

12th Annual FPSO Congress
September 2011, Singapore

Industry and FPSO Health & Safety Performance

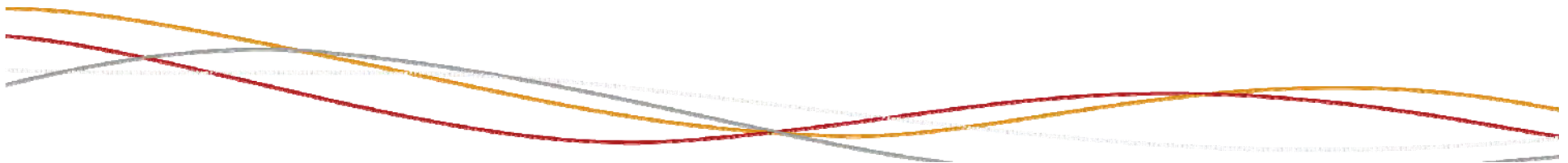
Simon Schubach

Regulatory Operations General Manager





- Background to NOPSA
- FPSO health & safety performance
- Lessons from inspections
- Lessons from incidents





A safe Australian offshore petroleum industry





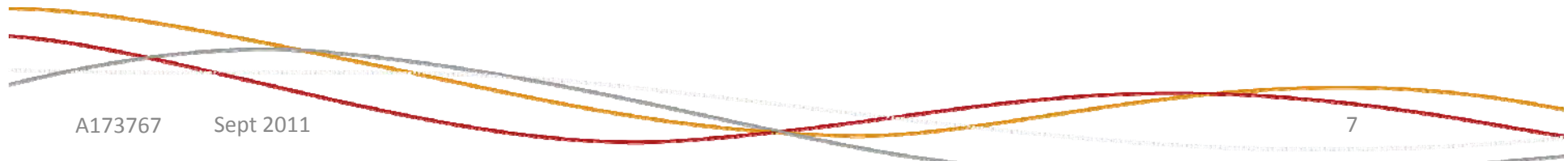
- A 'General Duties' regime: reduce risk ALARP
- Performance-based, with prescriptive elements
- An accepted safety case is required in order to undertake activities
- The primary responsibility for ensuring health and safety lies with the operator



- **Challenge the Operator**
 - Thorough Safety Case assessments - targeted
 - Rigorous facility inspections – sampled verification
 - Comprehensive incident investigation – depending on severity
 - Principled Enforcement – verbal / written and prosecutions
- **Independent assurance**
 - Facility health and safety risks are properly controlled by Operators of facilities through securing compliance with OHS law



