SPE Well Decom 2025, 11th June 2025

SPE International
Aberdeen Section

WELL-SAFE SOLUTIONS

Managing the Complexities of P&A

Pete Savage

Well Abandonment Superintendent, Well-Safe Solutions

Managing the Complexities of P&A

Presentation Outline

- **Differences Between Well Construction & P&A**
- **P&A Challenges: Unplanned Occurrences:**
  - Life Cycle Unknowns
  - Lost Or Missed Data
- **Management Of Change (MOC)**
- **Minimising Consequences**
- **Case Study 1 (Platform)**
- **Case Study 2 (Subsea)**

Schooner Platform, SNS (well bay following successful P&A campaign)

Well Construction vs. P&A

What's The Difference?

Well Construction:

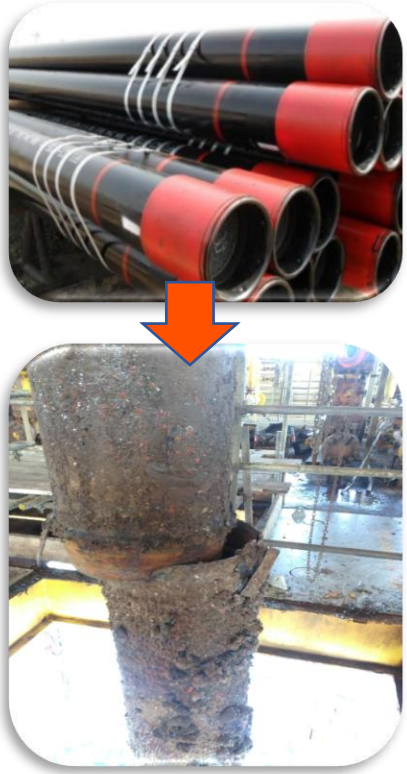
- New components
- Subsurface understood
- Majority of contingencies are programmed

MOC Light

Plug & Abandonment:

- High potential for unknowns
- Tooling availability
- Potential requirement for a bespoke solution

MOC Heavy



20" conductor installed in late 1980's

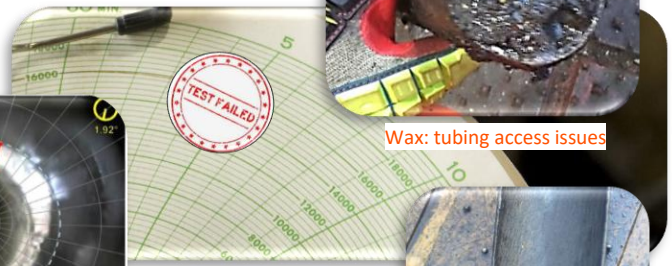
SSXMT installed in late 1970's

Potential Unknowns: Life Cycle

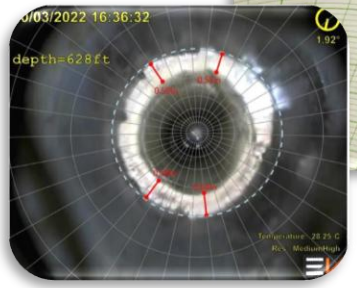
Well Issues Waiting To Be Discovered

- Erosion / Corrosion / failures / blockages / deposition of solids, subsurface anomalies…
- Increased risk via:
  - Well use beyond design life / poor operating practices.
  - Years of P&A deferment (extended suspension).

Wax: tubing access issues

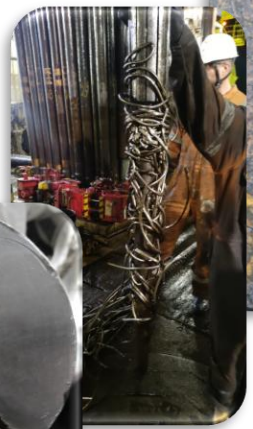


Failed integrity tests



Scale: tubing access issues

Corroded tubing fish – cut from spear on rig floor



Fished control line (tubing corroded)

Minimising The Chance & Consequence Of Surprises

- Contingency Planning
  - Experienced engineers
  - Adequate time
- Collaboration
- Lessons learned
- Peer review

