NOPSEMA | Australia's offshore energy regulator

Industry Update

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Prevention of Well Control Incidents
Problem Statement

Which Problems are being tackled

IRF and industry have prepared the following 3 problem statements to be addressed collaboratively

Prevention of well control incidents

- Greater emphasis on "left hand side" of well control bow-tie, particularly with regards to PPFG prediction and monitoring
- IRF contact: NOPSEMA (Australia)

Investigation quality / sharing & application of learnings

- Improve investigation quality and improve ways to embed learnings
- IRF contact: ANP (Brazil)

Digitalisation

- Reducing risks from automated systems with a human-centered design approach
- IRF contact: PSA (Norway)

Background

A significant number of serious well control incidents have been caused by over-reliance on the pre-drill pore pressure prediction and failure to detect and respond appropriately to an underbalanced situation.

Such well control incidents have potential to escalate into surface blowouts with catastrophic safety and environmental consequences.

IRF first communicated this problem to IOGP & IADC in the form of an “IRF Problem Statement”. The problem was refined and is currently being actioned by IOGP-led task force.

The purpose of this briefing pack is to share the problem statement and how it is being actioned with IRF members.

Examples of the problem

From 2014 – mid-2021, 8 well control incidents shared by IOGP had similar causes:

- **Overconfidence in the pre-drill pore pressure & fracture gradient (PPFG) prognosis**
- **Actual PP >> pre-drill prediction**
- **Early signs of underbalance missed or inadequately actioned**

Offshore Australia, 2010 – 2016:

Two additional serious well control events occurred when actual PP far exceeded pre-drill prediction.

Size and intensity of influx exceeded the well design envelope, leading to underground flow.

It is likely there have been many additional incidents not widely shared.

Evolution

2016

Well control incident

Tertiary well control incident – offshore Australia, Dec 2016

2017

Incident investigation

2018

Data gathering

Identified several well control incidents caused by over-reliance on the pre-drill PPFG prediction and/or inadequate PP monitoring

2019

Problem statement definition

Drafted well control problem statement & incorporated feedback from IRF and IOGP

2020

IOGP taskforce formed

IOGP formed a PPFG taskforce to address the problem statement.

IRF/IADC/IOGP follow up meetings.

2021

Progress the deliverables

IOGP taskforce agreed the contents of the PPFG guidance note & distributed topics for drafting.

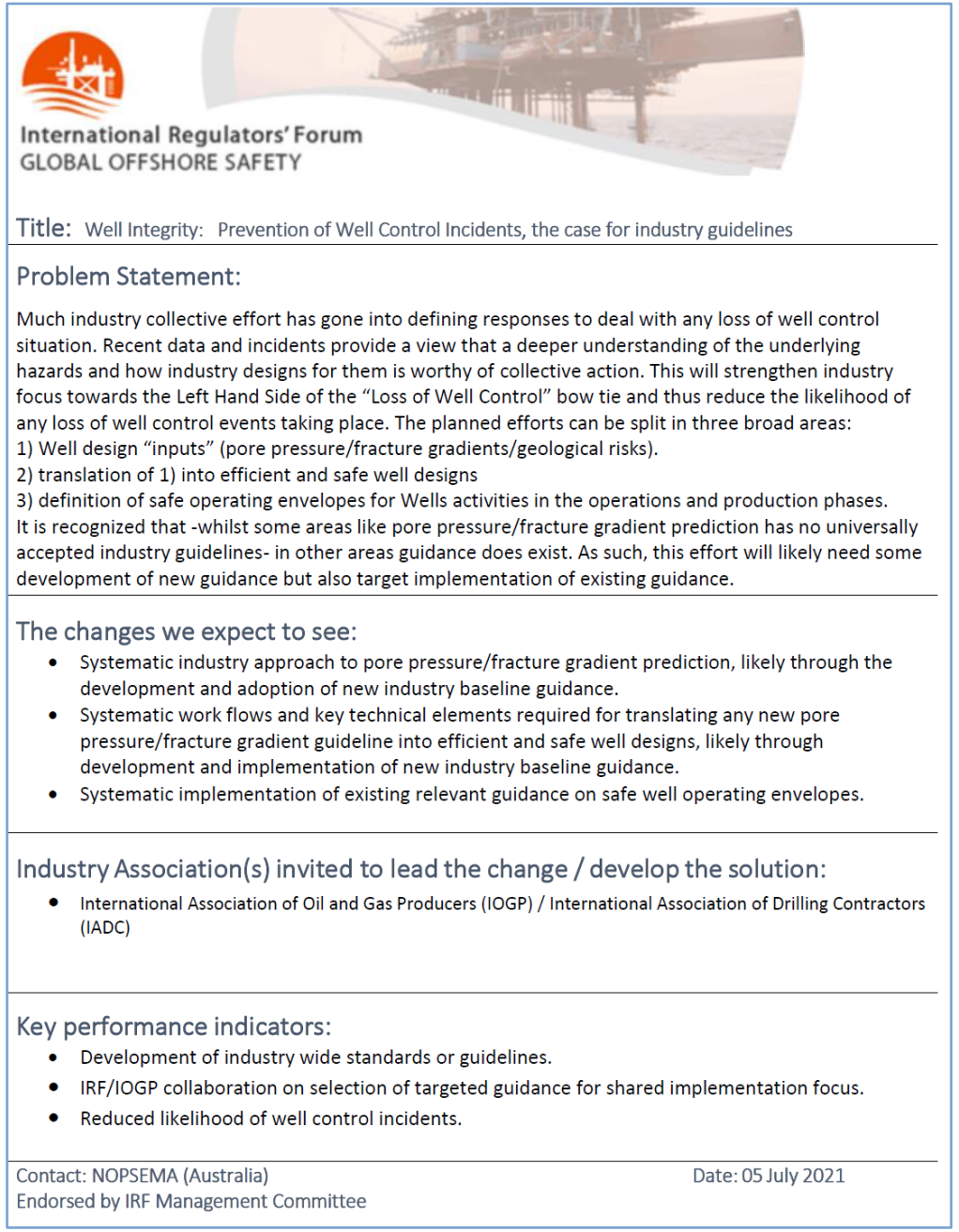
IRF well control working group formed.

