



Development in Regulation of FPSOs in AUSTRALIAN WATERS

Slide Notes for Presentation

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NOPSEMA's role as regulator is to provide independent and robust challenge.

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Ask 3 questions

1. Is the Operator doing enough to be safe?
2. Are they doing what they say they would do?
3. When something goes wrong – what happened? Did someone break the law?

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- Crystal Ocean
- Four Rainbow
- Pyrenees Venture
- Stybarrow
- Challis Venture
- Jabiru Venture
- Van Gogh (Operations)
- MODEC Venture 11
- Dampier Spirit
- Karratha Spirit
- Cossack Pioneer
- Nganhurra
- Vincent (Maersk Nguijima-Yin)
- CWLH OKHA

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Validation

for all **safety critical elements** covered by the agreed scope of validation the design, construction and installation **codes and standards applied in relation to a facility are appropriate**; and that if these codes and standards are used then the design, construction, and installation of the facility will incorporate measures that **will protect the health and safety of persons at the facility and are consistent with the formal safety assessment** for the facility, where appropriate.

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Left hand bars

- **Damage to Safety Critical Equipment** – eg ESD hardware and systems
- **Other Incidents that need immediate investigation** – includes musters

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NB: LTI includes LTI \geq 3 day and LTI <3 days

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NB: No fires reported on FPSOs in 2006

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SPAC = Standards, Policies & Administrative Controls

CAR = Corrective Actions Required / Recommended

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Use of recip compressors need to be appropriately integrated.

FPSO's designed to be operated and maintained by a core crew of 50 (for Africa or Brazil) have maintainability and operability issues when trying to run with a manning philosophy of 20 core crew (Australia).

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Design Issues

Consideration of Critical Function Testing

- A large number of Notifications involve the failure of Safety Critical Equipment to meet it's performance standard.
- Many items require a production shutdown to function test and as such, frequency can often be annually during the scheduled yearly ESD function test.
- Often following intervention to repair, testing can only be conducted under shutdown status (no differential pressure, lower temps etc).
- Systems should allow for performance tracking / reporting of Safety Critical Equipment during unscheduled shutdowns.

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Undetected gaps in subcontractor QA/QC have resulted in degraded SCE. E.g. Defective valve actuators with insufficient break out torque fitted on many ESD/BDV valves

Commissioning (cold) should be substantially completed before sail away from the yard rather than trying to commission plant on the voyage or at location. Operations people should be involved in commissioning.

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- Inadequacies in competency / training
- Cross-training of Marine and Operations personnel on FPSOs is a common practice.
- Restart of plant and processes, berthing of offtake tankers or preparation for cyclone disconnect are complex tasks requiring technical skills and experience.
- Operators must ensure sufficient time for required competencies to be acquired.

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Provisions currently in place

Experiences and challenges with these provisions

Working towards future provisions for Proposed Production facilities


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Since the introduction of offshore petroleum legislation in the late 1960's there has never been a formal, and appropriately focused mechanism for duty-holders and the safety regulator to commence dialogue regarding the concept selection and design of a proposed production facility.

Legislative provisions for formal engagement with the safety regulator commence just prior to activities being conducted on-site (the construction and installation stage in the life of a facility), historically through a range of consents to undertake activities and since 1996, through the submission of safety cases and associated validation.

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In late 2009 NOPSA was approached by a proponent of a FLNG facility who sought to commence formal engagement with respect to the safety of the proposed facility.

The facility expected to utilise a range of new technologies not yet seen in the offshore industry, as well as complex combinations of existing technologies, all on an unprecedented scale.

Throughout the first half of 2010 NOPSA worked closely with the Commonwealth Department of Resources, Energy and Tourism [DRET] to make provisions for formal early engagement.

The culmination of these efforts were amendments to the *Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2006* [OPGG(S)] and *Offshore Petroleum and Greenhouse Gas Storage (Regulatory Levies) Regulations 2004* [OPGG(RL)] that provided for the operator of a proposed facility (not yet under construction) to be able to submit a safety case to NOPSA without agreeing a scope of validation and for NOPSA to recover the costs of the subsequent assessment, even if the operator is located outside of Commonwealth waters at the time.

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To date NOPSA has completed an early engagement safety case assessment of the aforementioned FLNG facility and NOPSEMA has completed assessments for four other facilities with another in progress, two due to commence mid-year (one project) with negotiations ongoing regarding a further three facilities.

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Despite the challenges inherent in the application of the existing safety case requirements, feedback from operators has been positive in terms of the ability to formally engage with the regulator much earlier than was previously possible.

