“Small Field Development Options”
Small Field Developments - Contents

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4.0 Vessel concepts for small fields

5.0 Conclusions
Small Field Developments

- Development of small fields require:
  - Pay as you go
  - Enhanced field NPV
  - Pace / ready solutions

- The industry response is:
  - Re-usable multipurpose assets
  - Flexible low CAPEX solutions
  - Solutions for economic gas recovery
  - New business strategies

Creativity and Innovation Required
Small Field Developments - Field Development Phases

Crystal Sea Applications Identified:

- WT: 12k bbl/d
- EWT: 10-50k bbl/d
- EPS: 30-200k bbl/d
- Full Production: 10-50k bbl/d
- Tail End: Production decrease
## Cost-Effective Well Testing:

### Reservoir Uncertainties:

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Small Field Developments - Well Testing Vessel

M.V. Crystal Sea:

- Minimum CAPEX Commitment
- Vessel available on lease basis
- Fast Track Development
- Flexible Process System
- On-board Storage
- Production Revenues
- Minimal Field Infrastructure
- Dynamically Positioned

Benefit . . . Pay As You Go!
Small Field Developments - Puddle Depletion 1

Basic Puddle Depletion Configuration:

- Modified Crystal Sea
- Current QCDC Skid
- Single Flexible Production Riser
- Oil recovery
- Flare Gas
- Crystal Sea Shuttles Cargo
Small Field Developments - Puddle Depletion 2

Variation 1 - Puddle Depletion:

- Modified Crystal Sea
- Current QCDC Skid
- Dingle Flexible Production Riser
- Flare Gas
- Oil Production
- DP Shuttle Tanker
- Export to Tanker via Reeled Export Line
Small Field Developments - Puddle Depletion 3

Variation 2 Puddle Depletion:

- Modified Crystal Sea
- STP Production Buoy
- Single Flexible Production Riser
- Single Injection Riser
- Flare Gas
- Manual DP Tanker
- Export to Tanker via Reeled Export Line

Bottom Flowline - Bow Connection of Mooring Lines and Loading Hose - Seabed
Small Field Developments

Main Vessel Categories:

• Vessels for well testing and extended well testing

• Multipurpose or low CAPEX production vessels

• Vessels for extended step-outs
Small Field Developments

FPSO - PV 40 - Extended Well Testing / Early Production

- Evolved from Crystal Sea
- Increased storage (42k bbl)
- DP and/or STP station keeping
- Flexible process system (Plug & Play)
- Pace / Fast track
- Full FPSO capability
- EWT / EP
- Dedicated small to medium field production
- Gas / condensate production
- Tail end production

Main Benefit is Application Flexibility!
Small Field Developments - Drilling and Early Production

Early Production Opportunity:

- Flexible Early Production and Drilling Vessel
- Enhance Field economics (NPV)
- Improved faith in reservoir
- Beat the shipyard queues (limit the power of suppliers)

Get Ahead by Extended Well Testing and Early Production
Small Field Developments - Production Vessels

- Multipurpose vessels which ensure acceptable field economics by high vessel utilisation (exploitation of alternative applications between production roles).

- New build, novel and extremely simple designs offering improved field economics via a low vessel CAPEX

- Conversions of existing vessels which achieve CAPEX savings through low vessel purchase and conversion costs
Small Field Developments - Low CAPEX Vessels

Production Barges . . .

- Innovative yet very simple designs
- Fit for purpose, no frills
- Large payload / storage capacity
- Steel and concrete hull design options
- Deepwater capability

**Innovation ➔ Extreme Simplicity ➔ Low CAPEX**
Small Field Developments - Low CAPEX Vessels

Production Barge and Wellhead Platform:

- Plug And Play Process Systems
- No Turret or Low Cost Turrets
- Minimum Facility / Cost Wellhead Platform
- Low CAPEX Hulls
- Available on Lease Basis
- Technologically Up To Date
- Proposals based On Best Business Solution

Main Benefit . . . Maximised N.P.V.
Small Field Developments - Low CAPEX Vessels

Barge Production and Wellhead Platform . . .

Barge Data:
- Length : 65.2 m
- Beam  : 65.2 m
- Depth : 39 m
- Storage : 80,000 m³ Oil
- Construction : Steel flat plate, double side shell
- Process : As required
- Moorings : 12 - 16

Main Benefit . . .
Management of Difficult Reservoirs
“Small Field Development Options”

Thank You
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