SPE 166598
Barrel Chasing Through Well Interventions – Can We get Better At This?

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OVERVIEW

• Well Interventions Excellence Network (WIEN)
• WIEN Objectives
• Overview of Results
• Conclusions & Way forward
Arrest field decline by accelerating the pace of unlocking well potentials

- Initiated in 2011
- European operators sharing data and helping each other to improve production enhancement via well interventions

How:

1. External awareness – what has been achieved
   - See the bigger picture
   - Recognize what’s achievable
   - Identify bottlenecks to breakthrough performance

2. Make it work
   - Set stretch targets
   - Replicate successes

3. Make it Grow
   - Implementing a collaborative approach to overcome barriers to breakthrough performance

Raise industry & own performance levels through technical collaborative partnerships
Setting the Scene

1. **Collated well intervention (production) performance data for 2010-2012**
   - Standardized data submission template (oil, gas, onshore, offshore platform, NUI & subsea)
   - 22 intervention types
   - Grouped into 3 themes
     - Additional production
     - Safeguarding
     - Restoraton

2. **Key analysis parameters**
   - Intervention intensity (activity levels)
   - Technical success rate
   - Production gains per job
   - Unit costs of barrels generated
   - % contribution to total annual production

3. **Annual WIEN get together**
   - Overview of the benchmarking analysis – set the scene
   - All operators share and discussed high/low lights
   - Cherry picked specific topics for detailed sharing by most qualified operators
   - Identified areas of collaboration for follow-up

4. **Repeat exercise on annual basis**
   - Build a picture of (and steer) the development and direction of the industry

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**Additional production generation**
- Hydraulic fracturing
- Re/Add Perforations
- Acid stimulations
- Water shutoffs
- Gas shutoffs
- Plunger lifting
- Velocity strings/Tailpipe extensions
- Mobile wellhead compression for deliquification
- Downhole pumps for deliquification
- Gas Lift Valve changeouts
- Artificial lift (ESP, Beam pump, etc) changeout

**Production safeguarding**
- Foam lifting
- Water washes
- Scale squeezes
- Scale removal (CT jetting, etc)

**Production restoration**
- Tubing Clean outs (CT, bailing)
- SCSSSV repairs
- CT Kick-offs
- Gas Lift Valve repairs
- Tree restorations
- Tree recompletions

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## Overview

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of Wells</td>
<td>2104</td>
<td>4566</td>
<td>4183</td>
<td>(10844)</td>
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<tr>
<td>Number of Interventions</td>
<td>1173</td>
<td>1339</td>
<td>1336</td>
<td>3848</td>
</tr>
<tr>
<td>Intervention Intensity</td>
<td>56%</td>
<td>29%</td>
<td>32%</td>
<td>35%</td>
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<tr>
<td>% technical success rate</td>
<td>76%</td>
<td>77%</td>
<td>79%</td>
<td>77%</td>
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<tr>
<td>% contribution to production</td>
<td>7%</td>
<td>9%</td>
<td>11%</td>
<td>9%</td>
</tr>
</tbody>
</table>

- Significant data record
- 12 European operators
- Well interventions contributed ~9% of total production
- On average, 1 in 3 wells is intervened every year
- Good technical success rate (3 out of 4 jobs)
Majority of interventions are to safeguard production
Majority of production contribution is from restoration jobs

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Activity Levels & Success Rate (2010-2012)

- Intervention intensity decreases as we move to more expensive environments
- Risk averse culture in subsea well interventions despite high technical success rate (and reasonable unit costs)
- Lowest contribution to production in subsea wells
## Activity Levels (2011-12)

