Improving Industry Performance in the Offshore Petroleum Regime

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General Manager Regulatory
What I will cover

- NOPSEMA and legislation
- Industry performance
  - Accidents + Dangerous occurrences
  - Process safety survey
  - Inspection findings
- Abnormal conditions
NOPSEMA’s coverage

Operations
– Offshore petroleum operations
– Offshore greenhouse gas storage operations

Scope
– Occupational health and safety
– Structural integrity of facilities and wells
– Environmental management of petroleum activities
Legislation administered by NOPSEMA

- Schedule 3 to Cth OPGGSA
- OPGGS (Safety) Regulations 2009
- Part 5 of the OPGGS (Resource Management and Administration) Regulations 2011 [Wells regulations]
- OPGGS (Environment) Regulations 2009

Commonwealth Attorney-General’s website: comlaw.gov.au
Offshore petroleum operations:

- Under the Commonwealth OPGGSA 2006 in Commonwealth waters
- Conferred on it by the Victorian OPGGSA 2010 in relation to offshore petroleum operations in Victorian designated coastal waters
- Conferred on it by some other State/Territory PSLAs (Tas & SA) in relation to offshore petroleum operations in the designated coastal waters of that State/Territory
- Recent changes include removal of health and safety conferral for WA coastal waters
1. OPGGSA

PETROLEUM ACTS

2. WA - Petroleum Submerged Lands Act 1982
3. WA - Petroleum & Geothermal Energy Resources Act 1967
4. WA - Petroleum Act 1936
Commenced 1 January 2012

- Creation of National Offshore Petroleum Titles Administrator (NOPTA) to replace the Designated Authorities in Commonwealth waters
- Joint Authority retained as decision-maker for petroleum title decisions
- NOPTA will be a branch within RET, administer titles and petroleum data and advise the JA
- NOPSA’s functions expanded to include environment protection and general administration and is continued in existence as the National Offshore Petroleum Safety and Environmental Authority (NOPSEMA)
- Fully cost recovered from industry levies
NOPSEMA functions include monitoring and enforcement strategies to ensure compliance with obligations under the OPGGSA and its regulations – could include compliance with title conditions or field development plans.

Capacity to enter into contracts for regulatory services to other jurisdictions (States or NT for offshore and onshore and foreign countries).

Provides for States & Territories to confer OHS, structural integrity and environmental functions and powers in designated coastal waters. If any function is conferred, OHS and structural integrity must be conferred together.

Resource Management Regulations added to the listed OHS laws to the extent they relate to OHS matters.
• Direction-giving powers under s574 (general) and s586 (remedial) to NOPSEMA
• Ministerial directions (s574A) related to resource management, resource security and data management and will prevail over NOPSEMA directions, if there is inconsistency
• NOPSA Advisory board becomes NOPSEMA advisory board with increase in Board membership by one
• 3 year operational review to every 5 years
Petroleum Safety Zones – s616

• Purpose: to protect petroleum wells, structures or any equipment in an offshore area by prohibiting vessels or classes of vessel from entering or being present in a specified area (petroleum safety zone) and to ensure the safety of navigation.

• The prohibition of vessels from entering or being present in a petroleum safety zone surrounding the petroleum well, structure or equipment, via a notice published in the Gazette by NOPSEMA

• A petroleum safety zone may extend to 500m around the well, structure or equipment

• Petroleum safety zones will be established by NOPSEMA based on assessment of applications by the titleholder or operator for wells, structures or equipment in their title area, or by NOPSEMA directly

• NOPSEMA also assesses applications for:
  – Consent for vessels to enter and be present in a petroleum safety zone; and
  – Authorisation for a vessel to enter and be present in “the area to be avoided” (a large defined area in the Bass Straight detailed in schedule 2 to the OPGGSA)
• NOPSEMA must co-operate with NOPTA regarding administration and enforcement
• NOPSEMA will appoint and deploy petroleum project inspectors (PPIs)
• NOPTA may give directions to a PPI regarding information gathering
• Where a PPI undertakes activities related to a NOPTA function, NOPSEMA costs can be recovered
Significant incident directions

