APPEA / NOPSA
Asset Integrity Workshop

Welcome

Jane Cutler, CEO NOPSA
3 March 2011
Mission

To independently and professionally regulate offshore health and safety
Workshop purpose

• The value of sharing: learning from each other
• Improve performance to achieve safe and reliable operations
• Prevent loss of control and loss of containment
• Keep it in the pipe – reduce the risk of major accident events (MAEs)
MAE implications

- The law holds operators accountable for safety and integrity
- Harm to people
- Loss of community trust, loss of licence to operate
- Other losses: facility damage, production, insurance
- Maintain integrity, protect vulnerable objects: people, environment and assets
Thank you
APPEA / NOPSA
Asset Integrity Workshop

Industry Asset Integrity Performance

Simon Schubbach
General Manager Regulatory, NOPSA
3 March 2011
Purpose
Sharing experience
Improving safety
Asset Integrity –
How far have we come since August 2009?
NOPSA’s functions

- Promote
- Advise
- Monitor & Enforce
- Investigate
- Co-operate
- Report
Proactive verification 2010

31 OHS Inspectors (Incl. 4 Investigators)

170 Facilities (Incl. 70 pipelines)

141 inspections
Reactive analysis

Submissions and Incident Notifications 2010

Assessments 164
Accidents & DOs 388
Complaints 16
Facilities in NOPSA’s jurisdiction

<table>
<thead>
<tr>
<th>Not Normally Attended Platforms</th>
<th>Fixed, Normally Attended Platforms</th>
<th>FPSOs/FSOs</th>
<th>MODUs</th>
<th>Vessels</th>
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What will we cover?

• 2006-2009 Facility Integrity (FI) National Programme
• Summary observations from 2009 FI Workshop
• Industry hydrocarbon releases performance data and analysis
• Asset integrity/FI – themed audits findings
• Montara
Asset integrity

What do we mean?
### 2006-2009 Facility Integrity - inspection findings

<table>
<thead>
<tr>
<th>FI FOCUS AREAS</th>
<th>% Facilities did not meet FI Expectation levels</th>
<th>WEAK ELEMENTS</th>
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<tbody>
<tr>
<td></td>
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<td><strong>#1</strong></td>
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<tr>
<td>Facility Integrity Mgmt System - Onshore</td>
<td>18%</td>
<td>Audit &amp; Review</td>
</tr>
<tr>
<td>Topsides Maintenance System - Onshore</td>
<td>15%</td>
<td>Compliance w Performance Standards</td>
</tr>
<tr>
<td>Topsides Maintenance System - Offshore</td>
<td>13%</td>
<td>System Test of SCE</td>
</tr>
<tr>
<td>Topsides Process Integrity</td>
<td>9%</td>
<td>Audit &amp; Review Process Plant+ Mgmt Systems</td>
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<tr>
<td>Topsides Pressure Integrity</td>
<td>9%</td>
<td>Performance and Reporting</td>
</tr>
<tr>
<td>Topsides Corrosion and Erosion</td>
<td>4%</td>
<td>Well Caliper Surveys</td>
</tr>
<tr>
<td>Topsides Structures</td>
<td>2%</td>
<td>Inspection Programme</td>
</tr>
<tr>
<td>Small Bore Piping/Tubing, Flexible Hoses</td>
<td>35%</td>
<td>Field Installation</td>
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### Notes
- **WEAK ELEMENTS** are identified based on the percentage of facilities that did not meet the Facility Integrity (FI) expectations.
- The table highlights three key areas for improvement in each focus area, with **#1** being the most critical.
2004 to 2007 UK HSE asset integrity KP3

Maintenance management system aspects likely to perform badly:

- Maintenance of SCEs
- Backlog
- Deferrals
- Measuring compliance with performance standards
- Corrective maintenance
2009 FI workshop comments ...(1)

- Ensure independence of person undertaking assurance/verification
- Establish a specific process safety role and ensure both process safety and personal safety are addressed
- Develop common categorisation for process safety incidents
- Safety-critical elements: consider ‘envelope’ for performance testing rather than a single measure
2009 FI workshop comments ...(2)

