

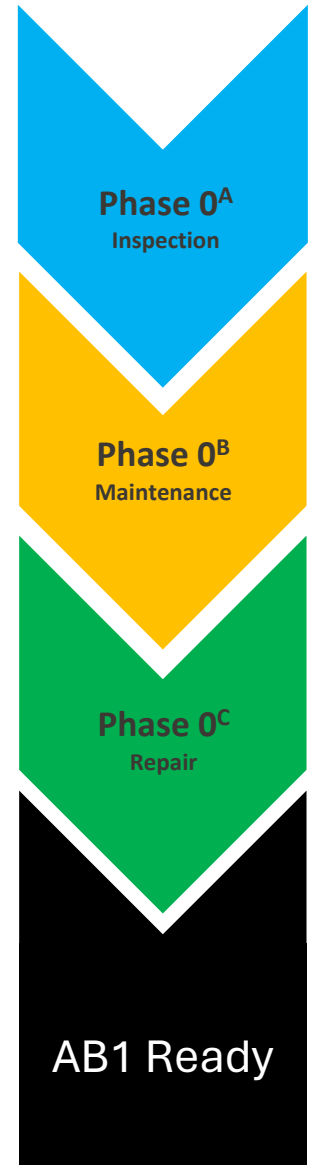
Phase 0 Integrated Verification & Well Diagnostics Package

Verifying near-surface integrity at the start of Phase 0 P&A operations helps to avoid unplanned cost, risk and downtime.



Agenda

- **Phase 0 – Scope**
- **Advantage & Benefits**
- **Typical Challenges & Enabling Technology**
- **Case History**
- **Questions**



Phase 0 - AB1 Preparation & Assurance

A Access & Condition & Verification

Inspection

- **Site Visit** - Visual Physical Inspection / Full integrity assessment
- **Quantity Survey** in support of Phase 0^B planning -
- **Mitigate** under / over estimation on spares and contingency levels in support of planning 0^B and, cost control and assurance

B Barrier Verification

Maintain

- Establish/Confirm full integrity envelope
- Full fabric and bolt maintenance, sealant injection

Actuators

- Inspect / Test / Repair / Replace

Tree Valves

- Inspect / Test / Repair


C Complete Integrity Verification


Repair

- Undertake repairs / remedial operations as identified in 0^B
- Phase-0 Assurance Level
- **AB1 Ready** ✓


Phase 0 - Advantages & Benefits


- Reduces operational risk and downtime potential
- Offline identification of potential issues and hazards for safer operations
- Reduces man hours and resources
- De-Risks AB1 planning, mitigating high level cost and operating exposure
- Identified material savings on contingent and unplanned costs

 **Actuator failure** - can result in costly delays due to access to the well - **6 Hours** not be fully open even when they appear to be externally.

 **Obsolescence - Failure of obsolete/aged OEM components** can result in **2 - 24 Hours** of replacement parts not available. Early identification critical.

 **Tree valve failure** - prevents rigging up onto well - **8 Hours**

 **Seized bolts or flanges/Tree Caps** can cause **6 - 48 Hours** of operations, resulting in additional equipment and machinery being mobilised

 **Corroded fittings, seized tiedown bolts and inoperable valves** can be hidden **6 Hours** of downtime

 **Sustained Annulus Pressure** leading to **8 Hours** of annulus milling and failure

Enabling Technology - Surface Intervention System



Concurrent-Remote-Restricted Access-NUI P&A

SIS Specifications

Max well pressure	5,000 PSI
Depth reach	30 m
Rod type	Hollow rod (shearable)
Additional features	Rotate function Data gathering functionality
Assembly weight	3000 lbs / 1361 kg
Assembly height	127" / 3.226 m
Hydraulics pressure	3,000 PSI
Connection flange	5 1/8" 10M API 6A BX169
Product specification level	PSL 3G
Trim level	API 6A DD
Lifting connections	2x 4.75 Te SWL Lift Points
Max push capacity	70,032 lbf / 324,907 N
Max pull capacity	44,392 lbf / 197,465 N

