Case Study of Riser-based Abandonments in the Gulf of Mexico
Abandonment Options

Riserless

Cat A

Riser Based

Cat B

Riser Based
Conventional

Cat C
History and Experience

Riserless-
- 28 years experience in the North Sea on more than 750 subsea wells

Riser-based-
- 15 years experience in the Gulf of Mexico on more than 180 subsea wells
Comparison

MAJOR FACTORS
1. Capability
2. Cost
3. Limitations technically
4. Contingency options
5. Efficiency of operations
Case Study of Riser Based Campaign

- **4 Well Decommissioning Campaign**
  - 4 wells in Gulf of Mexico
  - Water depth 3050 ft.
  - Completed in batch abandonments

- **Estimated Total Duration**
  - 135 days for all wells

- **Actual Total Duration**
  - 115 days for all wells
Abandonment Sequence

- Well #1 & Well #2 Lower abandonments
- Well #3 lower
- Tubing pull on Well #1, #2 & #3
- Well 3 Upper abandonment
- Well #1 and Well #2 Upper abandonments
- Well #4 Full P&A
Well Abandonment Methodology

- Utilize IRS and HP riser based system to establish vertical access
- Utilize CT to convey cement squeeze of perforations
- Punch tubing above production packer then convey balanced plug with CT in tubing and A annulus
- Recover IRS and tree once two tested barriers are in place in the well
- Pull tubing and tubing head spool
- Run IRS and perforate and squeeze upper annuli for upper abandonment
Statistics
Lower abandonment- 16 days to complete
Upper abandonment- 6 days to complete
Regulatory BSEE No Inc’s

Challenges
TRT Leak Recover LRP on wire
Re-Squeeze Cement plug #3
IRS Repair
<table>
<thead>
<tr>
<th>Operation</th>
<th>Q4000</th>
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<tbody>
<tr>
<td>Mobilization Land &amp; latch</td>
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<tr>
<td>Lower abandonment</td>
<td>11.25</td>
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<tr>
<td>Pull tubing</td>
<td>2.25</td>
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<tr>
<td>Upper Abandonment</td>
<td>3.75</td>
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<tr>
<td>Total time</td>
<td>22 Days</td>
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</tbody>
</table>

- NPT TRT
- NPT Plug #3 re-squeeze
- IRS Repair
Well #2

Statistics
Lower abandonment  15.0 Days
Upper Abandonment  17.0 days

Challenges
Tagged cement High, Regulatory waiver to move remaining cement plugs higher in well
Waiting on tools
Waiting on weather
E-line software issues
Well #2

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<td>Lower abandonment</td>
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<td>Pull Tubing</td>
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<tr>
<td>Upper Abandonment</td>
<td>13.4</td>
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<td>Total time</td>
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- ✓ NPT W.O.W.
- ✓ NPT W.O.T.
- ✓ MUX Cable
- ✓ E-line issues
Well #3

Statistics
Full Abandonment  23 Days

Challenges
TTIR Fail to seat Re-Run
Well #3

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<tr>
<th>Operation</th>
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<tbody>
<tr>
<td>Land &amp; latch</td>
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<td>Lower abandonment</td>
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<tr>
<td>Pull Tubing</td>
<td>2.3</td>
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<td>Upper Abandonment</td>
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<td>Total time</td>
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<tr>
<td>TTIR fail to seat</td>
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Well #4

Statistics
Full Abandonment 38 Days

Challenges
Hydrates in Re-entry hub
Annulus tubing repair (IRS)
Vertical access
CTLF Breakdown
Hard fill required CT milling
Weather
<table>
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<th>Operation</th>
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<td>Lower abandonment</td>
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<td>Upper Abandonment</td>
<td>8</td>
</tr>
<tr>
<td>Total time</td>
<td>38</td>
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</tbody>
</table>

- NPT Hydrates
- CTLF breakdown
- Vertical access
- Annulus tubing repair (IRS)
- Weather
Campaign Advantages

- **One mobilization for field abandonment**
- **Batch lower abandonments on first 2 wells**
  - Move from well to well with IRS deployed
  - Reduces critical path running pulling IRS times
- **Allows flexibility on well sequence**
  - Gives client option on well order for each phase of the abandonment
  - Most complicated wells at end of campaign to incorporate any lessons learned from first 2 wells
Overall Efficiency with Riser-based System

- Mobilization time into field is reduced
- IRS SIT times
- 2 ROV’s allow for SIMOPS during Abandonment
- Numerous BSEE Inspections No Inc’s.
- Large subsea crane allows for flexibility with operations
- Open MPT provides rig up and rig down flexibility with CTLF and surface equipment
Thank You