STEP CHANGE IMPROVEMENTS TO PWC Perf-Wash-Cement®

Arne G. Larsen
VP Business Development
**Rock to Rock Barrier**

- **P&A**
  - Permanent
  - Slot Recovery

- **Well Repair**
  - Annulus Integrity

- **Zonal Isolation**
  - Water/Gas Shut Off
**Perf-Wash-Cement**

### Technology Development

- **GENERATION 1 HydraWash**
- **GENERATION 2 HydraHemera**
- **GENERATION 3 HydraArtemis**

### Continuous Improvement

- Section-milling
- 10.5 days

### Growing Footprint

- **ConocoPhillips**
- **AkerBP**
- **equinor**
- **MAERSK**
- **TOTAL**
- **BP**
- **Shell**
- **REPSOL SINOPEC**
- **Chevron**
- **Centrica Energy**
- **TAQA**
- **Fairfield Energy**
- **Pepper Operating Co. Inc.**
- **PETRONAS**
- **ESCO**

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**SPE Aberdeen Well Late Life and Well Abandonment 27th & 28th June 2018, AECC**
Perf-Wash-Cement

**Quality**
- Plug success rate: 97.5%

**Cost Effective**
- Savings:
  - 4.5 Rig Years
  - >300 Mill USD
  - 12,000 meters
  - Section milling

**Experience**
- 250 plugs
- 16 operators
- 10 countries

Step Change Improvements
ENGINEERED BARRIERS

**CFD Computational Fluid Dynamics**

- Understanding Fluid Dynamics
- Verifying Design Integrity
- Optimising Operating Envelope
Engineered Barriers

Generation 1 HydraWash

SPE Aberdeen Well Late Life and Well Abandonment 27th & 28th June 2018, AECC
Engineered Barriers

Generation 2 HydraHemera
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Engineered Barriers

HydraArchimedes Cement Assurance Tool

Spray Cementing Valve

HydraHemera

Operating Parameters

Rig time

Quality