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Navigating the Future of Unconventional Resources

Dual Coil Milling System

Quantum Downhole Systems

Quantum Downhole Systems Inc.

NS17 - 177

Overview

- Introduction
- Opportunity
- Dual Coiled Tubing
- Dual Coil Milling System (DCMS)
- Case History
- Results
- Conclusion

Milling Introduction

- Production Restrictions
- Jointed Pipe vs Coiled Tubing
- Operational Deficiencies

Overbalanced

- Fluid to reservoir
- Formation damage
- Milling blind

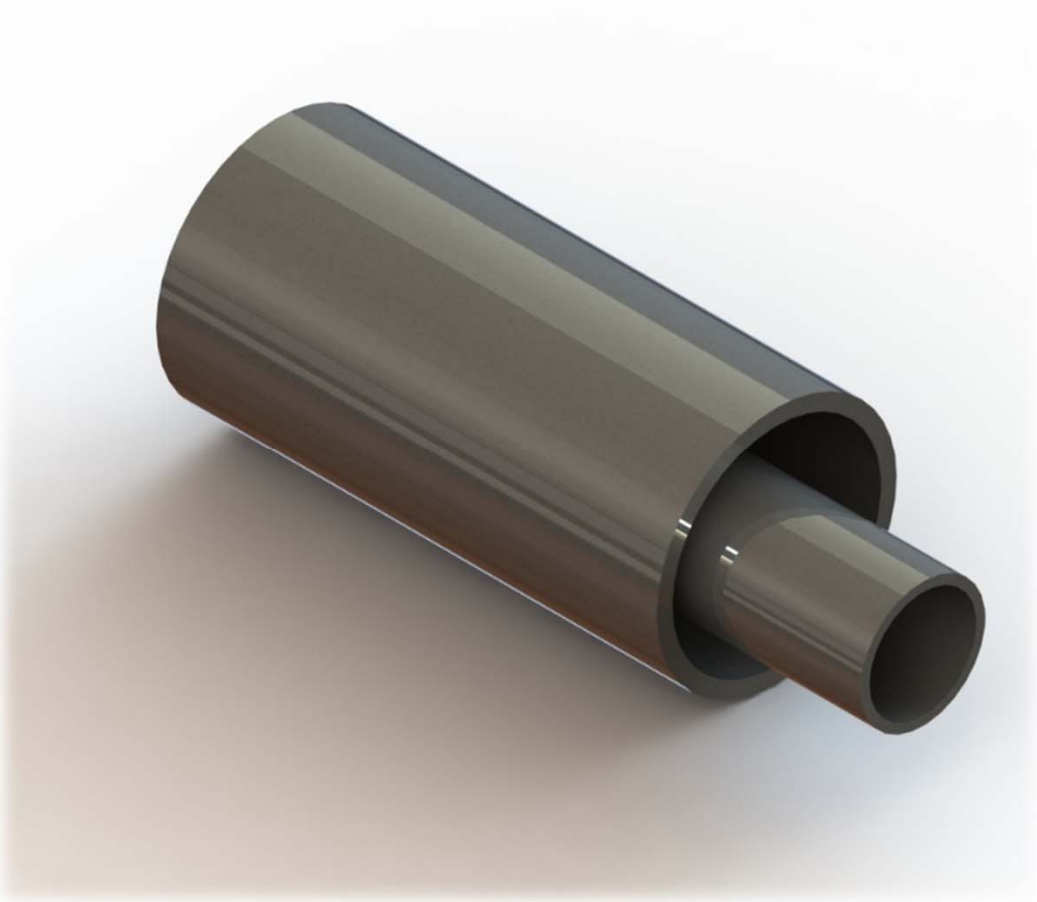