INDUSTRY PERFORMANCE





INDUSTRY

33 Operators
210 Facilities

286 Assessments submitted

365 Incidents Notified

43 Accidents

322 Dangerous Occurrences

NOPSA

33 OHS Inspectors
20 Support staff

218 Assessments Notified

152 Facilities Inspections

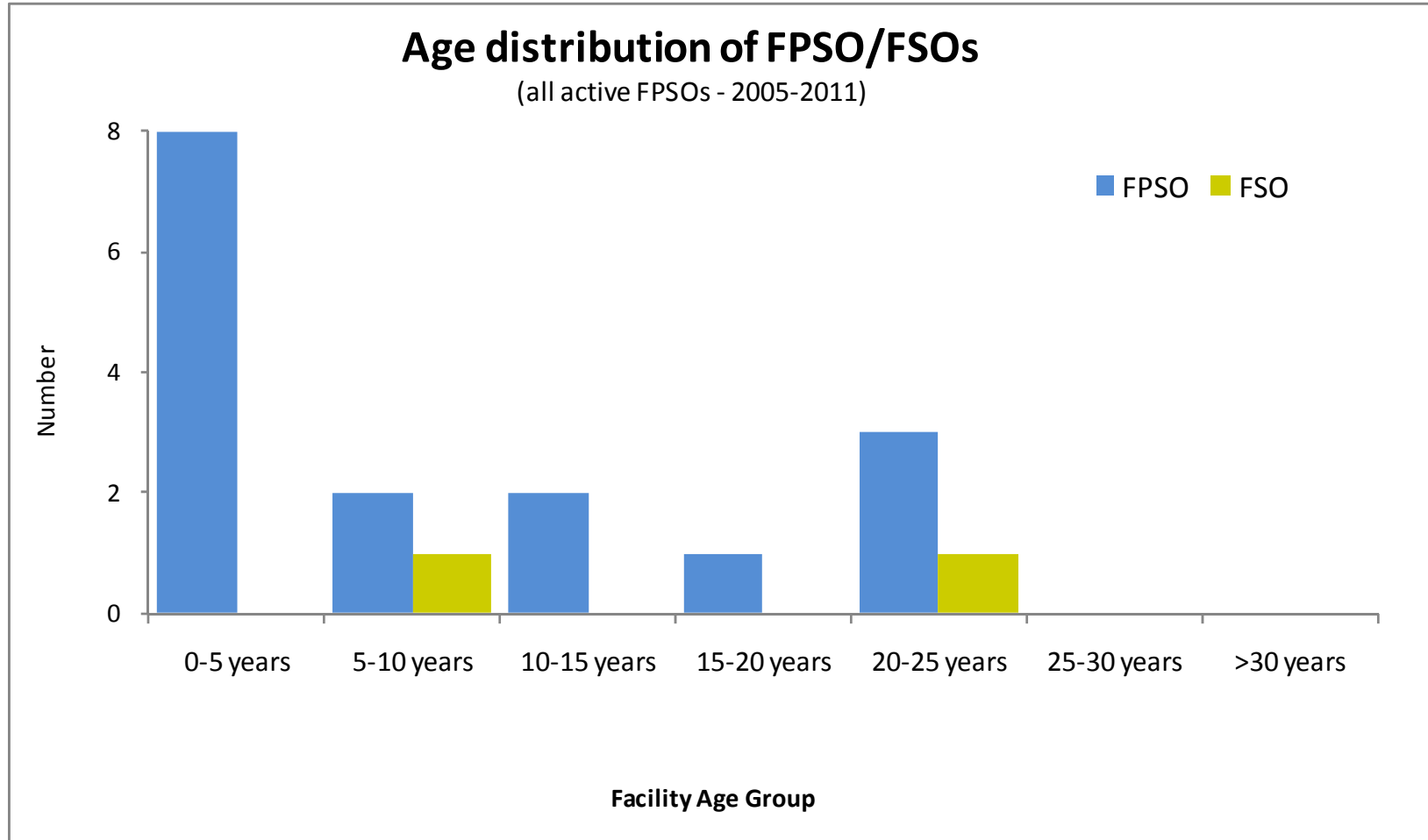
1 Major Investigations
31 Minor Investigations
333 Incident reviews