<table>
<thead>
<tr>
<th>Job Description</th>
<th># of interventions</th>
<th>Intervention Intensity</th>
<th>Technical success rate</th>
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<tbody>
<tr>
<td>Water washes</td>
<td>968</td>
<td>11.1%</td>
<td>83%</td>
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<tr>
<td>Foam lifting</td>
<td>442</td>
<td>5.1%</td>
<td>85%</td>
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<tr>
<td>Scale squeezes</td>
<td>173</td>
<td>2.0%</td>
<td>44%</td>
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<tr>
<td>SCSSSV repairs</td>
<td>127</td>
<td>1.5%</td>
<td>76%</td>
</tr>
<tr>
<td>Re/Add Perforations</td>
<td>86</td>
<td>1.0%</td>
<td>66%</td>
</tr>
<tr>
<td>Integrity recompletions</td>
<td>52</td>
<td>0.6%</td>
<td>85%</td>
</tr>
<tr>
<td>Acid stimulations</td>
<td>50</td>
<td>0.6%</td>
<td>72%</td>
</tr>
<tr>
<td>Scale removal (CT jetting, etc)</td>
<td>45</td>
<td>0.5%</td>
<td>82%</td>
</tr>
<tr>
<td>Tree restorations</td>
<td>43</td>
<td>0.5%</td>
<td>72%</td>
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<tr>
<td>Gas Lift Valve changeouts</td>
<td>36</td>
<td>0.4%</td>
<td>64%</td>
</tr>
<tr>
<td>Artificial lift changeout (ESP, Beam pump, etc)</td>
<td>14</td>
<td>0.2%</td>
<td>100%</td>
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<tr>
<td>Water shutoffs</td>
<td>28</td>
<td>0.3%</td>
<td>29%</td>
</tr>
<tr>
<td>Artificial lift changeout (ESP, Beam pump, etc)</td>
<td>12</td>
<td>0.1%</td>
<td>92%</td>
</tr>
<tr>
<td>Velocity strings/Tailpipe extensions</td>
<td>5</td>
<td>0.1%</td>
<td>100%</td>
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<tr>
<td>Hydraulic fracturing</td>
<td>5</td>
<td>0.1%</td>
<td>100%</td>
</tr>
<tr>
<td>Plunger lifting</td>
<td>5</td>
<td>0.1%</td>
<td>20%</td>
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<tr>
<td>Mobile wellhead compression for deliquification</td>
<td>2</td>
<td>0.0%</td>
<td>100%</td>
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<tr>
<td>Downhole pumps for deliquification</td>
<td>1</td>
<td>0.0%</td>
<td>100%</td>
</tr>
<tr>
<td>Gas shutoffs</td>
<td>0</td>
<td>0.0%</td>
<td>NA</td>
</tr>
</tbody>
</table>

A lot of “traditional” jobs, limited success with “new” type of jobs & limited chasing of new technology
Operator Performance Variations (2010)

Diversity in performance indicates significant scope for technical collaboration to raise industry performance.
Technical Collaboration Projects

1. Use of foam for de-liquifying subsea gas wells
   ➢ 3 operators, targeting batch foam treatments in subsea wells

2. Downhole pumps & plungers for gas well deliquification (in presence of SCSSSV)
   ➢ 8 operators, collaborative push for technology development and deployment

3. Mobile wellhead compression for deliquification
   ➢ 11 operators, searching for solution on identified common needs; sharing technical experiences

4. Gas lift valve change-outs and repairs
   ➢ 2 operators, exchanged of detailed operational learnings

• Takes time to build trust and agree on win-win tangible targets …..but can move fast thereafter

• Setting up projects emerging from this year’s WIEN.
Conclusions / Way Forward

• WIEN promotes good practice and can steer industry on actions to boost production via well interventions
• Diversity in performance levels indicates ample scope for improvement.
• Limited use of “non-traditional” discretionary type of well interventions to create additional production
• Technical collaboration projects have been kicked off
• Trust is building up and forum is expanding
• WIEN will continue on an annual basis
• Credibility of analysis, trends and required actions increases as the database builds up

WIEN invites your participation and support

Please contact a member of the organising committee

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Thank You / Questions?