

Introduction

Blowouts show **Human and Organisational** factors as primary causes

- **Industry Standards**, both corporate and International give good guidance to prevent MAE's.
- **Regulation** sets out expectations to protect people and the environment

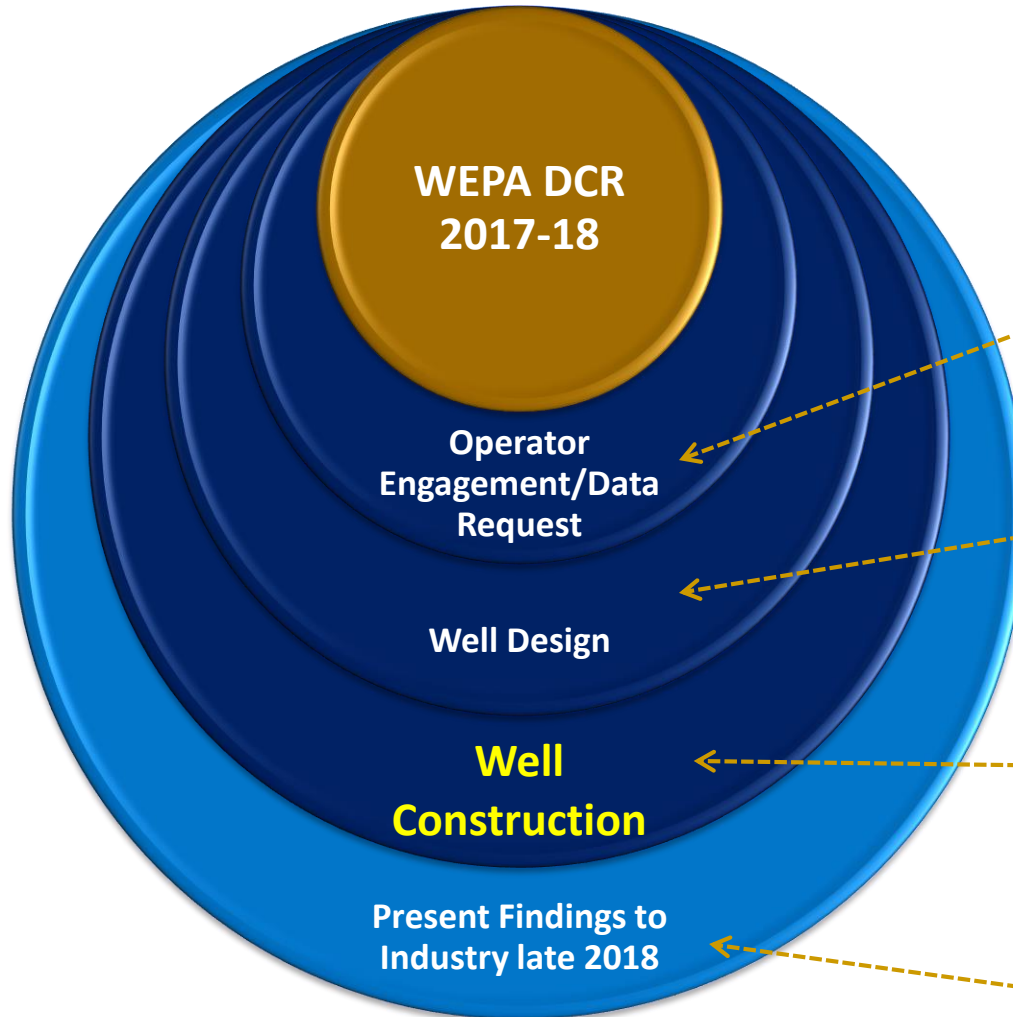
Loss of control events still happen:

- Incorrect Prognosis
- Barrier Failures
- Exceeding design constraints
- Human error
- Failure to learn
- Poor sharing

Design is not the issue with some exceptions.. failures are in **execution**.

