DeepStar Phase X

UDW Program for the Drilling & Completion Initiative

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Relationship and Differences of DeepStar and RPSEA

- Funding Source & Amounts
- IP differences
Overview

GOM Deepwater Fields
- Canopy, Coyote, Gumout & Diablo

Field Development Scenarios
- Dry Trees, Subsea Tiebacks to Hosts & Subsea to Beach Developments

Near-Term Needs & Tech Gaps
- Identifies parts of development scenarios that are not “Project Ready”

Road Maps
- A Technology Development Plan to achieve Program Goals

Generic Non-Commercial GOM Program Targets
- Focus on the small Canopy and the HPHT Diablo Fields

Use Dry Tree Scenario for Diablo and Subsea Tieback for Canopy Fields
What is in the Production Facility Frame?

Dry Tree System for Diablo Field Development

Paired Column Semi is base case

Risers & Moorings are key issues and apply to all dry tree systems

Jules Verne Subsea System for Canopy Extreme Tieback

Modular Systems for:
- Multiphase Boosting
- 2 Phase Separation
- 3 Phase Separation

All Ancillary Systems
- Drilling & Completion
- Power
- Well Intervention
- IMR Systems
What is in the SubSurface Frame?

**Exploration & Appraisal**
- 9702 - Lookback Evaluation
- 9902 - EPS Study
- 2501 - Well Testing Systems
- 9701 & 9002 - Sensors in Abandoned Wells
- 2001 - Synthetic Benchmark of Complex Salt
- 8701 - Pore Pressure & Commerciality
- 2701 - Resources to Reserves Acceleration
- 9001 – 3D Modeling

**Reservoir Management**
- 1701 - IOR
- Previous DS Water Injection Studies

Silleean FPSO
The Mother Nature Frame

Givens we have to live with or things where we have little control or influence.

- Flow Assurance
- MetOcean Conditions
- Regulatory Environment
- HS&E Constraints
- Location (in relation to Infrastructure)
The Innovation Frame

Most Innovation and Step Change Technologies come from small vendors or academia who may not have the resources or understanding to mature their Technologies to a “Project Ready status”

- “First Look” Evaluation and Initial TDS Assessments
- Understand the Value Add or Benefit to be provided by Innovative Technology. (Business Case)
Overview

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Program Goal: Development Scenarios matured to a “Project Ready” Status

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Generic Non-Commercial GOM Program Targets

Drilling & Completion Goal – Create a step change in GOM Wilcox well construction costs by 30%
Where Are We Working Currently?

Diablo Field; a 15 ksi, 10,000’ WD HPHT Development

- 1902 Compact Process Simulator
- 1402 Paired Column Semi
- 9402 Polyester Mooring Systems
- 9401 VIV Studies
- 1401 15 ksi Drilling Riser
- 1403 – Fatigue Resistant High Strength Steel Qualification Testing
- 1701 Improved Oil Recovery
- 2701 Reservoir Complexity
What is Next?

• Using this graphic to illustrate where others are performing related work and new work is proposed.
• Are the proposed projects relevant?

• Expected 15 ksi HPHT Dry Tree System Gaps:
  • Need a Field development scenario Risk Analysis
  • Need an assessment of all well construction and maintenance steps for Risk Assessment.

• Generic Improvement Gaps:
  • Need to penetrate reservoir with a larger wellbore. (Dual Gradient &/or Monobore drilling?)
  • Need for downhole artificial lift.
  • Others?

• When may we declare the dry tree development system “Major Capital Project Ready”? i.e. We will have achieved our Goal for this Development Scenario.
Jules Verne Development Scenarios

Canopy Field  Long Offset Satellite Tieback

Jules Verne Development Scenarios are Modular Systems which work together to produce the field over its life span.