Underbalanced

- Fluid to surface
- Reservoir pressure
- Cost

Opportunity Presented

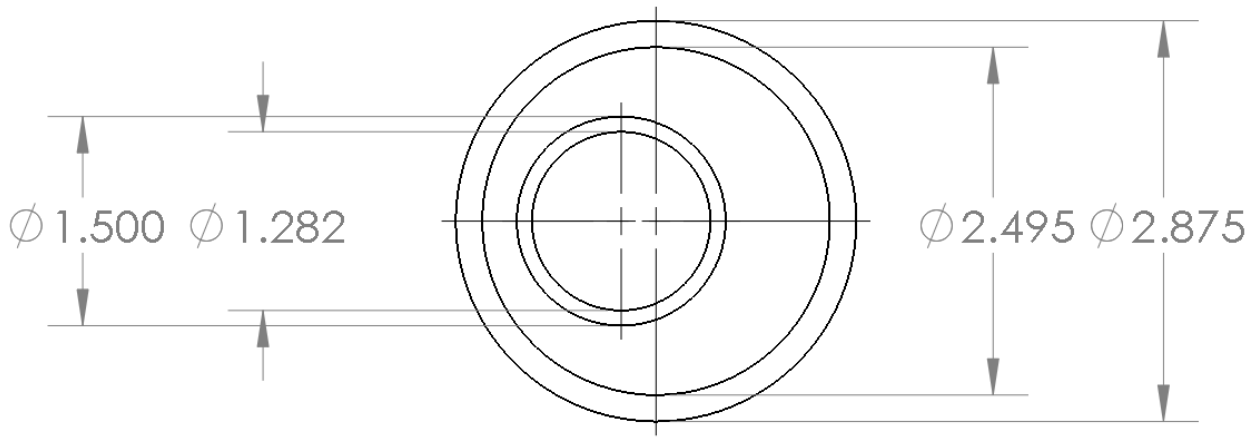
- JetVak™
- Dual Coiled Tubing

- MillVak
  - Patent-pending



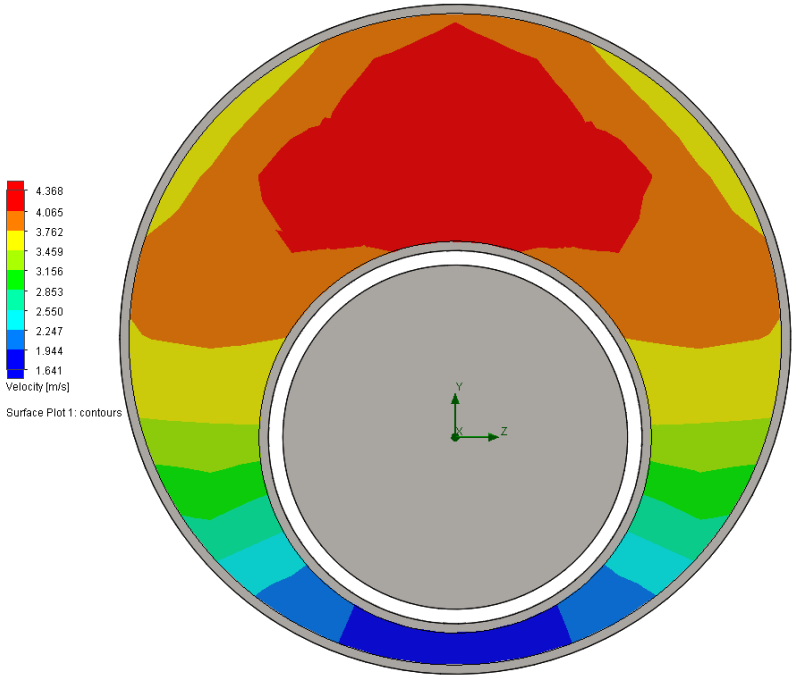
Dual Coiled Tubing

Overall Length (m)	Outer Coil OD/Wall/Grade (inch)	Inner Coil OD/Wall/Grade (inch)
2700	2.875 / 0.190 / 80	1.500 / 0.109 / 70
4200	2.375 / 0.190* / 90	1.250/ 0.109 / 70
2000	2.875 / 0.188 / 70	1.500 / 0.109 / 70
3050	2.375 / 0.175 / 90	1.250 / 0.109 / 70
2500	2.375 / 0.156 / 90	1.250 / 0.109 / 70



