State of the Industry of Riserless Light Well Interventions (RLWI)
Agenda

• Subsea well intervention introduction

• Economic drivers for Intervention

• Global experience with RLWI interventions

• New suite of tools to enable Riserless Subsea intervention

• Summary
Improving Recovery Rates Through Well Interventions

Interventions With Welltec Technology Increases Existing Reservoir Profitability and Recovery Rates...

...Experience From Fields in Norway Highlights How Interventions and Other Production Increasing Activities Can Unleash Significant Value

(Oil production rate; million Sm³ per year)

Source: Norwegian Petroleum Directorate; Company analysis
Drivers for Subsea Intervention

- Productivity of subsea wells is considerably lower than the equivalent dry-tree based wells (30-40% less, due to lack of intervention)

- General global decline in production

- Oil Company’s increased portfolio exposure to subsea production
  - Brown-fields require intervention/enhancement

- Market progression into deeper waters
  - Greater need for innovative solutions and alternatives to costly rig based intervention methods.

- Tightening market for offshore drilling rigs;
  - Conventional subsea well intervention with floating rig has been considered prohibitive (risk & cost)
Intervention Options – Conventional Drilling Rig (CAT C)

**Pros:**
- Depth limited to rig capacity
- Full pumping capability
- Can run all interventions (WL, CT, Pipe)
- Can pull/run completions
- Oil companies comfortable & understand the deployment/access technology

**Cons:**
- High Day rate and total spread cost
- Lack of available assets
- High mobilisation & Operating costs effect economics for interventions
- Not able to drill when using for intervention
- Over-kill for electric-line interventions
Intervention Options – Riserless Light Well Intervention (CAT A)

**Pros:**

- Lightest most cost effective and flexible intervention setup for electric-line
- Can be deployed from Vessel of Opportunity
- Fast to mobilise, deploy & move between wells
- Can achieve 90% of intervention requirements on e-line with Welltec mechanic suite of tools
- Vessel can be used for additional activities (IMR, Construction, Installation, SAT etc)

**Cons:**

- Limited number of SSL systems worldwide (12)
- Cannot pump large volumes of fluid
- Cannot run Coil Tubing
- Oil Companies not all locally aware of technology
Key Components of RLWI

Alliance/partnership of subsea specialists providing **Cost Effective Access**, Enabling the deployment of specialist intervention services & technology for **well maintenance**, **production enhancement** or **abandonment** in subsea wells,

More **cost effectively** than using a conventional drilling rig.

**Vessel**

**Subsea Lubricator**

**Down hole Intervention services**
Global Subsea Intervention Market

Access systems and vessels needed for performing interventions are limited – and often assets are on long-term contracts so not available on spot market.

Mapping of subsea-wells, subsea lubricator systems and suitable intervention vessels:

**Gulf of Mexico**
- Existing subsea wells: ~830
- Number of available subsea lubricator systems: 6
- Number of suitable intervention vessels: 10

**North Sea**
- Existing subsea wells: ~1800
- Number of available subsea lubricator systems: 5
- Number of suitable intervention vessels: 11

**Brazil**
- Existing subsea wells: ~1000
- Number of available subsea lubricator systems: 0
- Number of suitable intervention vessels: 1

**South East Asia/Australia**
- Existing subsea wells: ~400
- Number of available subsea lubricator systems: 2
- Number of suitable intervention vessels: 6

**West Africa**
- Existing subsea wells: ~800
- Number of available subsea lubricator systems: 1
- Number of suitable intervention vessels: 2

**World total**
- Existing subsea wells: ~4800 (5200 by YE 2012)
- Number of available subsea lubricator systems: ~12
- Number of suitable intervention vessels: ~30

>> 12 Subsea Lubricators Worldwide. 4 on LT contract. 3 are 3” ID. 5 available on call out for standard subsea XMTs. Approx 30 Intervention Vessels Worldwide.