- Apply alternative process & methodology
- Commit to reduced POB
- Expand operational efficiency and bandwidth
- Deploy enabling technology

Enabling Technology – Compact Shear Seal - CSS

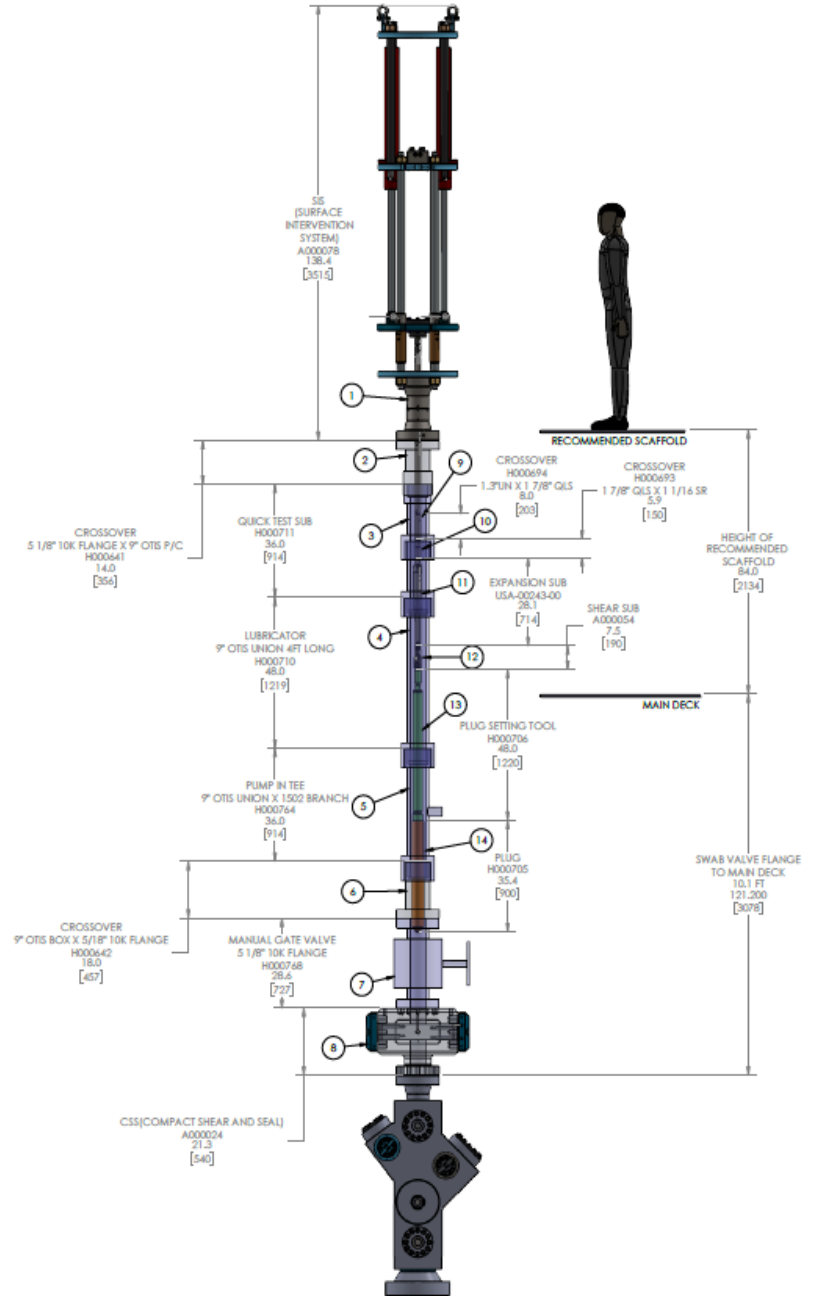
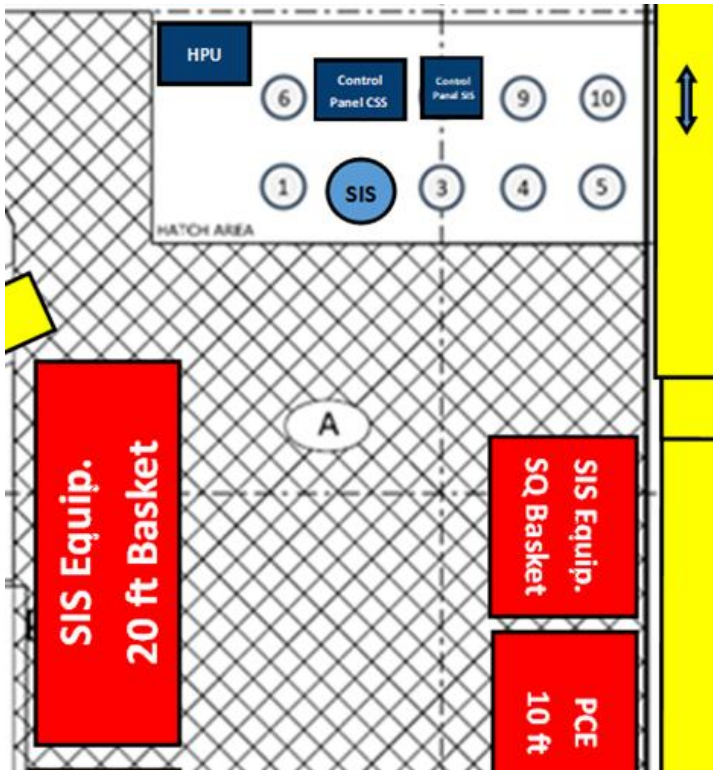