Feedback to operators through the assessment process has been viewed as valuable and has resulted in changes that should lead to reduced levels of risk to the offshore workforce in the future.

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No consideration within the OPGG(S) regulations of a design stage in the life of a facility and hence the content requirements for a safety case gives scant regard to matters such as concept selection and inherent safety in design;

Formal dialog between NOPSEMA and the operator is constrained by the regulations to making requests for further written information;

A focus on decision making against a criteria which is unlikely to ever be met at an early stage in the design of a facility, leading to the unpalatably inevitable prospect of a rejection unless the submissions made are withdrawn from assessment by the operator prior to decision making; and

The current provisions are optional and hence neither ensures that engagement is commenced early enough – at the time of concept selection – nor that early engagement is undertaken for all proposed production facilities.

These limitations collectively reduce the likelihood of realising the full potential of early engagement to improve safety outcomes on future production facilities.

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The key issue with respect to early engagement is the construct of reasonable practicability, the weighing up of the size of the risk against the costs of prevention. A risk reduction measure can be considered as being reasonably practicable if the costs to implement it are not grossly disproportionate to the reduction in risk achieved.

On the basis that the primary objective of early engagement is to realise potential benefits to the workforce in terms of lower risk, timing is the critical factor.

Reasonably practicable was legally defined in England by Lord Justice Asquith in *Edwards v National Coal Board* [1949] who said:

“Reasonably practicable’ is a narrower term than ‘physically possible’ and seems to me to imply that a computation must be made by the owner, in which the quantum of risk is placed on one scale and the sacrifice involved in the measures necessary for averting the risk (whether in money, time or trouble) is placed in the other; and that if it be shown that there is a gross disproportion between them — the risk being insignificant in relation to the sacrifice — the defendants discharge the onus on them. Moreover, this computation falls to be made by the owner at a point of time anterior to the accident.”

This English decision has since been confirmed by the Australian High Court - *Slivak v Lurgi (Australia) Pty Ltd* (2001) 205 CLR 304 cited in *Bluff & Johnstone* (2004) The relationship between Reasonably Practicable and Risk Management (WP 27 ANU National Research Centre for OHS Regulation).

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Acknowledging that as an offshore petroleum project moves from feasibility to concept selection then progresses on to preliminary engineering, front-end engineering and design, the cost to make fundamental changes increases so in terms of reducing risk, the scope of what may be reasonably practicable to change is decreased.

The passage of time changes the balance of what is reasonable practicable, effectively limiting the regulator’s ability to challenge key choices made by an operator.

A particular case in point is consideration of the principles of inherent safety, first formalised by Trevor Kletz in the mid-1980s as a proactive approach to risk management, primarily during design. The five guidewords or principles commonly used are: elimination, minimisation, substitution, moderation and simplification.

Arguably the application of these principles is only reasonably practicable at the earliest stages in an offshore petroleum project as they impact on concept selection and key issues such as facility layout and technology selection.

Kletz, T. and Amyotte, P., 2010—Process Plants – A handbook for Inherently Safer Design, Second Edition. Boca Raton, FL, USA: CRC Press
Khan, F.I., and Vetich, B. (2004)

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Having foreseen the challenges of the current legislative provisions NOPSA undertook a review of early engagement strategies employed by the members of the International Regulators Forum (8) and a selection of Australian occupational health and safety [OHS] regulators (3). This review sought to evaluate early engagement strategies as a basis for developing a legislative change proposal. The evaluation methodology endeavoured to take into account the strategy's: 'fit' or suitability with a performance-based regime, the level of legislative change required, safeguards for regulatory capture, resource and skill implications, potential for increased levels of safety in design, usage of the approach (sample size), inherent consistency of approach, and regulators' feedback on industry's view of the approach.

Of the five approaches subjected to detailed review the results indicated the UK's Design Notification Scheme provides the optimal model for legislative provisions focused on early engagement. Furthermore, the UK Health and Safety Executive [HSE] has documented guidance on the application of the scheme and the legislative provisions should not, in NOPSEMA's view, pose any significant challenges with respect to incorporation into the OPGGSA and associated regulations.

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Appropriate legislative provisions for early engagement have the potential to lead to a significant reduction in the level of risk to which the workforce of future offshore petroleum production facilities is exposed. Experience to date has shown there are benefits to all stakeholders from effective early engagement between an operator and regulator.

Realising these benefits requires focused legislative provisions that ensure production facility operators commence formal dialogue with the regulator around the time a design concept is being selected.

Thank You