# A Case Study: Lessons Learnt and Experienced gained from employing Perf-Wash-Cement® Technique for Permanent Well Abandonment of Wells in the Pelican Field

*Gary Mason – Senior Drilling Engineer, TAQA Bratani Ltd.*
*Tom Leeson – Chief Commercial Officer, HydraWell Intervention a.s.*

SPE Aberdeen

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TAQA

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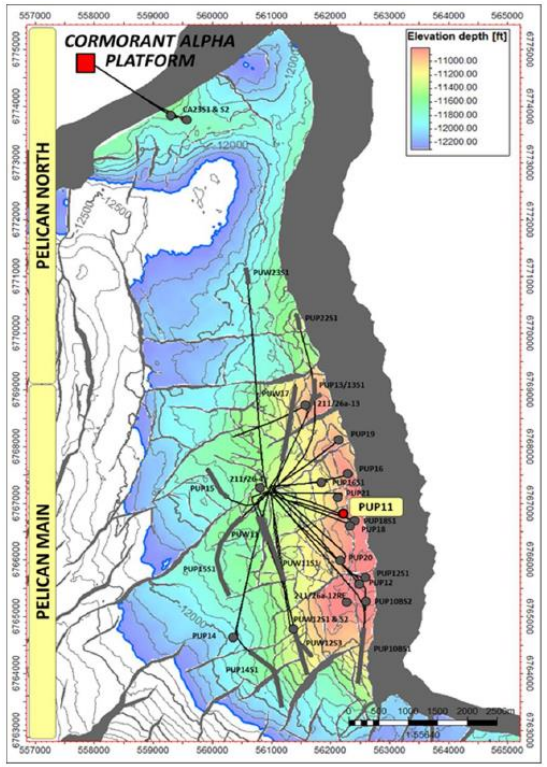
## Agenda

- Scope of Work
- Abandonment Design
- Annular Remediation Options
- Design Considerations
- Operational Performance
- Isolation Verification
- Conclusions

# Overview of Abandonment Scope




Scope:

- 4x PWC® Reservoir Barriers & 3x Intermediate Barriers within a campaign of 6 completed wells subsea (6x 9 5/8" and 1x 10 ¾")
- Rig: Paragon MSS1 semi-submersible
- Schedule: Planning commenced Q3 2017, Field Operations Q2 2018 – Q2 2019
- TAQA operated Pelican Field (sub sea development)

| Zone | Depth ft TVD SS |
|---|---|
| Hutton Sand | - |
| Hutton Clay | 2711 |
| Balder Tuff | 4278 |
| Shetland Group | 5823 |
| Shetland Clay | 6916 |
| Cromer Knoll | 9404 |
| Kimmeridge Clay | 10459 |
| Heather Clay | 10775 |
| Brent Group | 10895 |
| Dunlin Shale | 11176 |

# Abandonment Design

Compliance with:

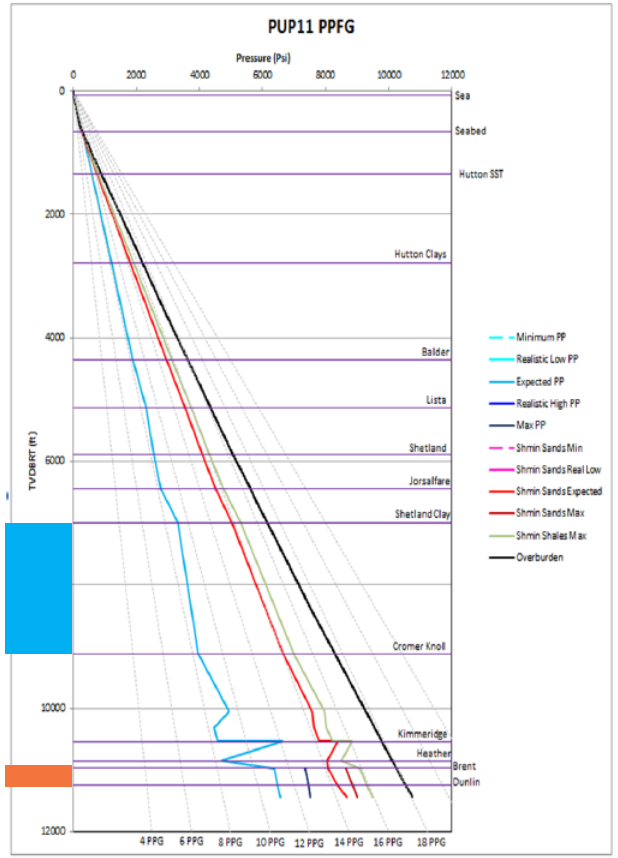
- Design & Construction Regulations (DCR)
- All Environmental Regulatory Systems for UKCS Operations
- Oil and Gas UK Well Decommissioning Guidelines (Issue 6, June 2018)
- TAQA Well Barrier Standard (TUK-11-B-009)