*Operators are not short of data, but are short of **access, timely, quality, transparent analysis** of the data, particularly of trends – **This is a resourcing and organisational choice***

WEPA Process



Key Elements

1. WEPA DCR Introduction
2. Identify candidate well(s)
3. DNRM data request

Review Regulatory Compliance:

4. Operator Standards
5. Well Design & Planning
6. Rig Selection
7. Specialised equipment selection (e.g. MPD)

Monitor:

8. DDRs
9. MOCs in drilling
10. Well barrier validation
11. Well Incident (if any)
12. Well suspension/abandonment

Drilling outcomes:

- Technical challenges, lessons learnt, innovation

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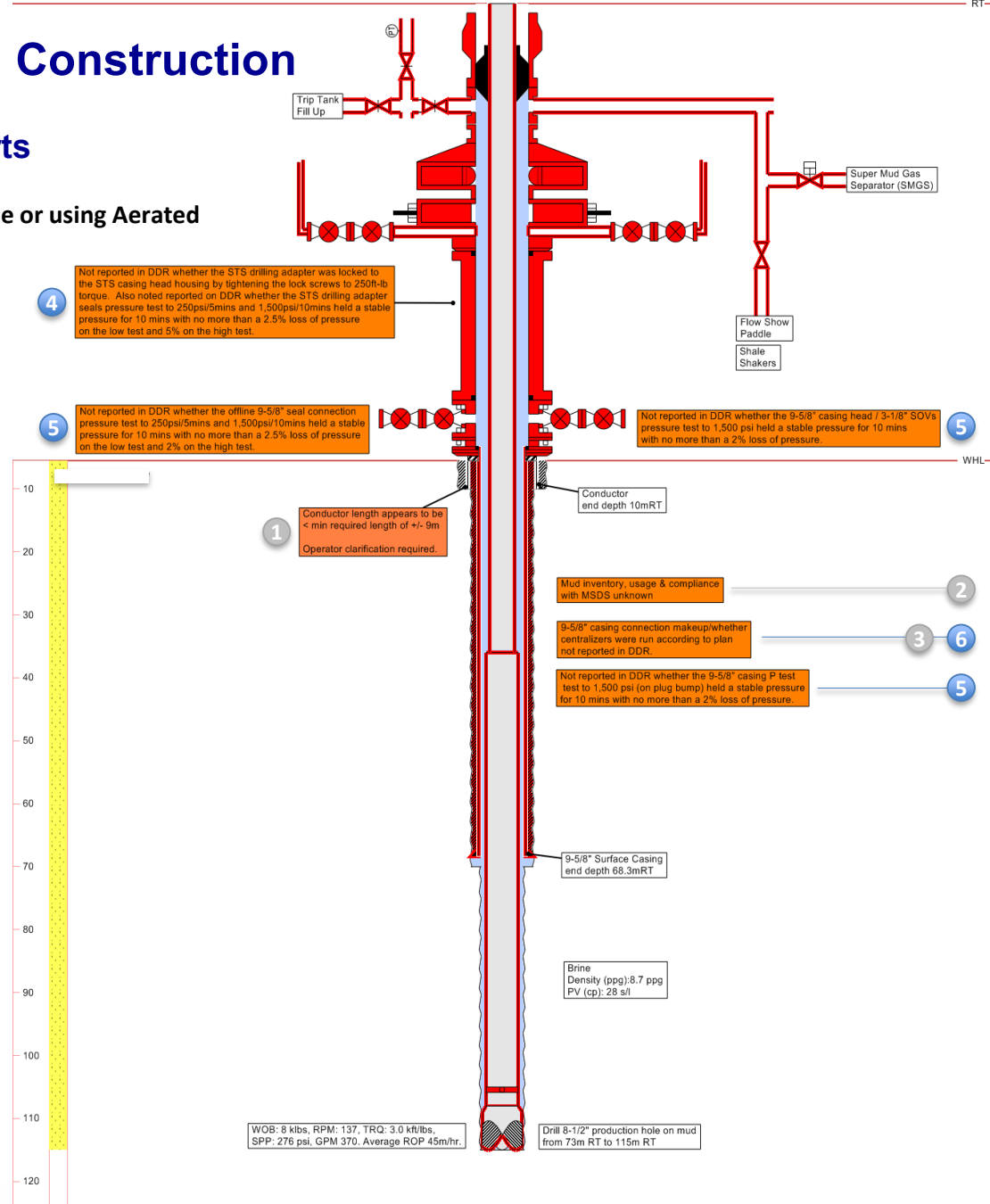
PGI Daily Barrier Assessment – based on Operator DDR and other reports

