Multilateral technology
Field development benefits

Gorm Liland, Halliburton
Stavanger SPE Meeting 18. March 2015
Outline

1. MLT Installation history in Norway
2. Field development savings
3. Available sealed junction systems
4. Risk management & Success criterias
5. Summary
Level 5 - MLT installation history Norway

- TAML level 5 / junctions sealed by the completion kit

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*Updated Feb 2015*
## Production results with MLT wells

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<tr>
<td>Reserves (IOR)</td>
<td>1800 mill bbl → 2700 mill bbl</td>
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<td>Production rate</td>
<td>Dual MLT well is lower than 2 single wells</td>
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<td>Cumulative production</td>
<td>Higher due to delayed water/gas break-through</td>
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<td>Reservoir exposure</td>
<td>High production rate at low drawdown (13.6km)</td>
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<td>Construction cost</td>
<td>Less than 30% (D&amp;C costs only)</td>
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Random field development
Conventional well planning

- Huge efforts on project planning
- Combined wellbores not considered
- Historically - typical plan
- Cost 24 BNok
MLT Optimized field development

- Combined wellbores
- Average of 2 laterals / well
- Requires early buy in on technology
- 40 reservoir sections
- Saves: 20 slots and 8.5 Billion Nok
MLT Maximized field development

- Paradigm Shift
- Slight wellbore adjustments
- 40 reservoir sections
- Saves 25 slots and 10.5 Billion Nok
Technology climate

- Marginal field development economy
- Cost focus for the well, not the project
- Risk adverse behavior
- Technologies evaluated away

Det norske varsler kraftige kostnadskutt
Fallende oljeprice og en tung periode for bransjen gjør at oljeraisset Det norske planlegger å redusere kostnadene med over 750 millioner kroner

Note: Det Norske is currently using MLT technology on Alvheim

2 laterals on Ivar Aasen can save the company about 840 MNok
Available solutions

- Standard commingled flow
- Intelligent Completion Interface
- High Pressure systems
- Liner Deployment systems
- Gravel packed lateral
Available solutions

- Inflow control of unlimited number of laterals
- Completion string run through all junctions
- ICV’s and packers between laterals and in mainbore below
- AICDs to control zones in laterals
- More than 30 installations done on Troll Olje
Available solutions – other applications

• Frack pack / gravel pack
• Stimulated laterals
• Additional lateral liner
• Cemented lateral
Risk Management

• Perception of MLT to be risky is wrong
  • Less downtime on MLT operations than on Standard drilling operations

• MLT operations time per junction 3-5 days
  • This time is spent instead of drilling down to the junction area twice

• Worst case experience, lost mainbore or lateral
  • Never happened with the 230 well expeirience base.
Success Criteria – focus areas

- Early commitment
- Thorough planning
- Preparation for unknown reservoir conditions
- Dedicated personnel – also for the operator
- Open communication – get it all on the table
- Continuous operations improves knowledge
Summary

- Existing Technology + 230 level 5 junctions
- Increased reservoir exposure & # of economical targets
- Earlier plateau production, increased cumulative production
- Reduced drawdown → improved drainage
- Reduced environmental impact
- 70% cost saving
“If you always do what you’ve always done, you’ll always get that you’ve always got.”

(borrowed from Henry Ford)

Thank you!

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