Failure to drift – hang up at tubing hanger

LIB impression following drift failure

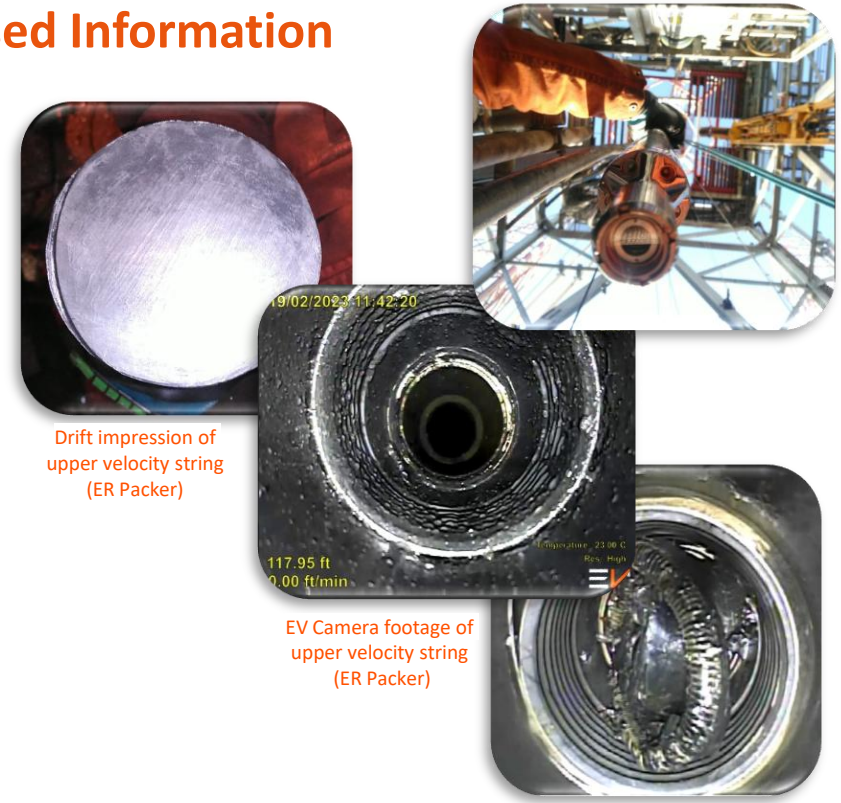
Potential Unknowns: Lost or Missing Data

Poor Reporting / Bad Record Keeping / Missed Information

- Increased risk with years of P&A deferment (extended suspension)
- Poor record keeping, poor digitisation
- Low level of diligence / rushed data mining
- People move on, teams are disbanded

Minimising The Chance Of Missed Data

- Highest level of diligence at SELECT & DEFINE phases
  - Ask questions of the data, is there more?
- Data mining by experienced P&A Engineers
- Seek out individuals with site specific experience
- AI data searches



Drift impression of upper velocity string (ER Packer)

EV Camera footage of upper velocity string (ER Packer)

EV Camera footage of lower velocity string (ER Packer) after recovery of Upper VS / ER Packer.

Management of Change – Why?

A Systematic Approach

- The goal is to protect our personnel & the environment from harm that could arise during the implementation of change
  - MOC & Risk Assessment forces team to take a step back & look at the bigger picture
  - Potential benefits need to be weighed against the risks
  - Approval should be appropriate to the level of change