Activity: Drill 8-1/2" hole section to TD in conventional mode or using Aerated drilling (contingency)

Primary Barrier(s)		
Barrier Element Type	Display Name	WI Status
Fluid Column	8-1/2" Drilling Fluid	!
Secondary Barrier(s)		
Barrier Element Type	Display Name	WI Status
Drilling Adapter	9" STS Drilling Adapter	!
Casing	9-5/8" Surface Casing	!
Casing Cement	9-5/8" Surface Casing Cement	!
Drill String & BHA	Drill String	✓
Drilling BOP	Drilling BOP	!
Stab-in safety valve	Stab in Safety Valve	!
Wellhead Spool	9-5/8" STS Casing Head Housing & SOVs	!
MPD System	MPD System	!

Additional Barrier Verification Comments:

- Unknown** whether the STS drilling adapter was locked to the casing head housing by tightening the lock screws to 250ft-lb torque.
- Unknown** whether P tests were "stable" as required by the Drilling Program (4.11):
 - Offline 9-5/8" seal connection P test
 - 9-5/8" casing head & 3-1/8" SOV P test
 - 9-5/8" casing P test (on plug bump)
- Unknown** whether the 9-5/8" casing centralisers were run according to plan



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PGI Daily Barrier Assessment

Daily Integrity Report (DIR)
[sent to operator](#) as part of
 compliance check

Queensland Government		Daily Integrity Report																																														
Well, Hole Section and Activity Summary																																																
Well	Description		Status																																													
Well Section	South Storage 2		In Progress																																													
Hole Section	17 1/2" Hole Section		In Progress																																													
Activity	Install and Plug B & C section Wellhead Assembly and 12 1/2" BOP		Completed																																													
Report and Well Data Details																																																
Report Number:	11	Actual Air Gap (m):	6.75																																													
Date:	26/04/18	Actual Ground Elevation (m):	377.00																																													
Spud Date:	22/04/18	Current (MDC):	390.00m																																													
Spud Time (h:m):	0400	Current (TVD):	390.00m																																													
Country:	Australia	Plan TD (MDC):	390.00m																																													
Permit/Access:	PL 102	Plan TD (TVD):	390.00m																																													
Rig:	Rig 106																																															
Wg Manager:	Wade Starling	Current Hole Size:	17.000in																																													
Day Rig Supervisor:	Todd Sullivan	Casing ODI:	18.875in																																													
Night Rig Supervisor:	Jan DeGugler	Casing MDC:	367.50in																																													
Drilling Contractor:	Sustarwell	Casing TVD:	367.50in																																													
Wellsite Geologist:	-	TOL MDC:	-																																													
Rig Drilling Engineer:	-	TOL TVD:	-																																													
User Show MDC:	-	User Show TVD:	-																																													
Operations Summary																																																
Current Op:	3460	Drilling out the surface show track.																																														
24-Hr Summary:	<p>Finalised pre-testing the BOPs connections after riggle up. Conducted successful accumulator closing & pump-up tests in accordance with AP53. Installed the lower wear loading seal in the B section. Made up & function tested the PRL sub at surface, prior to making up the BHA. Made up the 12 1/2" Dynamis 141, Power Drive BOP, 28 R33 & remaining intermediate, packed hole BHA to 100mMD. Conducted a successful shallow hole MWD/LWD test & continued to run in the hole to 1420mMD. Washed down the test stand of drill pipe & tagged the TDC plug at 1013.00mRT with 560s. The static bottom hole temperature was recorded at 115.37 Celsius with 800gms required for communication to the Pathfinder tools. Performed a baseline/footprint test to 1200m 20ppg 8MM, pumping at 0.2864/mph with the Halliburton cement unit. A rig service was conducted to replace the heavy HCR hydraulic control valve on the accumulator due to it bypassing. The issue was required to be troubleshoot further which identified that the hydraulic HCR valve on the BOP was causing the bypass issue, not the heavy HCR hydraulic control valve on the accumulator. Ripped down the choke line & replaced the hydraulic HCR valve on the BOP.</p>																																															
24-Hr Planned Ops:	Conduct GCT & drill ahead 12 1/2" intermediate hole.																																															
Barrier Element/ Secondary Traps/ Light Status		Reduced Air-Bell Wellbore Diagram																																														
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<p>Wellbore Diagram Comments: WB Diagram updated as of 2018 for on 26/04/18.</p>																																																

