not adopted
- Contractor interest in DTU
**Spar Fundamental Issues**
- Centre well space is too small
- Aircan design problems
- Vessel interface too complex
- Serious safety issues
- Low flexibility
- Limited availability

**TLP Fundamental Issues**
- Tether axial stiffness
- Tether collapse
- Interface sensitivity
- Payload sensitivity

Learn more at www.2hoffshore.com
**Wellhead Barge**

- Simple vessel
- Large moonpool
- Simplified riser interface

**BUT**

- Mild environment only
- High cost risers (steel/buoyancy)
- Complex buoyancy
- HP riser safety issues

---

**Subsea Tree Offset Riser Manifold**

**storm™**

**A Deepwater Solution to Deepwater Problems**

Learn more at www.2hoffshore.com
**storm™ Design Drivers**

- Maintain DTU drilling WO benefits
- Illogical to tie back wells in deepwater
- Simplify interfaces to simplify execution
- Eliminate need for motion optimised vessel
- Improve levels of safety
- Subsea trees have never been cheaper
- Facilitate upside flexibility
Technology Options for Deepwater West Africa

**storm™ Semi**

- Improved safety
  - Eliminates HP risers
  - Subsea isolation
  - Eliminates congested wellbay
  - Separates drilling & production
  - Eliminates riser clashing risk
  - Improved emergency disconnect

- Reduced cost
  - Lower cost hull + deck
  - Low cost risers and subsea equip.
  - Low Cost Abandonment
  - Residual asset value

- Min. offshore construction
  - No offshore hull/deck mating
  - No hull aircans installation

- Flexibility
  - Simplifies interfaces
  - Well count flexibility / expansion
  - Predrill or pull-over drilling
  - Pre-installation of risers

Seabed Arrangement

Learn more at www.2hoffshore.com
Reduced Riser Numbers and Weight

- **DTU**: 3,300 lb/ft
- **storm™**: 570 lb/ft

**Saving**: 2,730 lb/ft

---

**Storm Vs TTR**

**CAPEX - 20 wells 1500m W.D.**

- **Trees, Manifolds, Risers, Control, Jumpers**

- **storm**: $0 - $80,000,000
- **TTR**: $20,000,000 - $100,000,000

Learn more at www.2hoffshore.com
Drill Through Tree

HP Dual Concentric Drilling Riser

Learn more at www.2hoffshore.com
Technology Options for Deepwater West Africa

Major WO Sequence

WO Options

HP Drilling Riser

Small bore completion Riser

Learn more at www.2hoffshore.com
**COR™/SLOR™**

**TRF JIP**

- Exxon/Mobil
- bp
- Total/Fina/Elf
- Chevron
- Texaco
- British Gas
- Conoco

**Technology Options for Deepwater West Africa**

**SLOR™**

Single Line Offset Riser
Application - GI, WI (Production)

**COR™**

Concentric Offset Riser
Application – Production
Riser Base Gas Injection
Active Heating
$N_2$ or Vacuum Insulation

Learn more at www.2hoffshore.com
Modified Casing Connection

- Non Welded
- High Grades P110
- Proven Metal Seal
- Fast Make-up
- Good Fatigue
  - SCF 3.0
  - B SN curve (or better)
- Environmental seal

Learn more at www.2hoffshore.com
Technology Options for Deepwater West Africa

Application to West Africa

Learn more at www.2hoffshore.com
2H Offshore - deep water riser engineering

**Storm™ Best of Both Worlds**

- **Surface Trees**
  - High Capital Cost
  - Low Cost Drilling
  - Low Opex
  - Low Flexibility
  - Surface Isolation
  - Process Flow Friendly
  - Complex Riser Interfaces

- **Storm™**

- **Subsea Trees**
  - Low Capital Cost
  - High Drilling Cost
  - High Opex
  - High Flexibility
  - Seabed isolation
  - Process Flow Challenge
  - Simplified Interfaces

---

**Storm™ Summary**

- Riser & well system focus solution
- Re-packaged proven hardware
- Simplified interfaces
- Safe Solution
- Addresses key development costs
  - Drilling and well construction
  - Offshore construction (flowlines / risers)
  - Well intervention and WO
- High flexibility (Wellcount, vessel type, EPS)
- Cost effective (CAPEX and OPEX)
- Deep and ultra deep water solution
- GoM, Brazil, West Africa application

Learn more at www.2hoffshore.com