- Significant Incident Directions amendment to the OPGGSA
- s576B will enable NOPSEMA to direct a titleholder, in the event of a significant offshore petroleum incident (similar to that for Inquiries) that has caused or might cause an escape of petroleum, to:
  - take action (prevent, eliminate, mitigate, manage or remediate) or not to take an action, and
  - may be unconditional or subject to conditions
- The direction may apply either within or outside the titleholder’s title area
- A standing or permanent direction requires JA approval
- If there is inconsistency with s574 or s574A, s576B directions prevail
<table>
<thead>
<tr>
<th>Functions</th>
<th>Safety</th>
<th>Wells</th>
<th>General Administration</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scope</td>
<td>People at facilities</td>
<td>Well integrity</td>
<td>Petroleum exploration and recovery</td>
<td>Petroleum activity</td>
</tr>
<tr>
<td>Dutyholder</td>
<td>Operator of a facility</td>
<td>Titleholder</td>
<td>Titleholder</td>
<td>Operator of a petroleum activity</td>
</tr>
<tr>
<td>Permissioning document</td>
<td>Safety Case</td>
<td>WOMP</td>
<td>Titles + conditions</td>
<td>Environment Plan</td>
</tr>
<tr>
<td>Compliance</td>
<td>OHS inspectors</td>
<td>OHS inspectors</td>
<td>Petroleum Project Inspectors</td>
<td>Petroleum Project Inspectors</td>
</tr>
<tr>
<td>Powers</td>
<td>OHS related entry, seizure, Notices</td>
<td>OHS related entry, seizure, Notices</td>
<td>Entry &amp; information</td>
<td>Entry &amp; information</td>
</tr>
<tr>
<td>Money</td>
<td>Safety Levy</td>
<td>Well Levy</td>
<td>Reimbursement from NOPTA</td>
<td>Environment Levy</td>
</tr>
</tbody>
</table>
What does the regulator do?

Challenge the operator

– Assessments – rigorous & targeted
– Inspections – thorough & sampled
– Incident Investigation - depending on severity
– Enforcement - verbal / written and prosecutions
– Provide a level of assurance that facility health, safety, integrity and environmental risks are properly controlled through securing compliance with the OPGGSA
**INDUSTRY**
- 35 Operators
- 209 Facilities
- 447 Assessments submitted
- 340 Incidents Notified

**NOPSEMA**
- 48.2 FTE Regulatory Staff
- 23.3 FTE Support staff
- 382 Assessments Notified
- 157 Facilities Inspections
- 0 Major Investigations
- 11 Minor Investigations
- 329 Incident reviews
- 100 Enforcement actions

**2011 Activities**
Approach to Decisions

• Independent and Professional
  - Transparent, coherent policies and processes, shared with industry and consistent with the requirements of the regulations, administered by a critical mass of skilled professionals that focus on ensuring dutyholders, and the regulator, comply with their obligations specified in law

• Respect for “due process”
  - Timely and competent decisions based on criteria set out in the regulations
  - Processes outside the regulatory requirements are not created
  - Requirements and interventions by the regulator are not arbitrary

• Certainty for industry and a reduction in regulatory burden

• Ongoing dialogue
<table>
<thead>
<tr>
<th>Facility Group</th>
<th>Based on Current (2011) data *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platforms</td>
<td>58</td>
</tr>
<tr>
<td>FPSOs</td>
<td>14</td>
</tr>
<tr>
<td>MODUs</td>
<td>15</td>
</tr>
<tr>
<td>Vessels</td>
<td>13</td>
</tr>
<tr>
<td>Pipelines</td>
<td>109</td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td><strong>209</strong></td>
</tr>
</tbody>
</table>

* Numbers fluctuate slightly as facilities enter and leave the regime e.g. mobile facilities and inactive facilities.
Actual harm

Annual TRC (Total Injuries) Rate
per million hours

TRC = LTI + ADI + MTI
Actual harm

#1 = Vessel Operator
#2 = MODU Operator
#3 = Platform Operator
#24 = Platforms Operator

Variation amongst operators
Potential large-scale harm

Hydrocarbon Release Rates
per 100 Production /Drilling Facilities per month

Rate

2005 2006 2007 2008 2009 2010 2011

Total HC Gas Releases
Total HC Liquid Releases

A197852

22
• >35% of all incidents occur on **FPSOs**
• >25% of all incidents occur on **Platforms**
Incidents per Facility per year
By Facility Type
2011