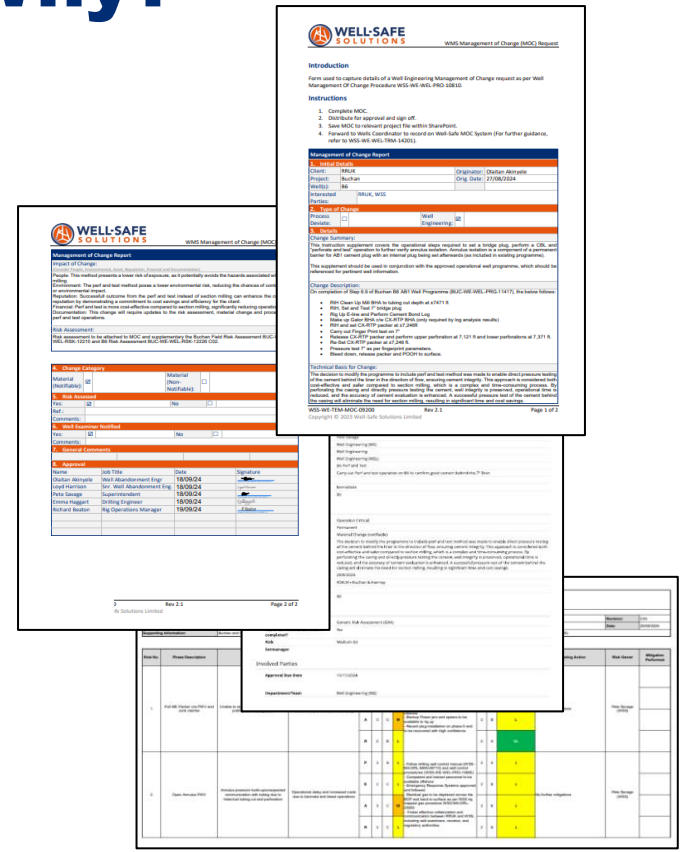
Thought Process

Assess situation - what risks might the change introduce?

Are risks short-term or long-term?

How can risks be mitigated?

How should we communicate change & associated actions to team & stakeholders?



Well-Safe Management of Change (MOC) Documentation

Management of Change – How?

Operational Teams

- Recognise that change has occurred
- Understand your remit for change based decision making
- Guard against a “groupthink” & indifference
- Be prepared to STOP while change is appropriately managed
- MOC to Programme standard

Weak MOC Process: Dangerous

Fit for purpose MOC

Heavy MOC process: Expensive

The System

Staged

Appropriate level to potential consequence of change

Assurance

Can we confirm actions are implemented

Time Appropriate

When should MOC/ dispensations be reassessed?

User Friendly

Auditable

"Compound" Management of Change

How Do We Ensure Interacting MOC's Account For Each Other?

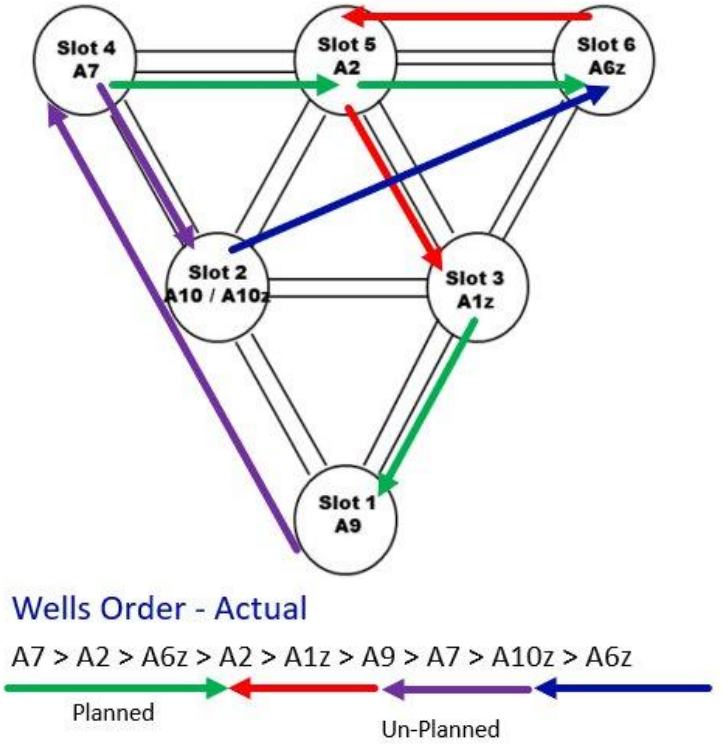
- **The first step is Recognition**
  - Have multiple changes altered scope?
  - Are multiple MOCs in place at same time?
  - Could the Programme be revised/re-issued (to remove MOC's)?