DCT - Friction

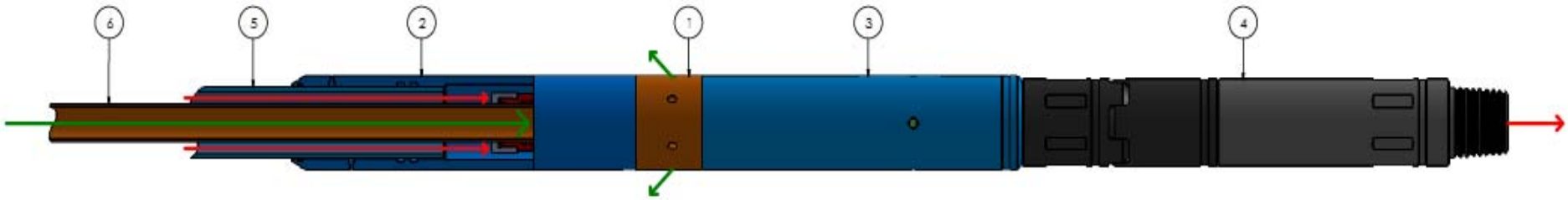
- Field tested
- FEA modelled
- Eccentricity
- Friction = 1.25” x 0.125”
- Flow = 2.375” x 0.190”
- Overall friction = 2.125”



DCT - Fatigue

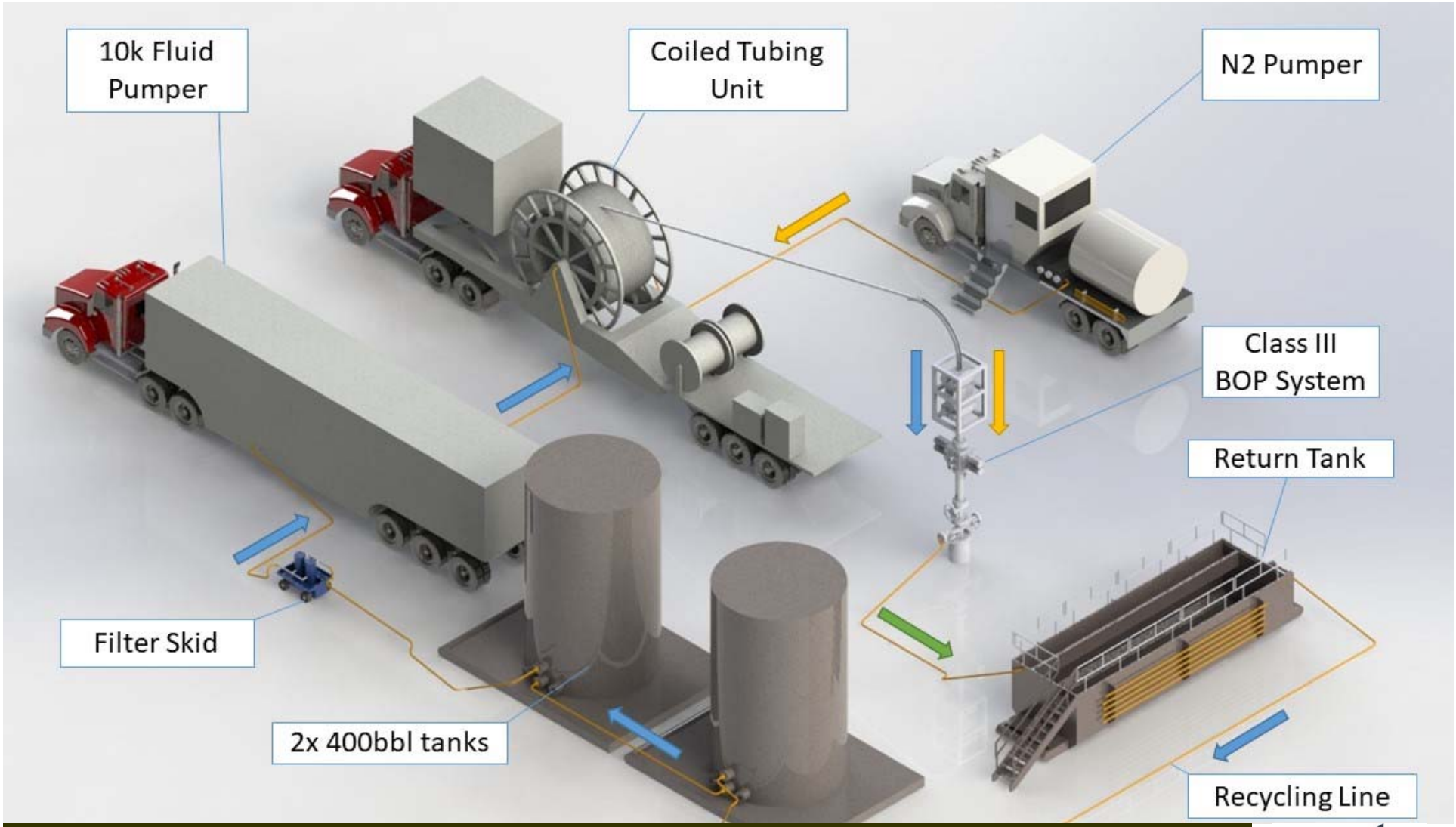
- Cerberus
  - Inner
  - Outer
- Steve Tipton
- Low Failure