Prevention of Well Control Incidents Problem Statement

Problem statement:
Greater emphasis is needed on the left-hand side of the "Loss of Well Control" bow tie, particularly on pore pressure & fracture gradient prediction (PPFG) and its application to well design and construction.

Expected outcomes:
- Systematic approach to PPFG prediction
- Systematic workflows for translating PPFG data into well design
- Systematic implementation of existing guidance on well operating envelopes

Deliverables/KPIs:
- Publish PPFG industry guidance – target by Q1, 2022
- Joint IRF/IOGP/IADC implementation
- Reduced risk of well control incidents



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Title: Well Integrity: Prevention of Well Control Incidents, the case for industry guidelines

Problem Statement:

Much industry collective effort has gone into defining responses to deal with any loss of well control situation. Recent data and incidents provide a view that a deeper understanding of the underlying hazards and how industry designs for them is worthy of collective action. This will strengthen industry focus towards the Left Hand Side of the "Loss of Well Control" bow tie and thus reduce the likelihood of any loss of well control events taking place. The planned efforts can be split in three broad areas:
1) Well design "inputs" (pore pressure/fracture gradients/geological risks).
2) translation of 1) into efficient and safe well designs
3) definition of safe operating envelopes for Wells activities in the operations and production phases.
It is recognized that -whilst some areas like pore pressure/fracture gradient prediction has no universally accepted industry guidelines- in other areas guidance does exist. As such, this effort will likely need some development of new guidance but also target implementation of existing guidance.

The changes we expect to see:
- Systematic industry approach to pore pressure/fracture gradient prediction, likely through the development and adoption of new industry baseline guidance.
- Systematic work flows and key technical elements required for translating any new pore pressure/fracture gradient guideline into efficient and safe well designs, likely through development and implementation of new industry baseline guidance.
- Systematic implementation of existing relevant guidance on safe well operating envelopes.

Industry Association(s) invited to lead the change / develop the solution:
- International Association of Oil and Gas Producers (IOGP) / International Association of Drilling Contractors (IADC)

Key performance indicators:
- Development of industry wide standards or guidelines.
- IRF/IOGP collaboration on selection of targeted guidance for shared implementation focus.
- Reduced likelihood of well control incidents.

Contact: NOPSEMA (Australia) Date: 05 July 2021
Endorsed by IRF Management Committee

Organisation and reporting

IOGP PPFG taskforce

Progress updates

IRF well control working group

Monthly progress meetings

Reports to:

- IOGP Safety Director and Chair of Wells Expert Committee (WEC) (≈2 monthly)
- Entire WEC (twice per year)

Reports to:

- IRF management committee (3 monthly)
- Entire IRF (twice per year)

IADC kept involved / informed throughout

Other industry bodies and standards organisations to be engaged at a later stage

Schedule

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Activities	2021	2022	2023
Prepare PPFG guideline			
Joint IRF/ IADC/ IOGP communications and outreach, e.g joint conference appearances.			
Publish PPFG guideline - Q1, 2022			
Measure implementation success*			