- **Take the Time**
  - Understand cumulative MOC interactions
  - Are mitigations fit for purpose beyond the individual MOC
  - Review documentation, discuss with appropriate stakeholders, revisit assumptions

Minimising Consequences

Safely Minimising The Consequences Of Unplanned Events

Back-up	➢Alternative wells ready to go
Collaboration	➢With the vendor/service community
Communicate	➢Stay on the right side of the Regulator
Contingency	➢ Cost / Risk benefit ➢ Understand limitations (what you haven't got) & lead times
Resources	➢Are contingency engineering resources available?
Self Sufficient	➢Be as standalone as possible



Schematic to show well order changes due to well challenges (Case study 1)

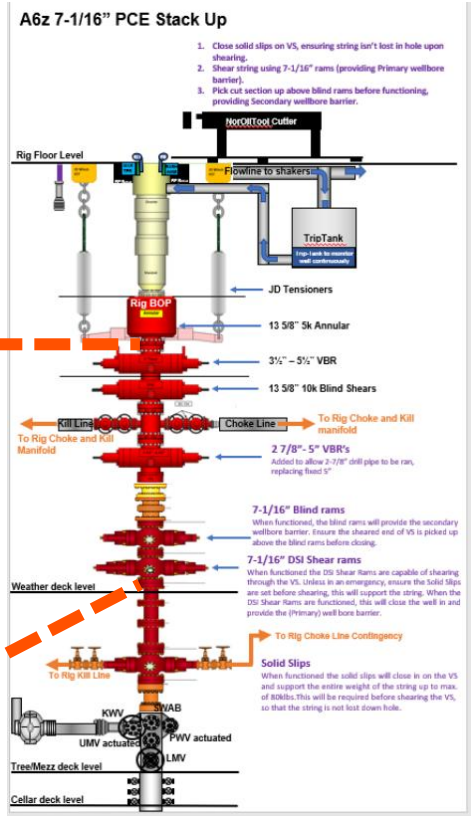
Case Study #1

6 well NUI SNS (drilled late 80's)

- Platform integrity challenges
- Multiple changes in planned well order due to "unknowns":
  - Failed HMV actuator
  - Issues with SSSV HOS
  - Hung up with initial drift at tubing hanger
  - 20" coupling failed during cut and prove operation
- **66** formal MOCs, **19 on one well!**

Parted DSL (digital slickline)

Failed 20" conductor couplings



Bespoke BOP: (7 1/16" rams integrated into rig BOP stack)

Case Study #1

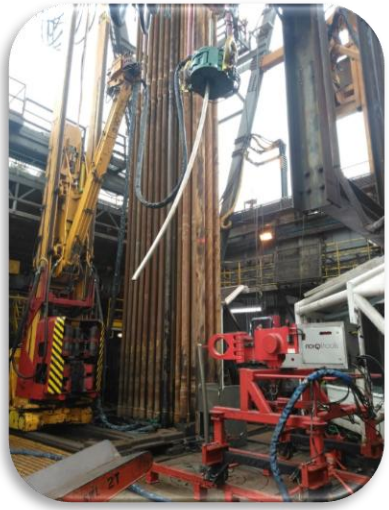
What Went Wrong?

- Insufficient infrastructure & wellhead maintenance (NUI)
- Poor record keeping
- Conductors out of design life

What's The Consequence?

- Time & cost
- Risk to personnel

Recovered velocity string (coiled tubing)



Velocity string recovery (tubing shear)

Clear conductor guides

Case Study #2

9 well subsea P&A (drilled late 70's / early 80's)

- Multiple failures of XMT functionality & integrity:
- Inability to bullhead tubing &/or annulus (or very low rates)
- Integrity issues with casing / seal-assemblies
- Known & unknown legacy tubing restrictions (mechanical fish, wax and scale)
- Incorrect information regarding downhole equipment configuration (e.g. Insert safety valves / DSHV lock-open status)

Recovered National SSXMT installed in 1979
c/w newly installed ROV panel

Case Study #2

What Went Wrong?

- Early generation subsea XMTs operational years beyond design life
- Poor operational practices during lifetime of field?
- Infrequent intervention
- Delayed P&A / extended suspension
- Poor record keeping

What's The Consequence?

- Significant additional time & cost
- Increased risk of incident, particularly:
  - Well control
  - Environmental

Gate valve milling to gain well access (recovered coupon)

Managing The Complexities Of P&A

Deferment increases complexity (cost)

Don't underestimate complexity

Engage early & support the highest level of diligence

Close relationships with supply chain are critical

Lessons Learned

Not just a database

Value & seek out experience from your teams & partners

Alternative Options

Ability to move on while working up a solution?

Think outside of the box!

Management of Change is a Mainstay of P&A Operations


WELL-SAFE
SOLUTIONS
Thank you
Any questions?