Dual Coil Milling System



1. Nitrogen diversion sub
2. Dual Coil connector
3. Hydraulic disconnect sub
4. Bi-directional jar
5. Outer coil, fluid flow path
6. Inner coil, N2 flow path

Dual Coil Milling System



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Case History

Parameter	Data
Date	October 2016
Formation	Cardium
Location	Narraway
Completion	16 stage FracPort
Ball Sizing	3.625” – 2.500”
TMD	2465 mKB
TVD	1486 mKB
BHP	12 MPa
WHP	0.1 – 5 MPa

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Results

Lifted 150 m3

Cuttings to surface

Continuous circulation

Fluid: 450 lpm @ 13 MPa

N2: 12 scm @ 13 MPa

14 seats 16 hours

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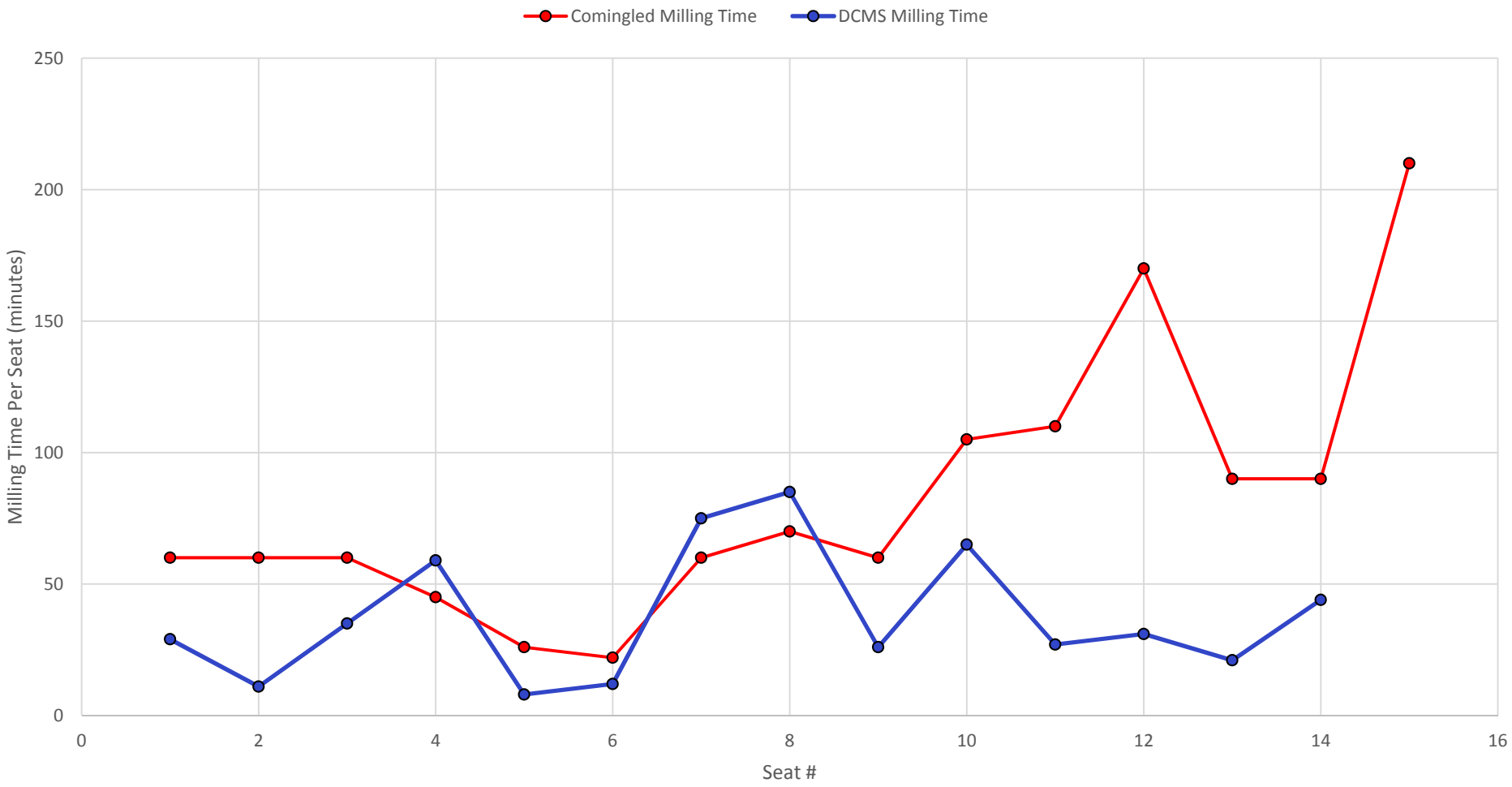
Results – Minutes Per Seat



