INTRODUCTION TO
PLUG & ABANDONMENT FORUM (PAF)

Plug and Abandonment workshop
Sola Quality Airport Hotel 9th of June 2011

Presenter: Nina Ringøen, chairman of PAF
Sr Drilling Engineer, Centrica Energi
Plug and Abandonment FORUM

Prepare for a potential “Big wave” of upcoming P&A’s

- When does the majority of P&A come?
- Are we ready?
Where does PAF belong?

OLF – Norwegian Oil Industry Association

- is a professional body and employer’s association for oil and supplier companies engaged in the field of exploration and production of oil and gas
- The OLF works to solve common challenges for the members and to strengthen the competitiveness of the Shelf.

Drilling Managers Forum

- 35 oil & gas companies
  - Well Integrity Forum (2007)
  - Plug and Abandonment Forum (2009)

“The P&A Forum was established in 2009 to develop robust and cost efficient solutions to the current & upcoming P&A challenges on the Norwegian Continental Shelf together with the service industry”.
- P&A Forum established November 2009 after initiative from a ConocoPhillips Norway P&A Workshop

- The Forum is comparable to Oil & Gas UK Decommissioning Work Group 5.

- **Members:** Currently 9 operating companies (Open operator forum)

- **Facilitator:** OLF

- **Observer:** Petroleum Safety Authority
The main purpose of the workshop is to encourage the industry to solve the P&A challenges identified by P&A Forum in close co-operation with the operators and their needs:

- Improve conventional section milling
- Qualify alternatives to section milling, creating annulus barriers
- Qualify alternative materials for annulus barrier
- Abandonment with a light well intervention vessel
- Pulling tubing without rig
- Qualify one long cement plug with a shared casing cement job as equivalent to two independent barriers
Norwegian Continental Shelf
– 42 years of history…..

Approximately 2000 wells to be abandoned from 2011 – 2040

- 193 wells temporary abandoned
- +/-150 new wells drilled/year
- more to come

1974 The Statford field is discovered in the North Sea
1977 First uncontrolled blow-out on the NCS. The Bravo incident on Ekofisk is halted by Boots Hansen and Red Adair

President Richard Nixon is resign over the Watergate
Elvis Presley dies at 42. Spain introduces democracy and applies for EC membership
The P&A forum should, amongst other:

- Communicate with PSA related to regulatory requirements, industry standards and guidelines through input to NORSOK D-010 revision

- Co-operate with service industry related to new requirements, technology & materials, and methods to achieve well integrity in a more efficient operation

- develop best practice and guidelines for how to achieve and verify robust well integrity
The P&A forum should, amongst other:

Be a place to discuss:

- common funding of R&D projects
- Opportunities for P&A activities that can be performed without a rig
- sharing of “case stories” and experience transfer among the operators to obtain common understanding
WELL INTEGRITY ENSURES ABANDONMENT SUCCESS !!

Permanent Abandonment is when the well or part of the well, will be plugged with an eternal perspective......

PERMANENT ABANDONMENT ACCORDING TO NORSOK D-010:

well status, where the well or part of the well, will be plugged and abandoned permanently, and with the intention of never being used or re-entered again.
P&A Forum

"Task force" established – preparing proposals for improvements of NORSOK D-010, rev.3, Aug 2004

- Terms and definitions
- General principles
- Sidetracks, suspensions
- Well Barrier Element Acceptance Criteria (WBEAC)

REVISION 4
2011/2012 ??
There shall be two well barriers available where a pressure differential exists that may cause uncontrolled outflow from the borehole/well to the external environment....
Acceptance Criteria
Which are....?

- Bridge plug
- Casing
- Mud
- Cement
- Formation
- Shoe Track

NORSOK D-010
Gives you many answers
• Permanent well barriers **shall** extend across the **full cross section of the well**, include all annuli and seal both vertically and horizontally.

Primary & Secondary well barriers **shall** be positioned at a depth with sufficient formation strength at the **base of the plug** in excess of the potential internal pressure (worst anticipated reservoir pressure into account for the abandonment period).
Applied to a real well

30" Cond
20" Shoe
13 3/8" Shoe
Reservoir 2
11 3/4" Shoe
Reservoir 1
9 5/8" Shoe
5 1/2" Shoe
Well design for abandonment?

Casing cement: Shall be minimum 100 m cement above a casing shoe and 100 m above production packer?

Production Packer to be positioned at depth with formation integrity to withstand any internal pressure below.
Lessons from other industries?

➔ Plugging and abandoning for eternity??
Summary

- Focus areas in PAF are amongst others:
  - Generate common understanding of regulations, guidelines and standards (NORSOK D-010)
  - Share ”Best practise” & Case stories
  - Focus on improvement in technical solutions for upcoming P&A operations
  - Ensure quality solutions with well integrity in both well design and P&A in a cost effective manner
  - Work together with service industry, Co-operate 😊
Solving the P&A challenges on the Norwegian Continental Shelf

Presenter: Nina Ringøen
Title: Sr Drilling Engineer
E-mail: Nina.Ringoen@centrica.com