78 Enforcement actions



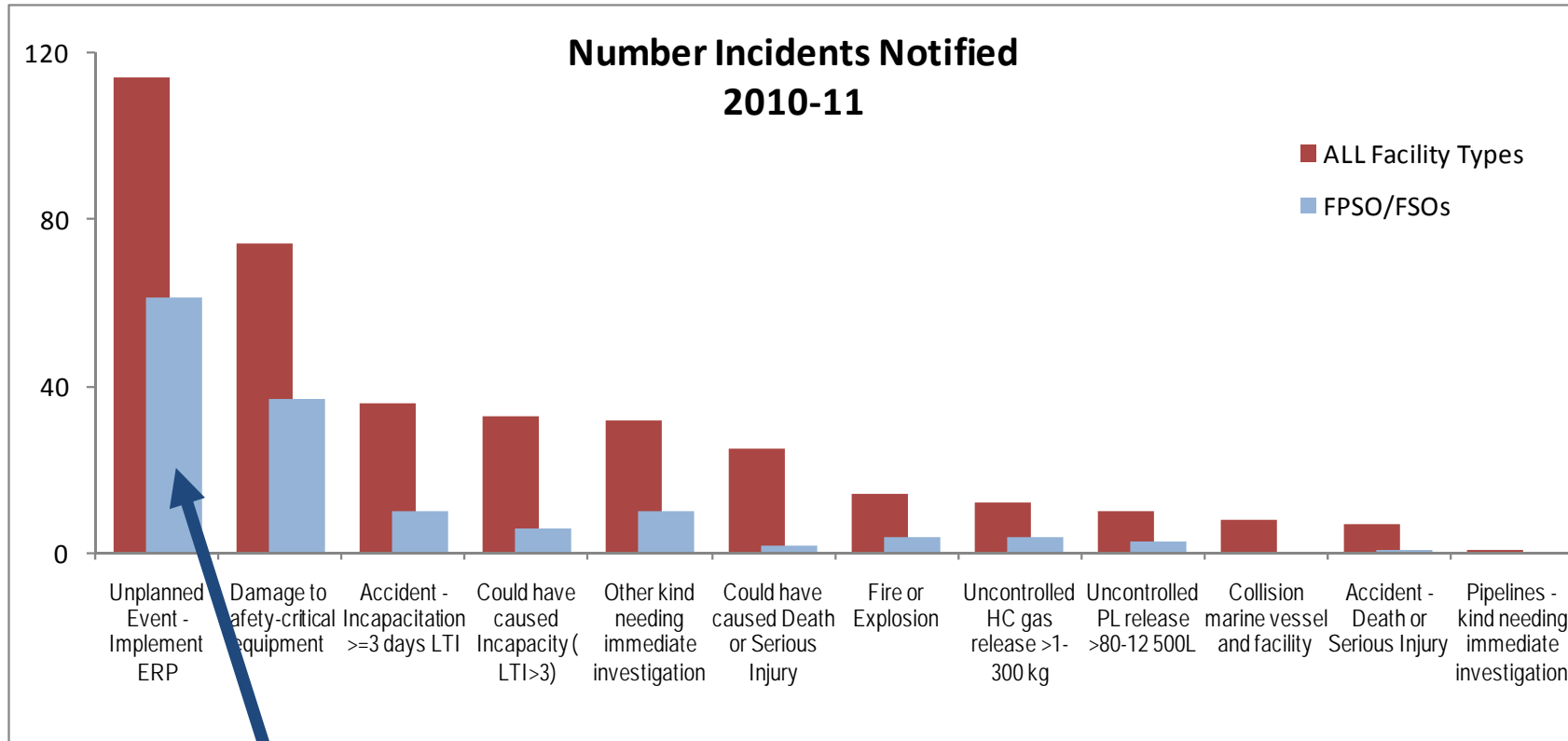
Facility Group	No. of Facilities Based on Current (2011) data *
Platforms	60
FPSOs / FSOs	14
MODUs	15
Vessels	10
Pipelines	110
TOTAL:	210

** Numbers fluctuate slightly as MODUs and vessels enter the regime and become facilities or leave the regime and cease to be facilities.*