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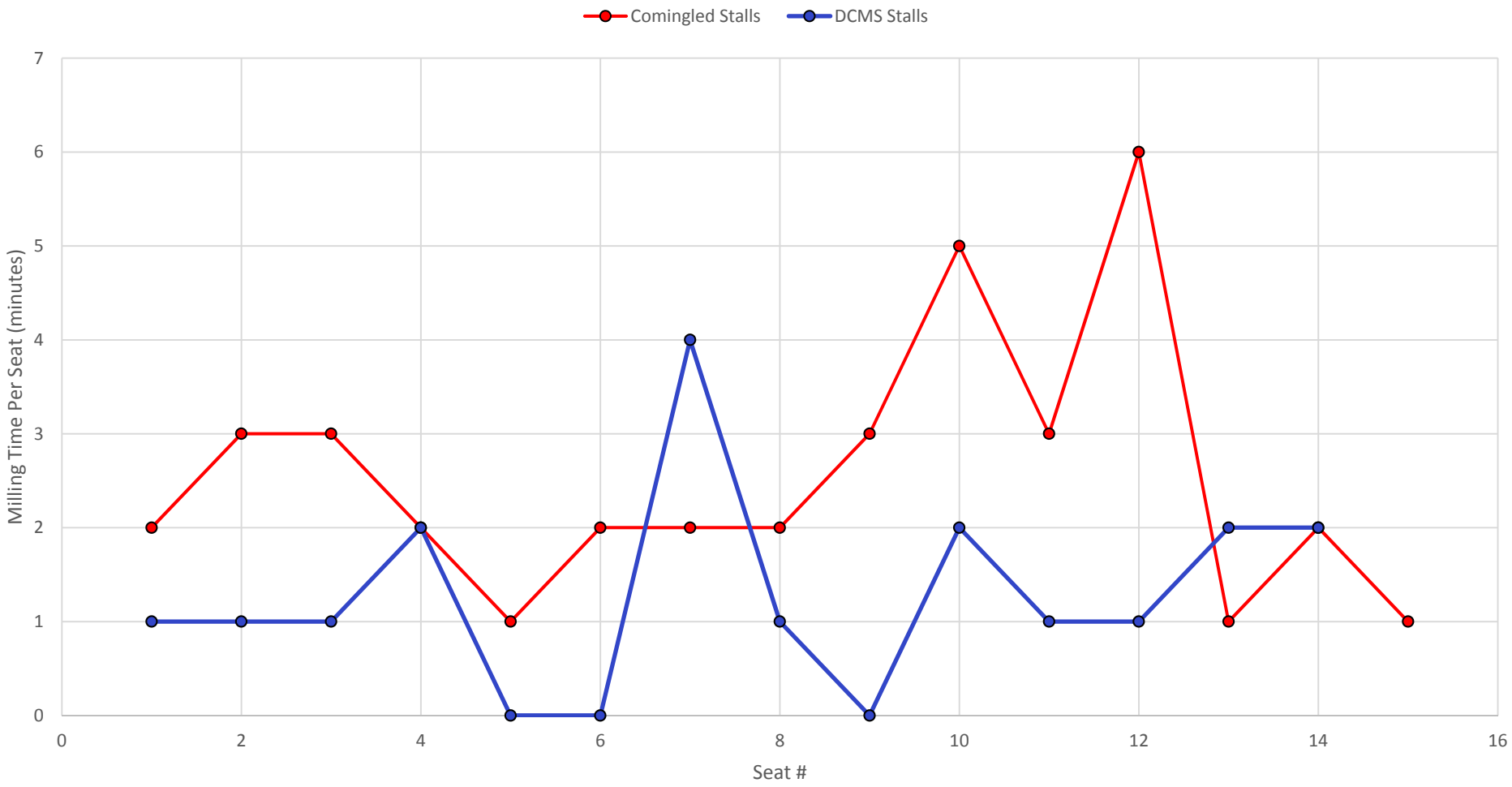
Results – Stalls Per Seat