Benefits

- Compact design to permit use in tight spaces
- 40% lighter than conventional BOP design
- Technology platform for Triple/Quad BOP
- High load shearing capability
- Field redressable
- Replaceable rams for varying applications

SIS Plug & Tree Removal

Reducing deck space and lifts



Surface Intervention System

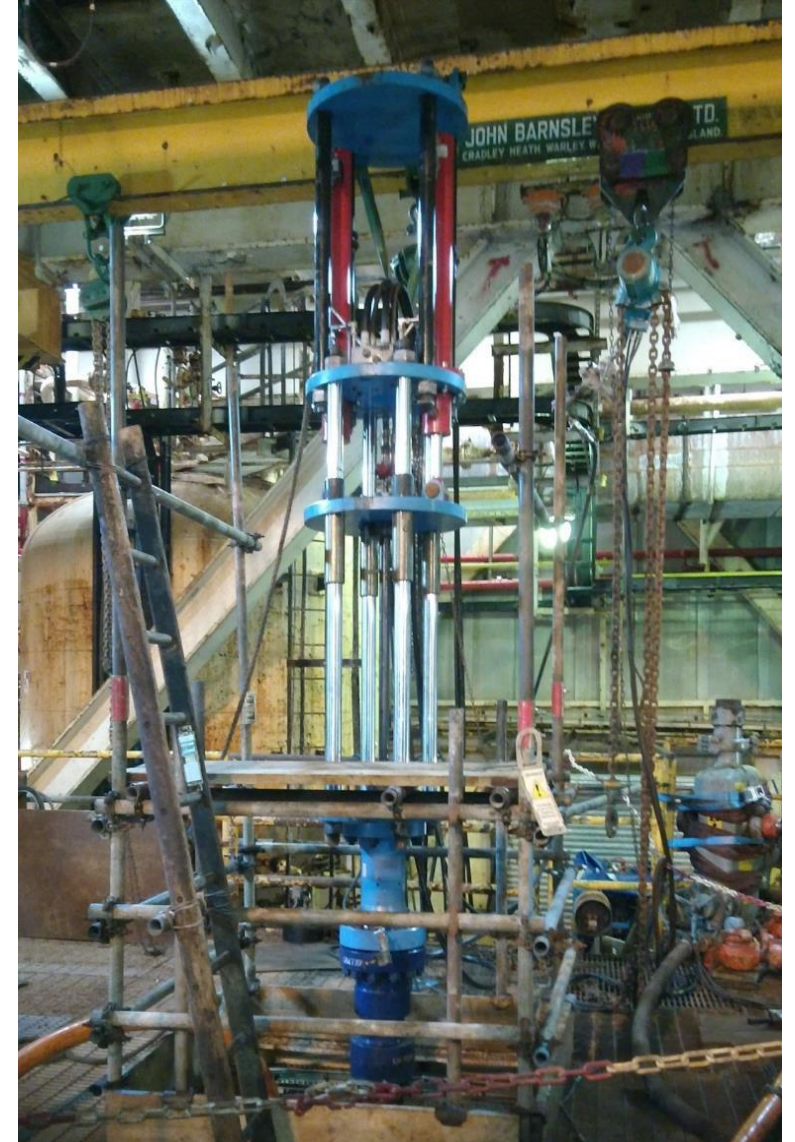
Case History - Multi-Well P&A

Case Study - Pre-Abandonment Operations:

- UKCS multi well campaign - set shallow plugs in to allow tree removal
- POB - 2 wellhead technicians covered complete scope including suspension flange installation
- 40% savings over conventional methods (personnel, equipment, shut in time)
- SIS package deployed under the mezzanine deck
- Autonomous standalone operations – Rig free

Key Benefits:

- Multi-skilled Reduced POB
- A-frame crane used, made operations completely autonomous from platform
- Minimised offshore operations by pre-making up multiple connections onshore and testing