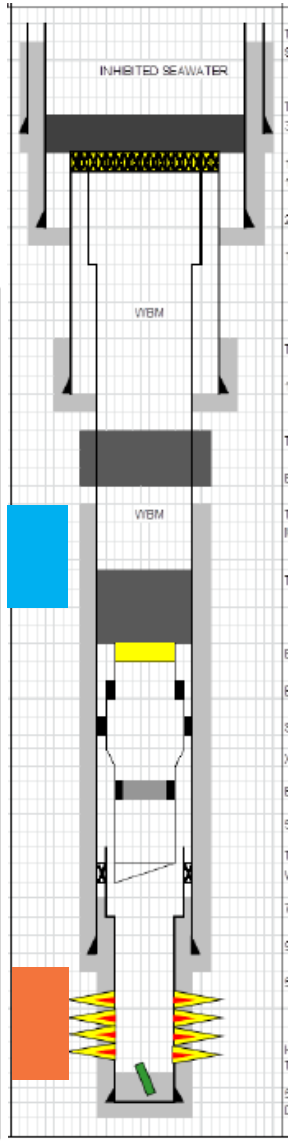
Anticipated Challenge

- Absent, Unknown or Poor Annular Cement above Production Packer due to limited historical CBL data

Risk Management

- Risk Register
- Review of PWC as acceptable method
- Peer Review & Abandon Well on Paper



# Annular Cement Remediation: Options

## Section Milling

- Time Consuming
- Swarf Handling
- Surface Modifications Required
- Damage to BOP’s
- Poor Performance due to rig movement & hence tool movement

## Cut & Pull Casing from Deep

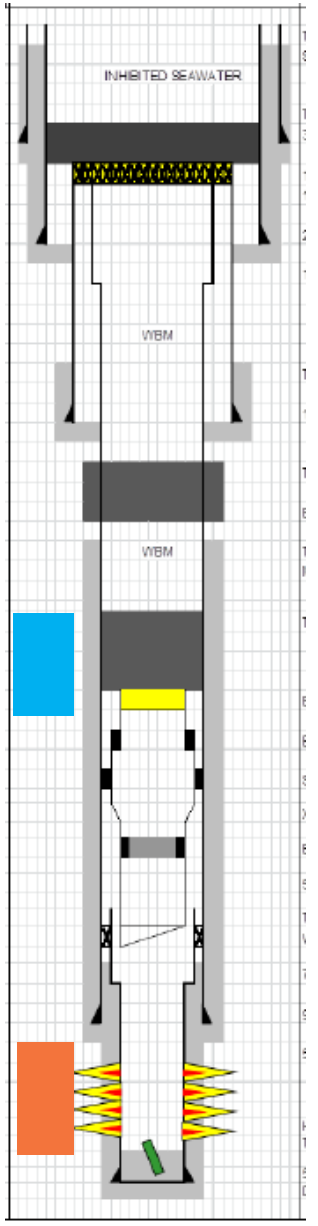
- Requires Spacer Hanger and Seal Assembly to be recovered prior to barrier being in place
- Requires Casing to be recovered from open hole – Can be very difficult in old wells
- Casing handling, backload & disposal at Surface

## Punch & Squeeze

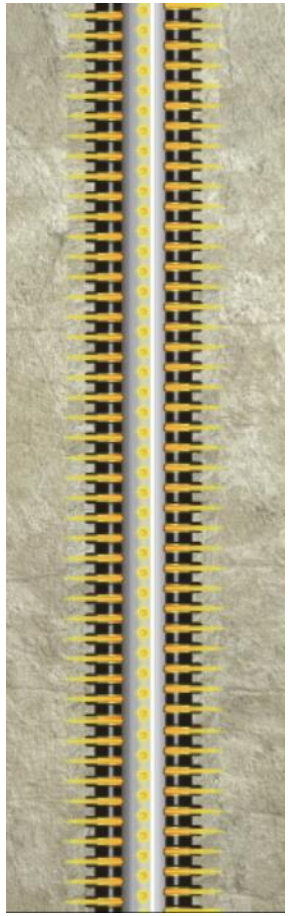
- No annulus Cleaning
- Limited cement placement