DeepStar 9901 is identifying TRLs and Technology Gaps for such modular systems. Report will be ready by year-end.
Where are We Working?
Drilling, Completion & Intervention

- 2301 – Riserless Light Well Intervention
- 1502 Coiled Tubing Intervention & Drilling
- 9501 – Riserless Mud Recovery for Tophole Drilling
- 9502 – Riser Damping Tests
- 8503 – Annulus Pressure Build-up Study
- 2502 – Managed Pressure Drilling Model
- 2902 – Fiber Sweep Muds

- 9301 – AUV State of the Art Survey
- 9305 & 2901 – Tetherless ROV Communications
What is Next for Jules Verne Scenarios?

• DeepStar 9901 is preparing a Technology Development Plan (Roadmap) for Jules Verne Scenarios. Ready by year-end.

• What constitutes a “Project Ready” status for a Jules Verne Major Module?
  • Is a full scale operational module required to be tested?
  • Is an onshore System Integration Test (SIT) acceptable?
  • Is an underwater test required?
Studies illustrate the uncertainty of UDW Reservoir performance. For the Wilcox Trend, Early Production Systems may be used for risk management.

This APL loading on Pierce will be similar to that used on the Cascade and Chinook development.

Next Major Gap: On-board CNG handling, offloading and transportation to market.

Amog EPS Concept operationally resembles a MODU with a recoverable riser and DP positioning.
Subsurface and Mother Nature Issues

These two areas of study have a goal of *continuous improvement*.

When does the *State of the Art* provide adequate risk management for sanction of a Major Capital Project?

Innovation Issues

The Innovation goal is a *continuous improvement* process since we do not know when inspiration or break-through technologies will walk through the door.
Forward Planning

Technology Development Status

Goals

Technology Development Plan defines Needs & Gaps
The TDP helps identify the priority for different Initiatives

Dry Tree Scenario
Jules Verne SSP
SubSurface Needs
Mother Nature Needs
Dry Tree Scenario
Jules Verne SSP
SubSurface Needs
Mother Nature Needs

TDS Assessment indicates the NEEDS and GAPS that limit GOAL Achievement
NEEDS, INITIATIVES & GAP definition enable a Strategy or “Road-Map” together with a Resource and Timeline to be developed for a system or module. This may be documented in a UDW Program TECHNOLOGY DEVELOPMENT PLAN.
Overview

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**Near-Term Needs & Tech Gaps**
Identifies parts of development scenarios that are not “Project Ready”

**Program Goal:** Development Scenarios matured to a “Project Ready” Status

**Use Technology Development Status (TDS) methodology for Gap definition**

**Road Maps**
A *Technology Development Plan* to achieve Program Goals

**Generic Non-Commercial GOM Program Targets**

A Tech Dev Plan is required to define and prioritize projects to achieve Program Goal(s)
Opportunities

• DeepStar Phase X will start in January 2010. Engage with the Drilling & Completion Committee. This X500 committee helps frame the TECHNOLOGY DEVELOPMENT PLAN.

• RPSEA FY 2009 RFPs for Drilling and Completion are out for proposals by interested and qualified organizations.
  
  • RPSEA requires a 20% cost share component for studies and 50% for Field Demonstrations.

  • Proposals are due December 14, 2009 for this FY 2009 program.

• RPSEA FY 2010 with DeepStar are starting work on Drilling & Completion RFPs. This is expected to be released for bidding in 2nd quarter 2010.
In Summary

DeepStar Phase IX - 32 Contracted Projects with a Value of $ ~9 Million USD.

DeepStar Phase X expects ~ $ 6 Million USD in contracts

RPSEA FY 2007 – 15 Projects with a total value ~ $18 Million USD – All currently working.

RPSEA FY 2008 – 15 Projects with a total value ~ $15 Million USD – All should be working by year’s end.

RPSEA FY 2009 – This FY program is currently being bid and projects will be selected over the next 2-3 months. Expect ~$20 Million USD in Projects to be selected.

Projects selected for funding will need relevance to the goals by meeting a NEED defined in a Technology Development Plan (Under development).

Currently managing 62 projects with a value ~$42 Million USD with an average project duration ~2 years.
Questions?