NB: Incidents includes Accidents and Dangerous Occurrences
Control measures relied on to reduce the risk of one or more MAEs to ALARP
• AIChe, CCPS (2008): Ensure Safety Critical Equipment is functional:
SCE inspections completed/Total SCE inspections due
Gas Release Rates
(per 100 million BOE)

Injury Rates (ADI+LTI)
(per million hours)

Australia

IRF Countries

Conservative estimate based on stable BOE 2010-11
<table>
<thead>
<tr>
<th>Incident Root Causes 2011</th>
<th>ALL OPERATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED - DESIGN - Design specs</td>
<td>12%</td>
</tr>
<tr>
<td>ED - PREVENTIVE MAINTENANCE</td>
<td>10%</td>
</tr>
<tr>
<td>ED - EQUIPMENT / PARTS DEFECT</td>
<td>8%</td>
</tr>
<tr>
<td>HPD - PROCEDURES</td>
<td>7%</td>
</tr>
<tr>
<td>ED - TOLERABLE FAILURE</td>
<td>3%</td>
</tr>
</tbody>
</table>
Process Safety

“The protection of people and property from episodic and catastrophic incidents that may result from unplanned or unexpected deviations in process conditions”

AIChE/CCPS (1985)
Process Safety Culture Survey

- Based on Baker Report survey
- Perceptions of safety culture
- Uses industry benchmarks
- Confidential
- Small number respondents
  - 9 Operators, 14 reports
  - (from 21 Facilities)
  - results indicative only
### Safety Culture Survey

<table>
<thead>
<tr>
<th>TOPIC Area</th>
<th>No. Operators/Facilities BELOW benchmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisory Involvement</td>
<td>3</td>
</tr>
<tr>
<td>Worker Professionalism/Empowerment</td>
<td>2</td>
</tr>
<tr>
<td>Reporting</td>
<td>4</td>
</tr>
<tr>
<td>Safety Values/Commitment</td>
<td>3</td>
</tr>
<tr>
<td>Procedures and Equipment</td>
<td>3</td>
</tr>
<tr>
<td>Training</td>
<td>8</td>
</tr>
</tbody>
</table>

n = 14
<table>
<thead>
<tr>
<th>Safety Culture Survey TOPIC AREA</th>
<th>Areas of concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Values / Commitment</td>
<td>Pressure to work overtime - loyalty to their own work unit</td>
</tr>
<tr>
<td></td>
<td>Process safety programmes don't have adequate funding</td>
</tr>
<tr>
<td>Reporting</td>
<td>Hazard identification, control and reporting training not adequate</td>
</tr>
<tr>
<td>Training</td>
<td>Contractors don't receive adequate training to do their job safely</td>
</tr>
<tr>
<td>Worker Professionalism / Empowerment</td>
<td>Workers don't actively participate in incident investigations</td>
</tr>
</tbody>
</table>
Topic-based Inspections

- Maintenance Management
- Ageing Facilities
- Emergency Management
- Contractor Management
• Variation between documented maintenance system and how maintenance is actually conducted
• Formal deferrals process not used – risks not assessed
• Temporary repairs risk assessment - poor
• 3rd party competency – EHS assessed but not technical competencies
• Maintenance supervisors workload
• Remote technical support
• Auditing – inadequate
• Some current integrity management systems take ageing into account
• Little evidence of systematic approach to systems (process, blowdown, electrical) other than structural
• Corrosion management – variable to poor
• Critical function tests (CFTs) – not conducted to equipment manual or overdue
• Classification for floating facilities – reliance on Class may not be sufficient to demonstrate ALARP
Emergency Management

- Drills being undertaken but do not cover all emergency controls
- PA systems ineffective
- Emergency escape routes not clearly marked or obstructed
- Response times – not subject to performance standards and not tested
- Inadequate debriefs
- Auditing - inadequate
• Variable level of supervision
• Contractors often considered as part of core workforce and given important emergency roles, however, not subject to the same level of training or supervision
• Lack of procedures for management of contractor OHS
• The safety case must describe the way the operator ensures each member of the workforce has the necessary **skills, training and ability** to undertake routine and non-routine tasks in normal operation conditions and in **abnormal** or emergency conditions and to respond and **react appropriately**
Abnormal situations - Blind operations