International Association of Oil & Gas Producers

*Qualitative rather than quantitative measures, to be determined

Q1 2022 Offshore Activity

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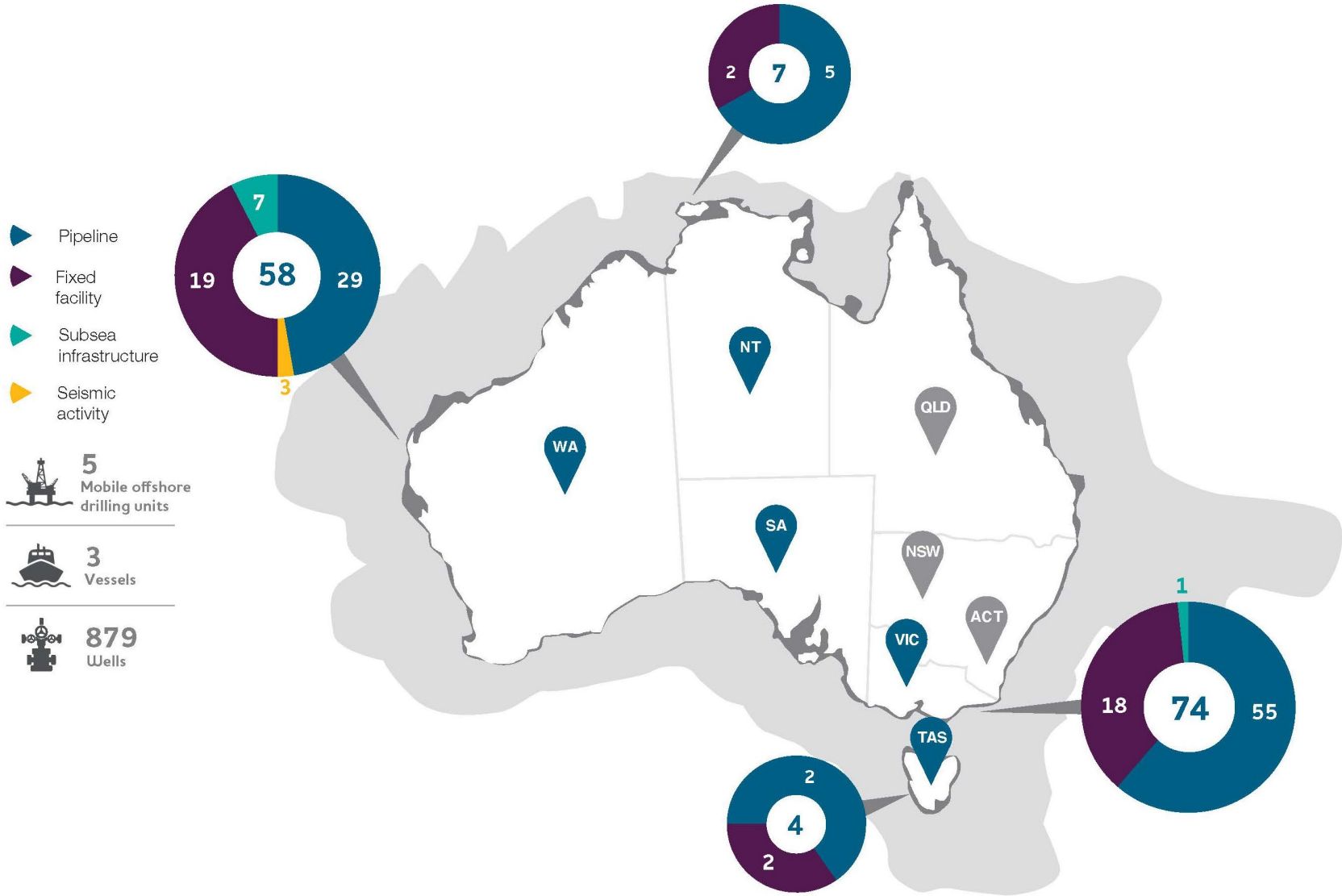

Safety Journey Changes

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1988

Piper Alpha Disaster

2006

OPGGS Act & associated Regulations

2016

INPEX Ichthys
Prelude FLNG
Wheatstone

2022+

Strategic Approach
Beyond compliance

Learn, share & Influence

Plan for Future

NOPSEMA's core processes:

- Assessment
- Inspection
- Investigation
- Enforcement
- Promotion & advisory activities

Significantly increased workload
Project scale and complexity

Unknown Unknowns

- Offshore Renewable Energy
- Financial Assurance
- Changes to Legislation / Regulations
- Future external factors

Known Unknowns

- Executive Oversight & Accountability
- Ageing Assets / Decommissioning
- Project Scale & Complexity
- Human Factors

Overview of Strategic Focus Areas

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Strategic compliance focus areas for **2022**

- Executive Oversight & Accountability
- Asset Integrity & Maintenance
- Human Factors

Questions?

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