## PWC

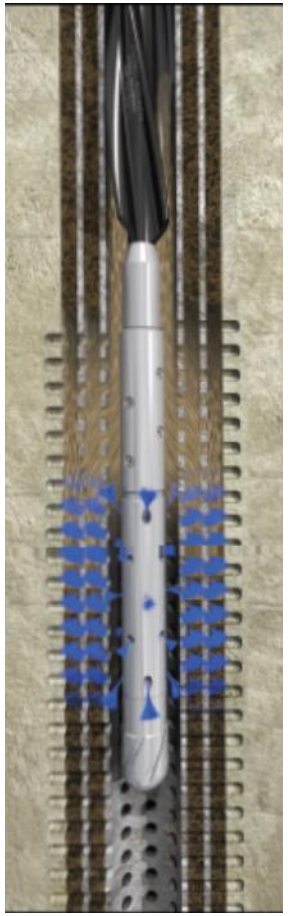
- Short Duration
- Field Proven
- Low Overall Risk



## Perforate



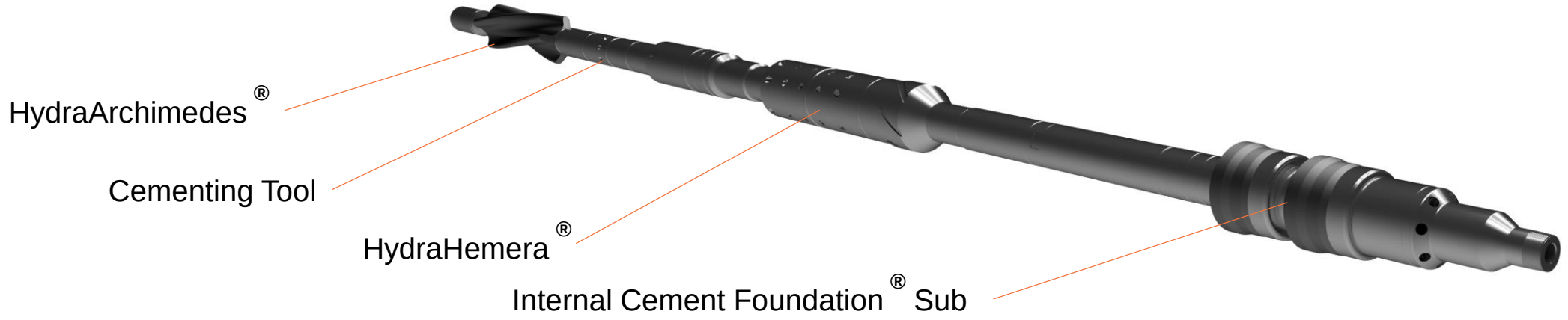
## Wash



## Cement

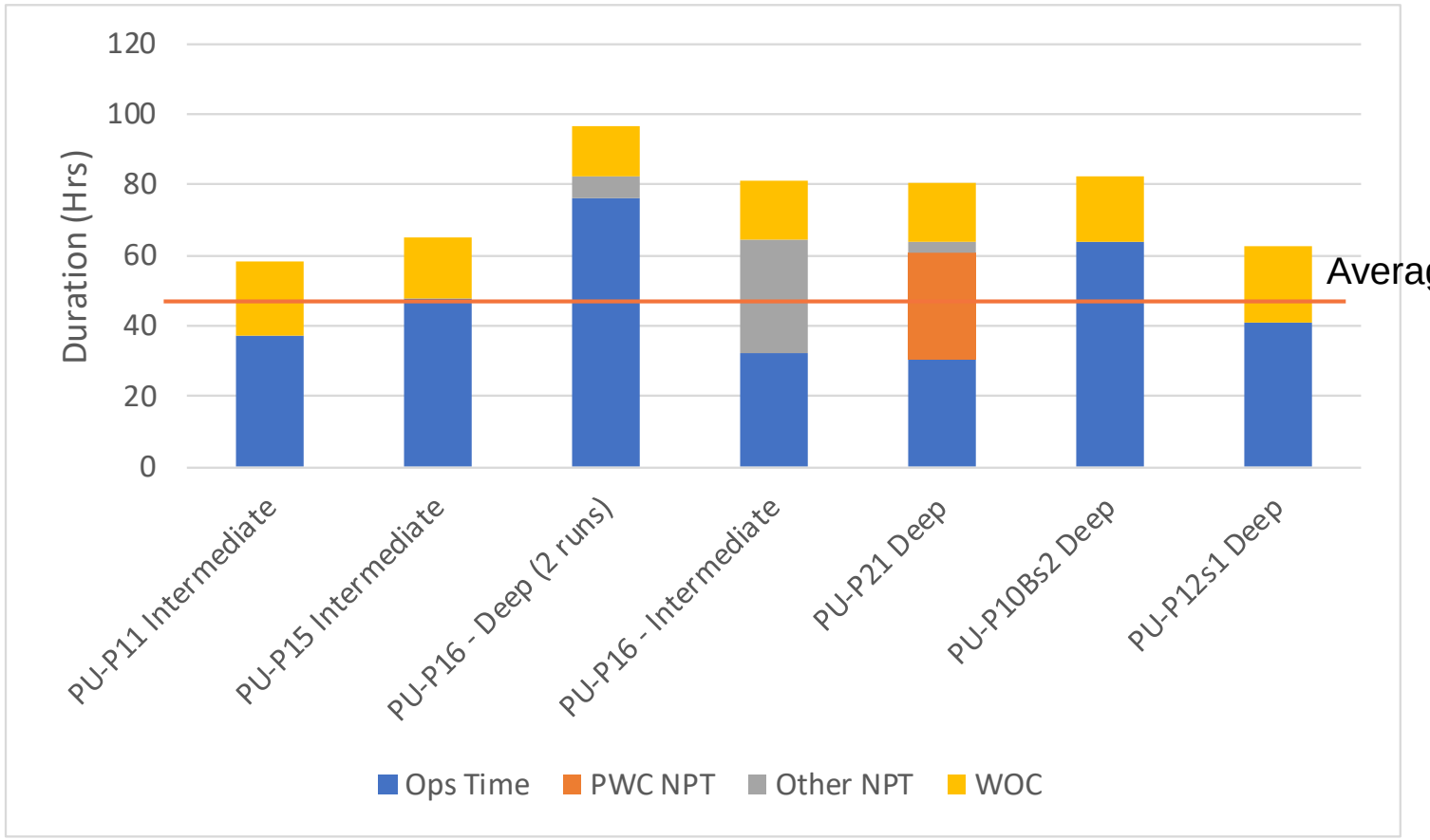
# PWC® Design Considerations

- Perforating
  - 18 spf x 200’ (5 of 6 run simultaneously with PWC® tooling)
- Fluids
  - 12.5ppg WBM Wash Fluid with surfactant
  - 14-14.5ppg Spacer, reduced to 13.5ppg for last operation
  - 16ppg Cement – Abandacem® -HT
- Tool Configuration
  - Internal Cement Foundation (ICF®) tool run and set below perforations
  - 30 wash nozzles and 4 cementing nozzles
- Operating Parameters
  - Wash at 450-500gpm, 2 passes at 1’/minute
  - Cement at 105gpm, pump-pull & rotate at 80rpm
  - 100bbl cement plug to give 800’ plug above perforations in main wellbore



## Operational Performance

- No H&S Incidents
- 1 unplanned discharge of Cement due to Perceived Operational Problems
- All 7 plugs fully passed Verification Tests: Tag, Pressure Test & Checklist
- 1 tool NPT Incident



## Isolation Verification

- Weight Tag: 10k lbs at expected depth
- Pressure Test:  500psi over leak-off for 30mins
- Operational Matrix Elements
  - Critical Deliverables from Pre-Job Planning
  - Well Conditions as required
  - Barrier Location definition
  - Post-Job Checks

## Conclusions

- Operational Success
- Consistent tagged TOC as anticipated, infers full annular cement volumes
- Removing Logging of Cement Quality reduces overall cost by:
  - Eliminating Charges for Logging Services & Associated Rigtime
  - Eliminating Ambiguity/Waiting on Decisions
  - Minimising Restocking Charges by Providing Certainty of Perforating Gun Useage
- TAQA will plan to use PWC® again for forthcoming UMC Abandonments

# Thank you

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