Note: All numbers are 2012 estimates.
Source: Quest Offshore; Infield Systems
Over 450 wells intervened on since 1987
Over 2000 RLWI operations performed globally

Current water depth intervention records are:
E-line = 1000m (3278ft)
Slickline = 1881m (6170ft)

Source: ENI RLWI study 2010-2011, TOTAL, FMC technologies, Well Ops
# Riserless Light Well Intervention (RLWI) Services

Example of jobs performed in North Sea

<table>
<thead>
<tr>
<th>Vessel</th>
<th>No of Wells</th>
<th>Runs</th>
<th>PLT</th>
<th>Perforations</th>
<th>Plugs</th>
<th>Insert DHSV</th>
<th>Scale Brush</th>
<th>Scale Mill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Island Frontier</td>
<td>87</td>
<td>620</td>
<td>58</td>
<td>59</td>
<td>180</td>
<td>12</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>Island Wellserver</td>
<td>45</td>
<td>384</td>
<td>44</td>
<td>55</td>
<td>85</td>
<td>18</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>Island Constructor</td>
<td>23</td>
<td>107</td>
<td>14</td>
<td>6</td>
<td>53</td>
<td>4</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Totals</td>
<td>155</td>
<td>1111</td>
<td>116</td>
<td>120</td>
<td>318</td>
<td>34</td>
<td>16</td>
<td>40</td>
</tr>
</tbody>
</table>

**Riserless Light Well Intervention (RLWI) Services**
E-line intervention tools removing snubbing & reducing CT

CT in subsea wells currently requires a riser to surface. Where e-line services can achieve the same results as Coil (cleaning, milling, shifting, injecting, cutting etc.) RLWI is enabled.

Introduction of Mechanical Services

RLWI services introduced

Introduction of the WellTractor®

Source: Statoil
## What are the Mechanical Suite of Intervention tools?

### Mechanical Services Categories

<table>
<thead>
<tr>
<th>Services</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conveyance Services</strong></td>
<td>Using the Well Tractor® we can deliver well intervention tools and other services to the desired location at high angle or where flow or completion geometry make conventional conveyance impossible.</td>
</tr>
<tr>
<td><strong>Mechanical Services</strong></td>
<td>Using the Well Tractor® as the platform and incorporating an ever growing number of proprietary tools such as the Well Stroker® and the Well Key®, client is able to carry out an increasing range of mechanical interventions including shifting sliding sleeves, changing out GLVs in single run, pulling or setting plugs and more.</td>
</tr>
<tr>
<td><strong>Milling Services</strong></td>
<td>Using the Well Tractor® if required and proprietary tools such as the Well Miller® to mill scale build up, while still flowing the well allows client to increase production from wells with restricted production bores as well as milling malfunctioning valves, glass plugs, nipple profiles, cement plugs and other obstructions.</td>
</tr>
<tr>
<td><strong>Clean-Out Services</strong></td>
<td>Using the Well Tractor® if needed and Well Cleaner® client can remove debris, clean subsurface valves, mandrels and profiles, perform completion cleaning, sand bridges and fracture clean up, all on e-line, without coil.</td>
</tr>
<tr>
<td><strong>Surveillance</strong></td>
<td>Run in combination or stand alone tools such as the Well Flow Imager and the Well Hardware Scanner, Welltec® is able to carry out a range of well diagnostics and to confirm mechanical services have been performed 100% (eg: confirm water flow is stopped after shifting sliding sleeve in same run)</td>
</tr>
<tr>
<td><strong>Subsea Intervention</strong></td>
<td>Above Mechanical suite of Intervention tools enable up to 90% of intervention requirements to be met through e-line intervention – Hence enabling the use of RLWI technology to enhance production and life of subsea wells (or platform wells)</td>
</tr>
</tbody>
</table>
Conclusions

• RLWI has become a routine operation with continuously increasing demands & continuously improving operational efficiencies
  • Over 2000 RLWI operations have been performed to date, worldwide with a very high degree of efficiency & cost saving
  • RLWI has been performed on a daily basis by Statoil, Shell & BP and other North Sea operators with high HSE standards
  • RLWI operations have been performed regularly in GOM and in recent years expanded to other regions (APAC, West Africa, Brazil)

• RLWI is providing reduced operational cost for subsea completed fields compared to the more costly rig alternatives

• Technology is mature and capable for deeper water applications (1000m +)

• Significant impact can be achieved on subsea field productivity and total Oil recovery in a cost effective manner by employing RLWI technology

• New suite of mechanical intervention tools allow a larger scope of work to be performed on e-line and hence without a riser (enabling RLWI)
Questions?

... and thank you for your time