Autonomous Applications



**Under Deck –
Restricted Access**



**Ultra Compact
Shear Seal**

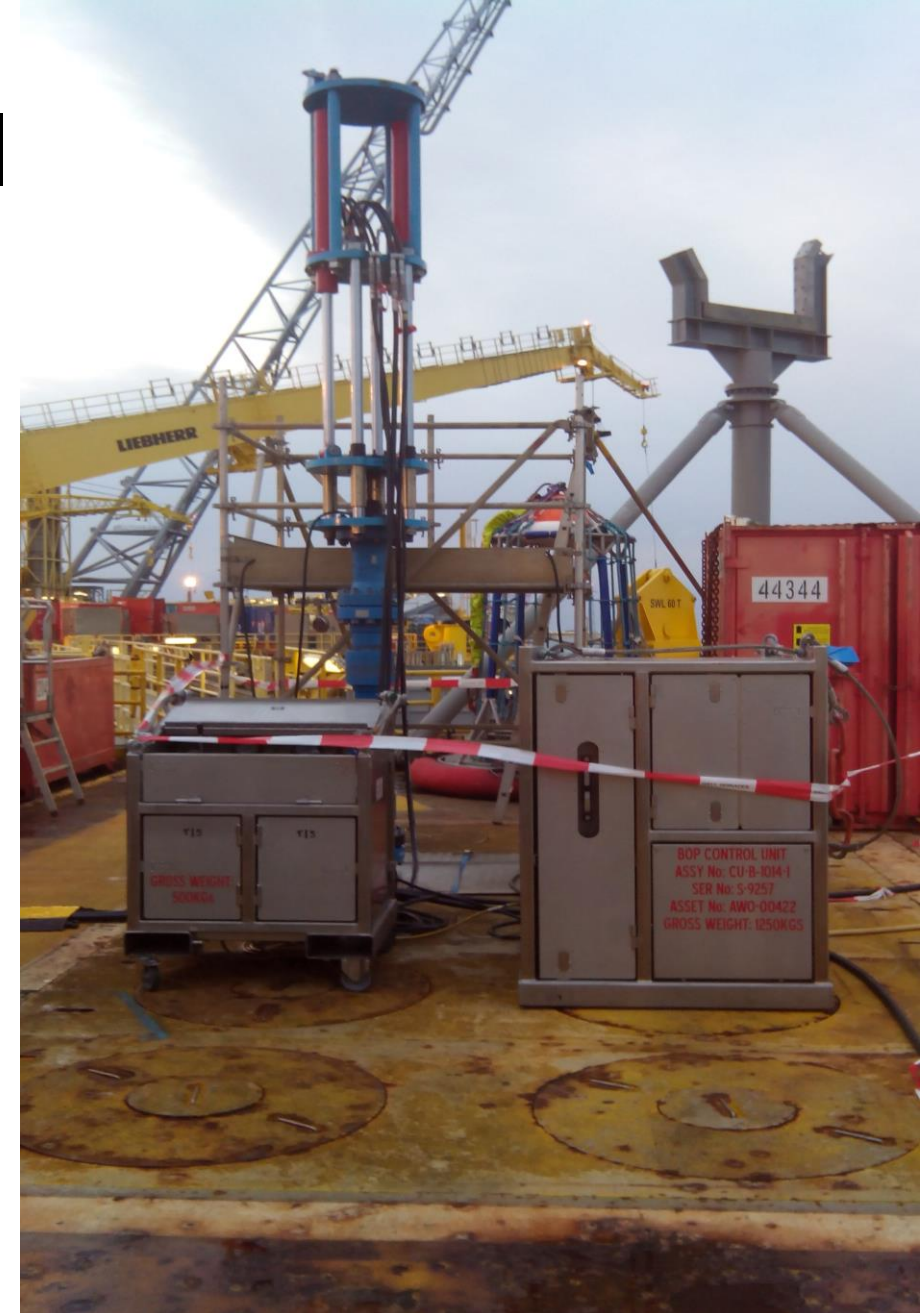


**Fits Thru Small
Hatches**



Reduce and Mitigate Operational Risk

- Collaborative relationship formed with our in-house Fiber Optic group providing Realtime downhole diagnostics
- Combining an enabled and reduced, multi-disciplinary POB where the functional operational whole is greater than the sum of the parts
- The complementary well surveillance and diagnostics provides crucial information to inform P&A strategy and reduce or, eliminate contingency costs
- A lower POB and compact solutions secures a reduced CO₂ footprint of operations is with
- Supply Chain considerations - A single contracting interface



Phase 0 - A Full, Simultaneous Wellhead-Wellbore Health Check

- Identify and confirm source of leak(s)
- Enables Data Driven decision and drives material ABEX reduction
- Reduces man hours and resources – 60% reduction in operational POB
- Reduce/eliminate traditional wireline operations
- De-Risks AB1 planning, mitigating high level cost and operating exposure



Well Example

Scenario – Suspected deep set plug leak, pressurised annulus and failed UMV
– Assumed Day shift only

Day 1

- Technicians perform Tree & WH Inspection
- Confirm Well Barriers and Access
- Rig-up SIS/FLI Universal PCE
- Launch FLI
 - Confirm Deep Plug Integrity
 - Diagnose Annulus Pressure Source