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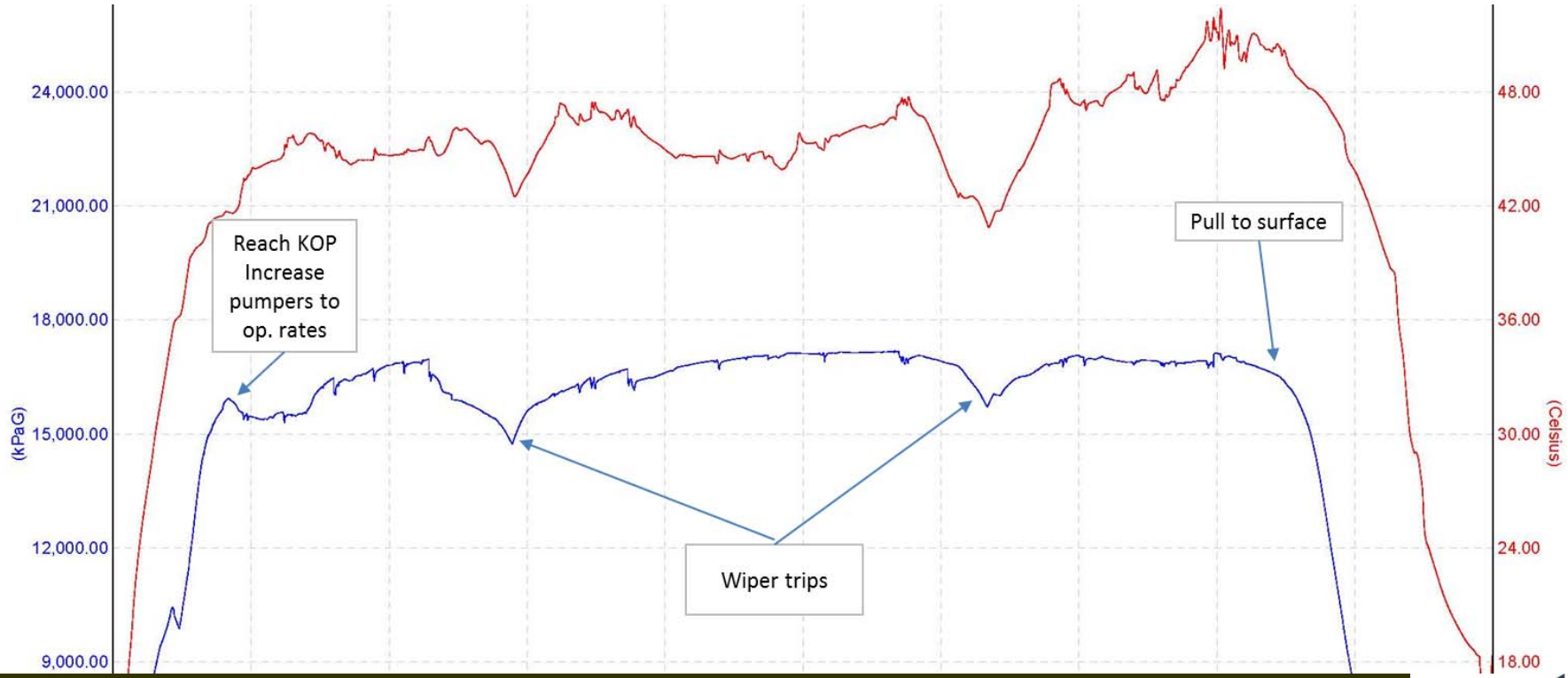
Results – Pressure & Temperature