- **Hazard recognition challenges**
  - no experience of something going wrong
  - over-dependence on ‘the system’
  - people forget to be afraid

- **Process safety reporting can lead to:**
  - an active and engaged workforce
  - improved safety culture

- **Involve operating staff during design/construction so lessons can be incorporated into future projects**

- **Implement contractual arrangements/quality control checks to ensure designs are followed**
2009 FI workshop comments …(3)

• NOPSA commitment

• NOPSA suggestion
  – explore development of a process safety indicator
The performance problem

The vision
A safe Australian offshore petroleum industry

The reality
Industry safety performance below international measures
HCRs – IRF data

Gas Release Rates
(per 100 million BOE)

Rate

- Australia
- IRF

2005 2006 2007 2008 2009
HCRs - rates

Hydrocarbon Release Rates
per 100 Production/Drilling Facilities per month

- Total Gas Releases
- Total PL Releases
HCRs – numbers and types

Number of Hydrocarbon Releases

- Uncontrolled PL release >12500L
- Uncontrolled PL release >80-12500L
- Uncontrolled HC gas release >300 kg
- Uncontrolled HC gas release >1-300 kg


Number of Hydrocarbon Releases

- 2005: 10
- 2006: 15
- 2007: 20
- 2008: 25
- 2009: 30
- 2010: 35

NOPS A
HCRs - per facility type

Number Hydrocarbon Releases per Facility Type

2010

- FPSO
- Production Platform no Drilling
- Unmanned Platform
- Large Production Platform

Number

0 5 10 15 20
HCRs - production operators

10 Facilities Reporting the most HC Releases
(Gas and Liquid)
1/1/2005 - 24/02/2011

Number of Releases

<table>
<thead>
<tr>
<th>Facility</th>
<th>Number</th>
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<tbody>
<tr>
<td>Hd</td>
<td>16</td>
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<tr>
<td>Fa</td>
<td>14</td>
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<tr>
<td>ABd</td>
<td>12</td>
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<td>HHb</td>
<td>10</td>
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<td>JJa</td>
<td>8</td>
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<td>Kb</td>
<td>8</td>
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<td>JJc</td>
<td>6</td>
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<td>JJk</td>
<td>6</td>
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<td>JJr</td>
<td>4</td>
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<td>JJj</td>
<td>4</td>
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<tr>
<td>JJg</td>
<td>2</td>
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</tbody>
</table>

F = FPSO
P = Platform
HCRs – parts and equipment involved

Hydrocarbon Releases - Parts and Equipment Involved

2005-2010
HCRs - root causes

Hydrocarbon Release Root Causes

2010

ED - Preventive Maintenance
ED - Design Specs
ED - Design Review
HPD - Procedures - Not Used / Not Followed
ED - Repeat Failure
HPD - Training - Understanding NI
HPD - QC - No Inspection
HPD - Individual Performance
HPD - MS - SPAC NI
HPD - Procedures - Wrong

A155115
21
HCRs - corrosion-related incidents

% Corrosion-related HC release incidents

'Uncontrolled HC release >1-300 kg'
'Uncontrolled HC release >300 kg'
'Uncontrolled PL release >80-12,500 L'
'Uncontrolled PL release >12,500 L'

Incident types only

per cent

2005 2006 2007 2008 2009 2010
Analysis of reported HCRs

1. Procedures incorrect / not followed
2. Inadequacies in competency / training
3. Restart of aging facilities
4. Repeat failures
5. Failure to complete corrective actions

Across the life-cycle of the facility
1. Procedures incorrect / not followed

- Procedures take time to achieve and should be considered as dynamic;
- Procedures should be accurate, validated or reviewed to reflect the current, best practice;
- Without MOC, procedures can be undermined, resulting in shortcuts and risk taking; and
- Fast-tracked projects:
  - procedures not in place or ‘scratched up’ on the run
  - procedures written as ‘desktop exercises’ without validation
2. Inadequacies in competency / training