• Where those conducting operations are unaware of the actual situations they are in
  – Tendency to interpret events in context of previous experience despite evidence to the contrary (mind set)
  – Management's failure to ensure that members of the workforce have the ability to identify, diagnose and respond to abnormal events

• One of the final barrier failures in the unfolding of large scale accidents
Reason’s Accident Causation
• People can forget to be afraid
• Organise in such a way that you are better able to notice the unexpected in the making and halt its development
• Use the safety case:
  – Major accident events, risk controls and performance standards
  – Safety management systems implementation
11 fatalities

- Commission findings include:
  - failure to properly conduct and interpret the negative-pressure test
  - WRONGLY ASSUMED well could not be flowing
  - kept running tests and coming up with various explanations until they convinced themselves their assumption was correct

- Commission identified a number of potential factors that may have contributed to the failure to properly conduct and interpret the negative-pressure test:
  - no procedures for running or interpreting the tests
  - no policy to seek second opinion about confusing data
  - lacking full appreciation of context in which the test was performed
No fatalities, well blowout.

- Return of fluid indicated float valve problem
- Commission findings include:
  - major shortcomings in procedures were widespread and systemic
  - cement in casing had been over-displaced
  - circumstances were not recognised or understood by senior personnel at the time
- Commission recommended:
  - decision-making about well control should be professionalised
  - existing well control training programs should be reviewed, with a focus on well control accidents that have occurred
Texas City 2005

15 fatalities

- Sustained overfilling of a fractionation tower during start-up – no product to tankage
- Pressure reliefs lifted releasing flammable liquid to a blowdown stack venting to atmosphere
- CSB findings included:
  - lack of supervisory oversight and technically trained personnel during startup
  - Operator training program was inadequate
  - Outdated and ineffective procedures did not address recurring problems
11 fatalities (ERT)

- Atmospheric drain tank vent was blanked but not positively isolated from a production header, overpressured and ruptured, damaging adjacent equipment

- Vapour ignited 17 minutes after the rupture
2 fatalities, 8 injuries

- Loss of hot lean oil flow resulted in low temperature in a vessel causing embrittlement
- Re-start of flow resulted in higher temperature causing stress in the vessel and brittle fracture
- Release of hydrocarbons that ignited causing an explosion and fire

Commission findings included:
- Lack of ‘knowledge of dangers associated with loss of lean oil flow and did not take steps necessary to avert those dangers’
- ‘Lack of knowledge ... was directly attributable to a deficiency in initial or subsequent training’

Commission recommendations included:
- ‘Operator to demonstrate that its training programs and techniques impart knowledge of all identifiable hazards and the procedures to deal with them’
1. Coolant pumps failed

2. Reactor pressure rose and pressure relief valve lifted and stuck open

3. Caused a sustained loss of coolant and a partial meltdown of reactor core

Commission concluded:
- Inappropriate operator action
- Deficiencies in their training
- Lack of clarity in their operating procedures
- Failure of organisation to learn lessons from previous incidents

Commission recommended:
“Emphasis must be placed on diagnosing and controlling complex transients and on the fundamental understanding of reactor safety.”
What you do need to do?

- Ensure staff are competent, well-trained and supported by effective procedures with a capacity to diagnose and respond to failures in physical systems

- Share and learn lessons from past incidents both within and outside the industry
What you do need to do?

- **Exercise major accident and loss of control scenarios:**
  - Work through the main procedural steps or rules to analyse, respond and mitigate abnormal conditions
  - If circumstances highlight deficiencies in previous hazard identifications, review through structured Management of Change, hazard identification and risk assessment

- **Quick, but ill-informed judgements of an abnormal situation can be catastrophic:** step back, analyse and evaluate, take a thorough look at the facts, and then respond
Shell announces worst oil spill in a decade. Up to 40,000 barrels of crude oil was spilled on Wednesday while it was transferred from a floating oil platform to a tanker 75 miles off the coast of the Niger delta.

22 Dec 2011
The Bonga field.
Spill ~ 70 km long.

17 Jan 2012
The KS Endeavor jack-up rig on fire at the Funiwa field in Nigeria. 2 people missing.
Photograph: Chevron
Thank you