- BHP 16-17 MPa
  - Hydrostatic 14.3 MPa



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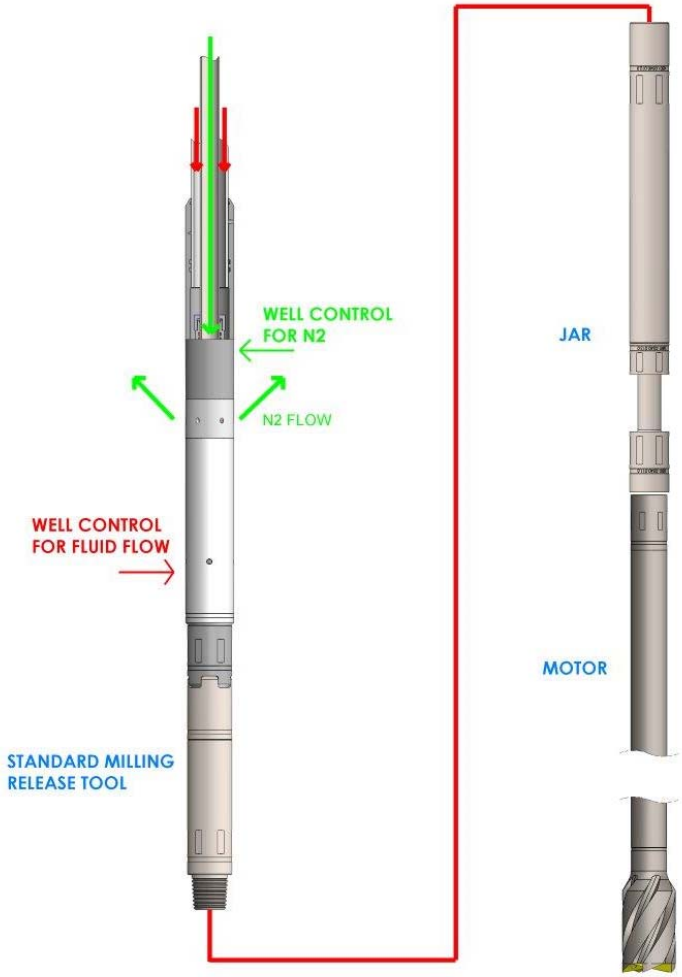
JetVak™ Cleanout

- Same connector
- Localized inflow
- Closed hydraulic circuit
- Reservoir evaluation
- 14 hours – 70.6 m3

Conclusion

- Two fluids conduits to BHA
  - N2 for circulation, H20 for milling
- High, consistent torque output
- Stalls minimized
- Circulation improved
- Economic



Future

Ongoing DCMS Millouts

Optimize Efficiencies

MillVak

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Acknowledgements

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Questions

Dual Coil Milling System

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Garrett Luebke