• Operators must ensure sufficient time for required competencies to be acquired;
• Cross-training of marine and operations personnel on FPSOs is a common practice; and
• Technical skills and experience for complex tasks:
  – restart of plant and processes
  – berthing of offtake tankers
  – preparation for cyclone disconnect
3. Restart of aging facilities

- Hydrocarbon releases have occurred on older FPSO facilities during restart;
- Few facilities go from initial production to end of facility life without life extension; and
- For life extension consider rate of change of temperature and pressure conditions in aging flexible risers, fixed piping and pressure vessels.
4. Repeat failures

- Repeat incidents (e.g. ‘pinhole leak in production spool’) are often at the same facility or assets within the same company; and
- Operator investigations need to consider ‘why has it happened again’? ‘where else can this occur’?:
  - on their facility
  - on other facilities within the same company
5. Failure to complete corrective actions

- Justifications for continued operations - often in place at the time of repeat or similar incident
  - ‘Case to operate’
  - ‘Deviations’
  - ‘Temporary operating procedures’ etc…
- Such permissions to operate should be time-limited and tracked to ensure permanent rectification is applied and maintained.
Design issues

• Fire and gas instrumentation
  – design location and type

• Alarm management
  – human equipment interface

• Poor equipment integration
  – reciprocating compressors (vibration issues)

• Consideration of field life extensions
  – aging facilities / flow lines / equipment
Commissioning issues

• Incomplete commissioning
  – construction debris
  – excessive punch list items
  – lack of QA/QC and validation by independent, competent person

• Safety-critical elements: performance non-compliance
  – UPS / BDVs / SDVs / PSVs
2010 Asset integrity – inspections

• Al prompt-sheet inspections conducted at six facilities and onshore:
  – 3 x FPSOs, 1 x MODU, 2 x Platforms

• Based on the OGP asset integrity question set - All focus areas included:
  (Onshore and Offshore)
  – facility MAEs and barriers
  – critical equipment (hardware barriers)
  – people and processes
  – projects
  – culture
## Asset Integrity - outcomes

### Examples of recommendations arising from Asset Integrity themed audits

<table>
<thead>
<tr>
<th>Procedures</th>
<th>Maintenance</th>
<th>Training</th>
<th>Design</th>
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<tbody>
<tr>
<td>Maintenance backlog - prioritisation</td>
<td>Regularly audit corrective actions process for closeout</td>
<td>Update training matrix to reflect current programmes</td>
<td>Provide appropriately engineered structural supports</td>
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<tr>
<td>Set and review against performance standards</td>
<td>Update backlog and rationalise</td>
<td>Ensure workforce competency in Maintenance management system</td>
<td>Mitigate vibration / fatigue induced damage</td>
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<tr>
<td>Risk management for delayed inspections, maintenance, CFT</td>
<td>Temp repairs – types available, approvals, notifications etc..</td>
<td>MAE risk identification and raise awareness</td>
<td>Reliability of ESD system</td>
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Case example

- NOPSA inspection found significant deficiencies in safety-critical maintenance management resulting in the issue of Improvement Notices.

- Underlying factors:
  - Problems with early commissioning – focus on reactive maintenance.
  - Facility Operator/facility owner interface.
  - Operator does not have ownership of the maintenance management system.
  - Lack of clarity on what constituted safety-critical maintenance.
Montara

Immediate Cause:
Primary cementing integrity failure

Root Cause:
Systemic failure of management systems, non-compliance with operating procedures
Montara lessons
systemic weaknesses

• Command and control
• Technical competence
• Understanding and capacity to diagnose failures in physical systems
• Staff selection
• Content and implementation of procedures
• Management of change
• Risk assessment
• Communications and hand-over
Asset integrity defined

- Prevention of major incidents
- Outcome of good design, construction and operation practices
- Achieved when facilities are structurally and mechanically sound and perform the processes and produce the products for which they were designed
Thank you