Considerations for Standalone Development of
Small Deepwater Fields

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G Ross Frazer – ATP Oil & Gas Corp.
Small Deepwater Fields - General Considerations

- 9 GoM Deepwater Fields > 250 MMBOE
- 150 GoM Deepwater Fields <50 MMBOE
- Business Focus on Small Field Development
- Requirements for Floating Infrastructure
  - Functionality for dry and wet trees
  - Residual Value: Mobility & Redeployment
Telemark Hub Overview

- 3 Fields: MC 941, MC 942, AT 63
- WD: 4000 – 4500 ft
- 70+ MMBOE
- Limited scope for appraisal & testing
- Multiple Pay Horizons
- Field Life 3 – 7 years
- Lack of accessible nearby infrastructure
- Possible Satellite Tiebacks in vicinity
Factors Driving Development

• Limited scope for appraisal & testing
• Multiple Pay Horizons
• Possible Satellite Tiebacks in vicinity
• Short Field Life
• Functional & Residual Value in Floating Infrastructure
MinDOC 3 Hull General Arrangement

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MinDOC 3 Hull Features

- Reduced Motions for Dry Trees & SCRs
- High Topside Payload/Hull Weight
- Spread Mooring for Wide Range WD
- Suitable for USGC Fabrication
- 3 Columns vs 1 Column
  - Fabrication yard friendly
  - Distributed Water Plane enhances stability
  - Smaller Diameter reduces VIM

Cost Effective Dry Tree Development in Deepwater West Africa                           May 2001

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Vortex Induced Motion - Dimensionless Parameters

- 0.8
- 0.9
Vortex Induced Motions – Dimensionless Parameters

- 0.8 – Say their hull does not require strakes
Vortex Induced Motions – Dimensionless Parameters

- 0.8 – Say their hull does not require strakes
- 0.9 – Subsequently proven wrong in model tests
MinDOC 3 Hull Features

- Central Access Trunk for Piping & Pumps
- No Sea Chest or Hull Penetrations
- “Fail Safe” Ballast System
- Frame for Supporting Riser Tensioners
Polyester Taut Leg Mooring System

- 12 Lines: 3 Groups x 4 Lines
- 5 in, Grade 4 Chain: 3365 Kips
- 9 ¾ in Polyester Hawser: 3500 Kips
- 84 in Anchor Piles: 205 – 225 ft
### Post-Katrina Metocean Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>100 Yr Winter</th>
<th>100 Yr Hurricane</th>
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<tbody>
<tr>
<td>1 Minute Wind Speed</td>
<td>54 MPH</td>
<td>132 MPH</td>
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<tr>
<td>Significant Wave Height</td>
<td>18 ft</td>
<td>54 ft</td>
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<tr>
<td>Max Wave Height</td>
<td>34 ft</td>
<td>92 ft</td>
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<tr>
<td>Crest Elevation</td>
<td>19 ft</td>
<td>51 ft</td>
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<tr>
<td>Peak Period</td>
<td>10.4 sec</td>
<td>15.6 sec</td>
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<tr>
<td>Max Loop Current</td>
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<td>4.7 kts</td>
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Seasonal Metocean Parameters

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<thead>
<tr>
<th>MPH or FT</th>
<th>1 Hr Wind</th>
<th>Max Wave</th>
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<tbody>
<tr>
<td></td>
<td>100 YR Hurricane - All Months</td>
<td>100 YR Hurricane - All Months</td>
</tr>
<tr>
<td></td>
<td>100 YR Hurricane w/o Aug-Sept</td>
<td>100 YR Hurricane w/o Aug-Sept</td>
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<tr>
<td></td>
<td>100 YR Hurricane w/o Aug - Oct</td>
<td>100 YR Hurricane w/o Aug - Oct</td>
</tr>
<tr>
<td></td>
<td>100 YR Winter Storm</td>
<td>100 YR Winter Storm</td>
</tr>
</tbody>
</table>

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Fabrication & Assembly

Graving Dock Excavation
Aug 2007

February 2007 - Beginning excavation of silt and loose soil to build the end wall foundation.

250 ft

March 2008 - Graving dock phase 1 complete. Fabricating upper column sections.

40 ft

Lower Hull Sections
Mar 2008

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Fabrication & Assembly

Setting Fwd Upper Column
Nov 2008

Fwd Upper Column Lift
Mar 2009

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Upending – Nov 09
Pumping Magnetite Ballast – Dec 09
Completed Platform

Topsides Complete
Dec 2009

Platform Rig Mob
April 2010

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Riser Tensioners
Heave & Riser Stroke

Tensioner Stroke: 26.5 ft

<table>
<thead>
<tr>
<th>Heave</th>
<th>Total Riser Stroke</th>
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</thead>
<tbody>
<tr>
<td>10 Yr</td>
<td>10 Yr</td>
</tr>
<tr>
<td>100 Yr</td>
<td>100 Yr</td>
</tr>
<tr>
<td>1000 Yr</td>
<td>1000 Yr</td>
</tr>
</tbody>
</table>

May 2010
SID & Drilling Risers

LP Riser – 5M: 21 in x 0.875WT, X80

IP Riser – 7.5M: 14 in x 0.750WT, SS95

HP Riser – 10M: 10 3/4 in x 0.625WT, SS95
SID & Drilling Riser Configuration

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Summary: Factors Driving Development

- Limited Scope for Appraisal & Testing
- Multiple Pay Horizons
- Possible Satellite Tiebacks in vicinity
- Short Field Life
- Functionality & Residual Value in Floating Infrastructure
Summary: Achievements

- First use of Multi-column, Dry Tree, Deep Draft Hull
- First Graving Dock in US for Offshore Fab
- First Deep Draft Dry Tree Hull Fabricated in US
- First Pre-installation of Polyester Lines on Seabed