Digitalized Wellbarrier Schematics Enhance Collaboration

Schlumberger Digital Forum 2022
Lucerne
Agenda

- Equinor strategic pillars
- Old way versus new way
- Wellbarrier solution
  - Why Wellbarrier?
  - Foundation
  - Planning (DrillPlan integration)
  - Integrity Management
- Intuitive and consistent
- Results
- User feedback
- Next steps
Equinor strategic pillars

**Always safe**
- Everyone home safe
  - No well control/well integrity incidents
  - No people in the line of fire
  - No hand and finger injuries
  - Always compliant and no security breaches

**Industrialize to increase well deliveries**
- Ensure two-year maturity in plans and increase use of standard well design across well portfolio
- Close the gap to perfect well
- Accelerate value realization from Digital Well Delivery activities

**Drive towards zero emission operations**
- Optimize energy efficiency on all rigs
- Drive electrification of drilling units
- Explore use of green fuels including hydrogen

**High value**
- Target based improvements
- Plan
- Act
- Do
- Check

**Low carbon**
- Stretch target 2022
  - 0 WCI
  - 0.2 SIF
  - 1.5 TRIF
- Strategic target 2025
  - Always safe
  - 0

**High value**
- - 30%* Well design cost with SUB
- - 30%* Reduced gap to perfect well in execution
- - 50% Well cost EPN IOR wells

**Low carbon**
- - 20%* CO2 emissions
- - 50%* CO2 emissions

*relative to baseline 2020
Two barrier philosophy (old v new)

Traditional “spreadsheet” approach

- 4-6 hours to prepare
- Inconsistent formats
- Difficult to maintain
- Version control
- Disconnected
- Data integrity challenges

Wellbarrier approach

- 10-20 minutes to prepare
- Standard format
- Easy to maintain
- Fully auditable
- DrillPlan integration
- Strong data integrity
# WELL BARRIERS

## Producer - A-04A

### Primary barrier elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Qualification</th>
<th>Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formation (intest) - EAC 51</td>
<td>MIT test to 15.0 kpsi</td>
<td>Not accessible</td>
</tr>
<tr>
<td>Production casing annular cement - EAC 12</td>
<td>Job performance DGR: 22/10/2015</td>
<td>8-barrier pressure</td>
</tr>
<tr>
<td>5 5/8&quot; x 10 3/4&quot; production casing - EAC 2</td>
<td>Pressure test to 3700 psi: 18/10/2015</td>
<td>8-barrier pressure</td>
</tr>
<tr>
<td>Production packer - EAC 7</td>
<td>Pressure test to 3300 psi: 15/11/2015</td>
<td>6-barrier pressure</td>
</tr>
<tr>
<td>5 1/2&quot; tubing - EAC 15</td>
<td>Pressure test to 3300 psi: 15/11/2015</td>
<td>6-barrier pressure</td>
</tr>
<tr>
<td>Downhole safety valve and control line - EAC 8</td>
<td>Info: test to 2500 psi and 0.25&quot; pressure test to 7500 psi DGR: 15/11/2015 and Well Perform: 18/11/2015</td>
<td>Periodic function / pressure testing by CL</td>
</tr>
<tr>
<td>Chemical injection lines - EAC 29</td>
<td>Pressure test to 2100 psi Well Perform: 18/11/2015</td>
<td>6-barrier pressure</td>
</tr>
<tr>
<td>Pinion valves - EAC 31</td>
<td>Pressure test to 5000 psi FAC Test: 02/02/2022</td>
<td>Periodic pressure testing</td>
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</table>

### Secondary barrier elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Qualification</th>
<th>Monitoring</th>
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<tbody>
<tr>
<td>Formation (intest) - EAC 51</td>
<td>MIT test to 15.0 kpsi</td>
<td>Not accessible</td>
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<tr>
<td>Intermediate casing cement - EAC 22</td>
<td>Job performance DGR: 20/06/2015</td>
<td>6-barrier pressure</td>
</tr>
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<td>13 5/8&quot; intermediate casing - EAC 2</td>
<td>Pressure test to 2600 psi: 10/09/2015</td>
<td>6-barrier pressure</td>
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<tr>
<td>Wellhead 13 5/8&quot; casing pack-off - EAC 5</td>
<td>Pressure test to 1800 psi: 10/09/2015</td>
<td>Periodic pressure testing</td>
</tr>
<tr>
<td>Wellhead - EAC 5</td>
<td>Pressure test to 5000 psi FAC Test: 07/10/2015</td>
<td>External observation</td>
</tr>
<tr>
<td>Wellhead annulus access valve - EAC 12</td>
<td>Pressure test to 5000 psi FAC Test: 07/10/2015</td>
<td>Periodic pressure testing</td>
</tr>
<tr>
<td>Surface man-trees - EAC 33</td>
<td>Pressure test to 5000 psi FAC Test: 07/10/2015</td>
<td>Periodic pressure testing</td>
</tr>
<tr>
<td>Tubing hanger - EAC 10</td>
<td>Pressure test to 5000 psi Well Perform: 14/11/2015</td>
<td>6-barrier pressure</td>
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<td>Crown plug - EAC 11</td>
<td>Pressure test to 5000 psi Well Perform: 15/10/2015</td>
<td>Test cap pressure</td>
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<td>KMIT instrumentation panel valves - EAC 55</td>
<td>Pressure test to 5000 psi FAC Test: 02/02/2022</td>
<td>Periodic pressure testing</td>
</tr>
<tr>
<td>Venturi - EAC 33</td>
<td>Pressure test to 5000 psi Well Perform: 14/11/2015 and 18/08/2015</td>
<td>Periodic pressure testing</td>
</tr>
</tbody>
</table>

### Barrier leak, minor integrity issue

1) A-04A is a pilot well to acquire data to drill the A-04A open hole sidetrack well.
2) Fluid Type: Oil / Oil Density: 14ºAPI / GOR: 75 scf/STB / Reservoir EMV high case 8.52 psi / Reservoir Pressure and Temperature: 3351 psi and 76ºF / @ 2112 m TVD, Max reservoir pressure at surface = 3351 psi - 3248 psi = 303 psi, Max reservoir pressure at secondary well barrier @ 1800 m TVD =
“application of technical, operational and organizational solutions to reduce risk of uncontrolled release of formation fluids and well fluids throughout the life cycle of a well” Norsok D-010
Deployment

2022 Statistics

- 130 people trained since June
- 1683 barrier schematics created in 2022
- 210 registered users
“...Very good explanations on the advantages of the Software, it was very easy to follow!”

“...Instructor well prepared and tool easy to use and understand”

“...It was nice to learn about the wellbarrier. It is easy to implement most of the information and features needed.”

“...Thank you for a good course – well needed software 😊”
Next steps

- Further integration (WellCom)
- Deploy integrity management solution
- Co-development opportunities
- New energy opportunities (CCS)
- Environmental focus
- ...how this aligns with Equinor strategic pillars
Questions
Digitalized Wellbarrier Schematics Enhance Collaboration

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Leading consultant SCM