Regulatory update with focus on Qualification of new technology & new materials including status of Temporary plugged wells

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PAF Seminar 20th of October 2022
Drilling & Well Technology
Petroleum Safety Authority Norway
PLUGGING & ABANDONMENT

Several fields on the NCS are now brown fields and at the end of their life cycle and will be permanently plugged and abandoned in the years to come.

For every year that goes by without the innovative focus on development and qualification of new technology for permanent plugging, the industry loses important experience and learning which are important for efficiency and costs.

It is only through continuous improvement that we can improve and learn so that the Norwegian continental shelf will continue to be a world champion within HSE.
Overall objectives for PSA Norway

“The PSA will set the terms for and supervise that participants in the petroleum industry are maintaining a high level of health, safety, environmental protection and emergency preparedness, and thereby also help to create the greatest possible value for society.”

from “Our Crown Prince's Regent's resolution”
Statistics:
Number of permanent P&A of wellbores / slot recoveries from NPD

Orange: Permanent plugged wells
Blue: Slot recoveries

Number of wells re-used for slot recoveries and permanent abandoned wellbores

Facility Regulations § 9
Qualification of new technology and new materials

Where the petroleum activities entail use of new technology (products, materials, tools) or new methods, criteria shall be drawn up for

Development, Testing and Use, so that the requirements for HSE are fulfilled; includes investigation and obtaining objective proof that the needs for a specific intended use are covered, cf. Section 21 of the Management Regulations.

The criteria shall be representative for the relevant conditions of use, and the technology or methods shall be adapted to already accepted solutions (best practice)

Guidance Level: DNVGL-RP-A203 and Oil & Gas UK Guidelines on Qualification of Materials for the Abandonment of Wells, issue 2 can be used to fulfill the requirements regarding methods for the qualification of new technology.
New Technology
NORSOK D-010 Well Barrier EAC Table
No. 61 Perf, Wash and Cement Plug (PWC)

➢ Builds on experience with emphasis on establishing a qualification matrix, track record and use industry best practice
➢ Reference to establish track record in Norsok D-010 Rev 5/2021
➢ Emphasis on limitations of application

Section 5.2.4 Elements acceptance criteria (EAC) tables states:

- "To qualify as a WBE, a well component shall conform to the acceptance criteria requirements specified in its corresponding EAC table. EACs shall be in place for all WBEs used."

- "A new EAC table shall be developed in cases where an EAC table does not exist for a specific WBE. The level of detail shall be defined by the user."
Qualification process for P&A “PWC report”

- Intention to Review of qualification processes and technology development related to Perforate, Wash and Cement (PWC)
- AkerBP, ConocoPhillips and Equinor have participated and provided information from their experience with qualifying and developing the method/technology
- The main technology providers in Norway, Archer and Hydrawell also contributed with their insight

Link: Technology and methods for permanent plugging on the NCS (ptil.no)
**Ongoing hearing on new EU Regulation on Methane Emissions**

Proposal for a regulation on methane emissions reduction in the energy sector and amending Regulation (EU) 2019/942

Co-ordinated feedback from Norwegian Authorities to OED. PSA, NEA and NPD work closely together.

➢ **Regular Meetings with Offshore Norge (Climate and Energy department)**

➢ **Rev. 3 «Inactive well»** means an oil or gas well or well site, onshore or offshore, where operations for exploration or production have ceased for at least one year. It does not include temporarily plugged wells, permanently plugged and abandoned wells, as defined in this Regulation.

➢ **Temporary plugged** and abandoned wells

➢ **Permanent plugged** and abandoned wells

➢ Will no be re-entered again.

EU Strategy is to improve measurement and reporting of methane emissions.

“Where [two] consecutive measurements quantification and pressure monitoring of methane emissions from an offshore temporarily plugged well, every two years, prove no methane emissions, this paragraph 2 shall cease to apply to that well”.