Preliminary Findings of the WEPA

Standards

- General compliance but Individual exceptions
- Notable **failure to comply by smaller independent operators** – use of consultant drillers struggling to build standards from scratch.

Well Design

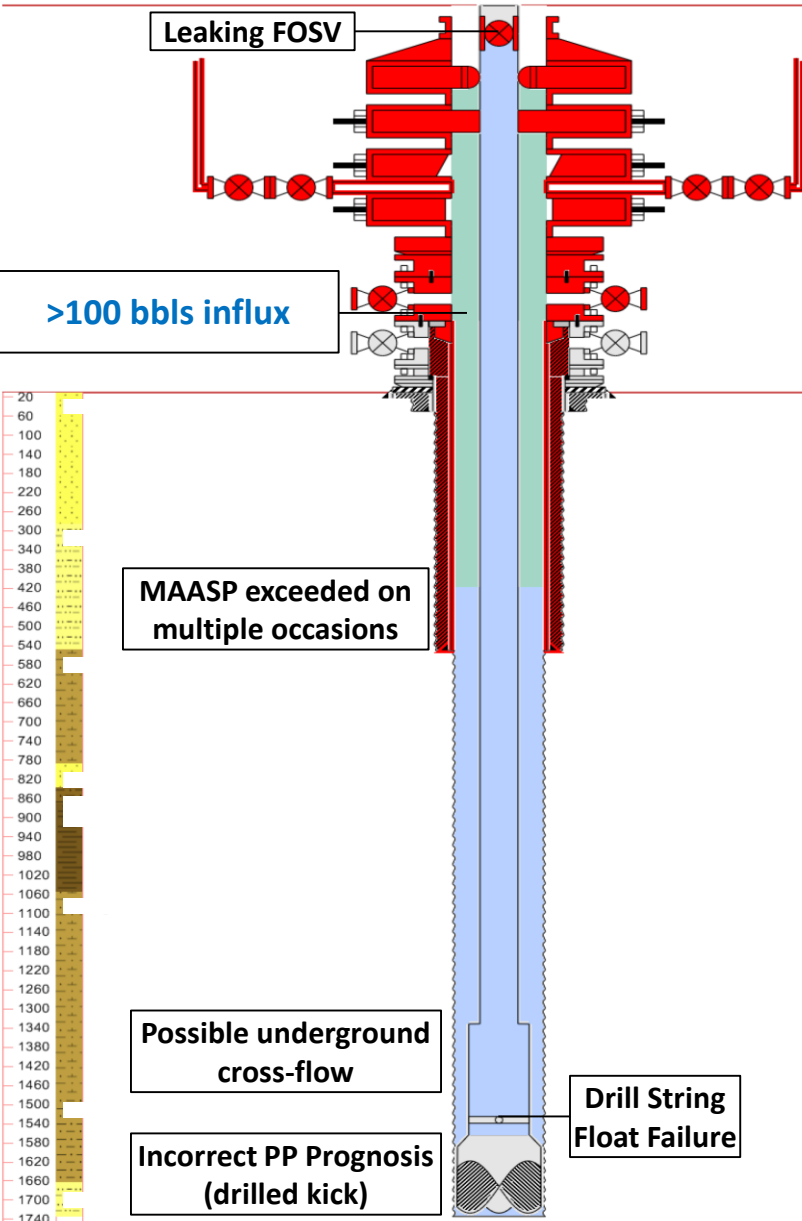
- Common risks taken in design choices, particularly casing
- Finalised **very late – impact on risk**