Day 2

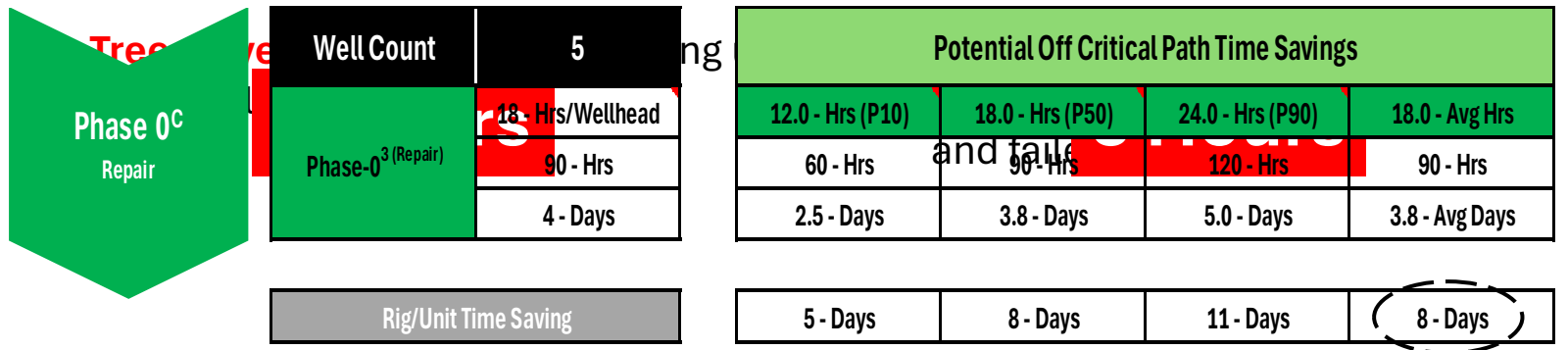
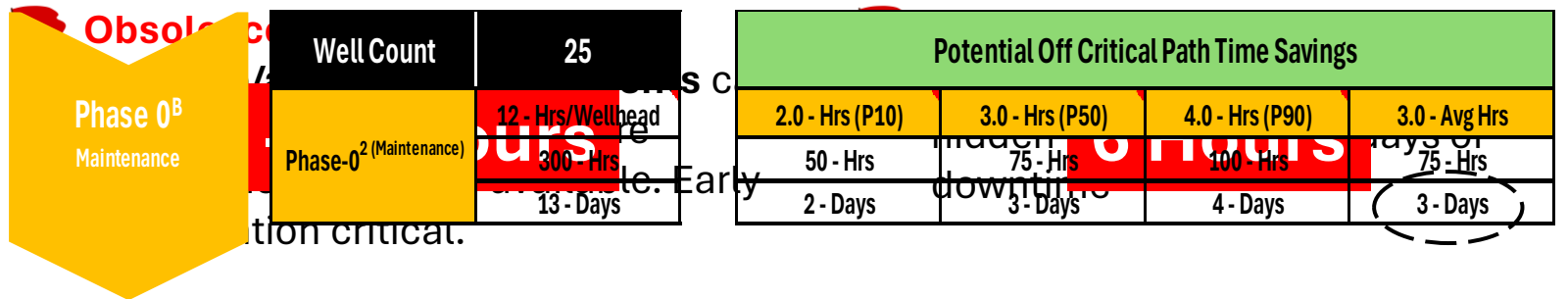
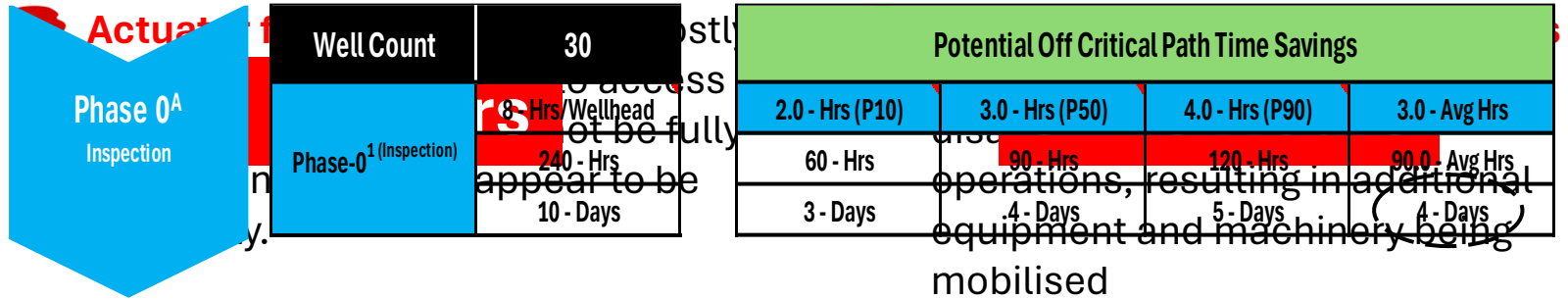
- Rapid Response FLI Data retrieval
- Rig down FLI/Rig Up SIS
- RIH set Plug of Choice
- Perform UMV Repair
- Rig down SIS & PCE
- Prepare tree for removal

Day 3

- Remove Tree
- Install Suspension/Trash Cap

Summary

- Access and Integrity Assurance ✓
- Reduces and controls operational risk and potential NPT ✓
- Offline identification of potential issues and hazards for safer operations ✓
- Reduces Operational hours and resources ✓
- Identifies material savings on contingent and unplanned costs ✓
- De-Risks AB1 planning, mitigating high level cost and operating exposure ✓



Questions

Thanks to Colleagues

- Stuart Slater
- Ian McGilvray
- Kevin Rose