Regjeringen.no
Well Integrity status 2021
Total number: **2129** wells

- Six wells (0.3%) in the red category
- 40 wells (1.9%) in the orange category
- 556 wells (26.1%)
- 71.7%

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**Figur 6.22 Brønnkategorisering - fordelt på brønnstatus, 2021**

- **Injeksjon**: 387
- **Produksjon**: 1462
- **Temporary Plugged with Monitoring**: 152
- **Temporary Abandoned**: 120
2022 Survey of Temporary Plugged and abandoned wells (Bi-yearly survey)

Changes 2020 – 2022

- Total number of wells in 2022 is lower than the preceding years (227 compared to 268).
- The reduction of 41 wells compared to 2020 is mainly caused by permanently plugging & abandonment of wells.
- The number of orange and red wells are also positively reduced with 7 wells compared to 2020.
Definitions

Temporarily plugged and abandoned wells are classified as “with monitoring” or “without monitoring” according to NORSOK D-010, 10.5.1 as follows:

➢ **“Temporary abandonment – with monitoring;** Well status where the well is abandoned, and the primary and secondary well barriers are continuously monitored and routinely tested.

➢ **“Temporary abandonment – without monitoring;** Well status where the well is temporary abandoned, and the primary and secondary well barriers are not continuously monitored and routinely tested.

As per Activity Regulations § 88, Securing of wells, the duration of the temporarily plugging and abandonment period for wells without monitoring is maximum two (2) years for exploration wells, and maximum three (3) years for production wells.
Overview of temporary plugged & abandoned wells 2022 on NCS

**WITHOUT MONITORING**

- 63
- 46
- 10
- 6
- 1

**WITH MONITORING**

- 164
- 64
- 90
- 8
- 2

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**Primary and secondary well barriers are not continuously monitored nor routinely tested. The abandonment period shall not exceed three (3) years.**

**Primary and secondary well barriers are continuously monitored and routinely tested. There is no time limit for this modus.**
Primary and secondary well barriers are not continuously monitored nor routinely tested. The abandonment period shall not exceed three (3) years.

Statistics – wells without monitoring
NCS Temporary abandoned wells 2022

Without monitoring: 63
Subsea – Platform: 47, 16, 39, 7, 46
Production: 33, 11, 27, 6, 10
Injection: 9, 5, 7, 1
Exploration: 5, 5

Red: Barrier failure and the other is degraded/not verified, or leak to surface
Orange: One barrier failure and the other is intact, or a single failure may lead to leak to surface
Yellow: One barrier degraded, the other is intact
Green: Healthy well – no or minor issue
Temporary plugged wells

All wells; Type of wells with and without monitoring

<table>
<thead>
<tr>
<th>Type of Wells</th>
<th>Count</th>
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<tbody>
<tr>
<td>Platform Wells</td>
<td>150</td>
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<tr>
<td>Subsea Wells</td>
<td>42</td>
</tr>
<tr>
<td>Subsea Expl. Wells</td>
<td>14</td>
</tr>
</tbody>
</table>

Duration of temporary plugging and abandonment periods - subsea wells without monitoring

<table>
<thead>
<tr>
<th>Duration</th>
<th>Count</th>
<th>Monitored</th>
<th>Not Monitored</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 yrs</td>
<td>11</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>1-3 yrs</td>
<td>4</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>3-10 yrs</td>
<td>24</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>10-20 yrs</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>20+ yrs</td>
<td>2</td>
<td>2</td>
<td>0</td>
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</tbody>
</table>

DRAFT
New Technology for more innovative P&A

➢ Equipment for monitoring of barriers (P/T) in Temporary plugged wells
   "what we can monitor, we can verify & influence"......

➢ A significant number of the temporary plugged and abandoned subsea wells falls into the category “without monitoring” (minimum requirement is yearly ROV survey or wireless monitoring to shore).

➢ Our focus areas within plugging & abandonment;
   ➢ Sharing of learning and knowledge across the industry (and with PSA...)
   ➢ Emphasis on the qualification process for new technology and new methods (TRL-process)
   ➢ Focus on current risk level, regulatory requirements and potential for continuous improvement for temporary plugged wells
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