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- Close monitoring and feedback beneficial to regulator and operator
- The **Daily Drilling Report (DDR)** focused is **performance and OHS not MAE**
- **DIR** did give regulator and operator insight into **escalating** non compliance risks
- Supporting data/evidence often lacking to demonstrate compliance with operator own standards
- One example of **major failure of kick detection** systems/human error – typically unreported outside of the WEPA

Major failure of Kick detection systems/Human error

RT-



Unable to pressure and function test BOPE per API Std 53 requirements due to on-going well control situation (>21 days)

Risk of BOP ram seal failure due to prolonged exposure to gas/liquid combination in annulus

PRELIMINARY KEY FINDINGS of Well Control Incident (WCI):

1. **PP prognosis failure** – drilled underbalance into overpressure hydrocarbons, causing large influx initially undetected and consequent risk of catastrophic loss
2. **Failure of kick detection systems/Signal negligence** Kick was not detected and BOP closed > **100 bls** influx.
3. **DDR report** – DDR contains insufficient information in a well control incident to interpret well integrity condition and risk development during recovery operations.
4. **Decision-making process** – Decision making and impact/risk assessment to prevent escalation to an MAE is not clear
5. **Heightened Risks to personnel and environment inevitable in a serious WCI**– risk of underground blowout, gas broach to surface, and uncontrolled flow through drill string or via annulus due to human error and/or loss of barrier integrity
6. **Daily Integrity Reporting by regulator (DIR)** – facilitating deeper learnings around the incident through transparency, which will benefit industry

Preliminary Conclusions of the WEPA

1. Some evidence of **failure to follow approved plans** during execution, particularly when problems develop. **MOC's do not tell** the complete picture
2. Daily Integrity system approach created **transparency** when deviations occur, and forced better management response.
3. WEPA programme showing potential to **reduce MAE risk** through transparency by encouraging operators to consider recovery operations more **evidence and analysis based**.
4. The WEPA process has important implications for **Oil and Gas wells** but also emerging **Geothermal well** projects where, due to current absence of global standards, compliance challenges exist
5. Blowout **underwriters supporting WEPA/DIR** programme as useful contribution to reducing MAE

VISION.....

- Use a harmonize WEPA approach across Australia States and Territories' regulators
 - Use a similar WEPA approach across several International regulators, Asia Pacific Region & ANZAC.
 - This would create a limited but global barrier validation best practice and potential failure data base for well construction
 - Include all critical component failures affecting well integrity
 - Aligns the safety of 'Wells' industry with aviation by sharing failure events globally cutting across national and corporate boundaries
 - *Regulators could show the lead as in Queensland in a limited scheme Operators may follow and create a truly global "Deep Learning" System!*

- *Set up an equivalent of the NTSB/AAIB specific to wells industry to investigate Loss of well control MAE's.*

Thankyou

Extra Slide

Introduction contd.

Queensland has an intensive wells programme particularly for CSG in the last several years, which will continue and grow again due to domestic gas demand, but does not have permissioning or wells examination regulations.

A 'Code of Practice' for Wells design and construction is in force, co-written by operators and the regulator, as enshrined in the regulation.

CSG and Petroleum Wells Drilled in Queensland