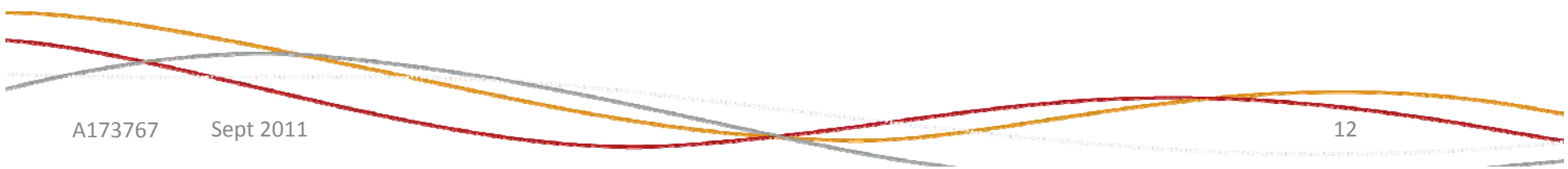


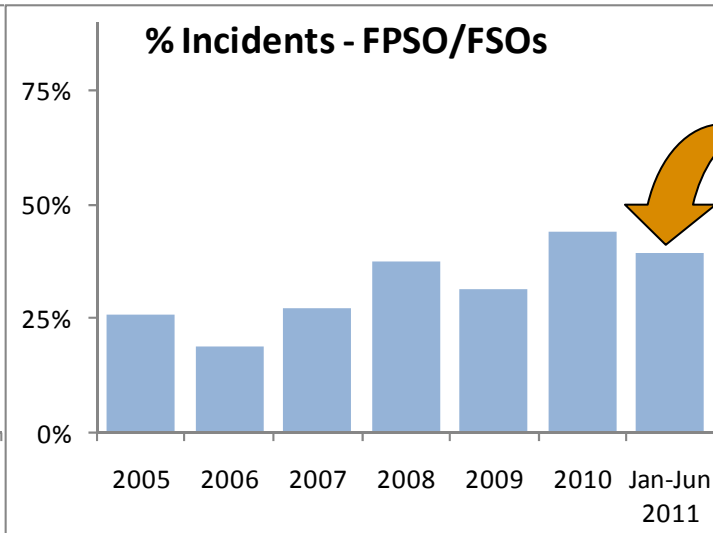
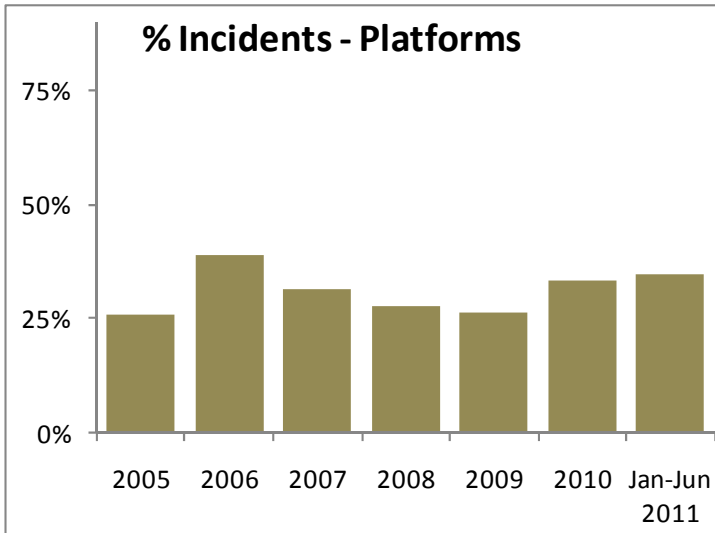


Activity	ALL Facilities	FPSO/FSO
Facilities Inspected	152	23 (15%)
Incidents reported	365	83 (23%)
Assessments notified	218	25 (11%)
Enforcement Actions issued	78	32 (41%)

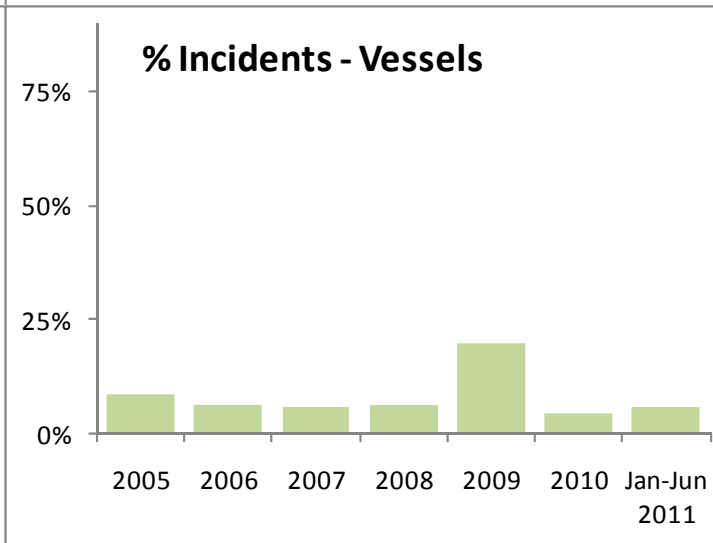
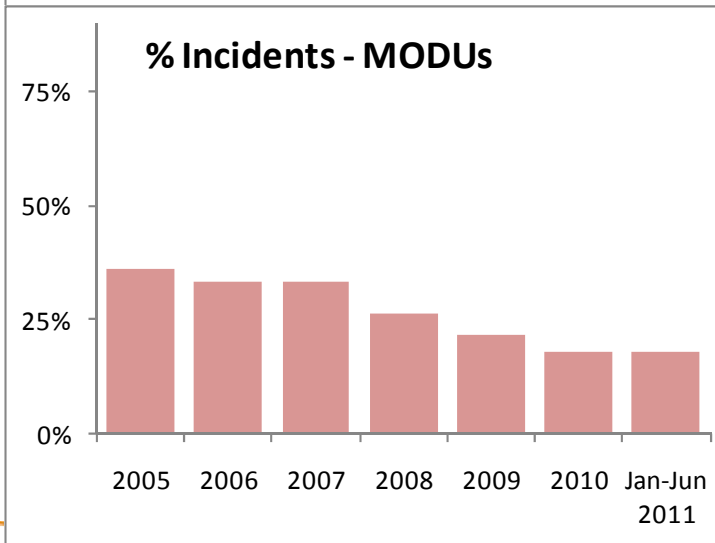


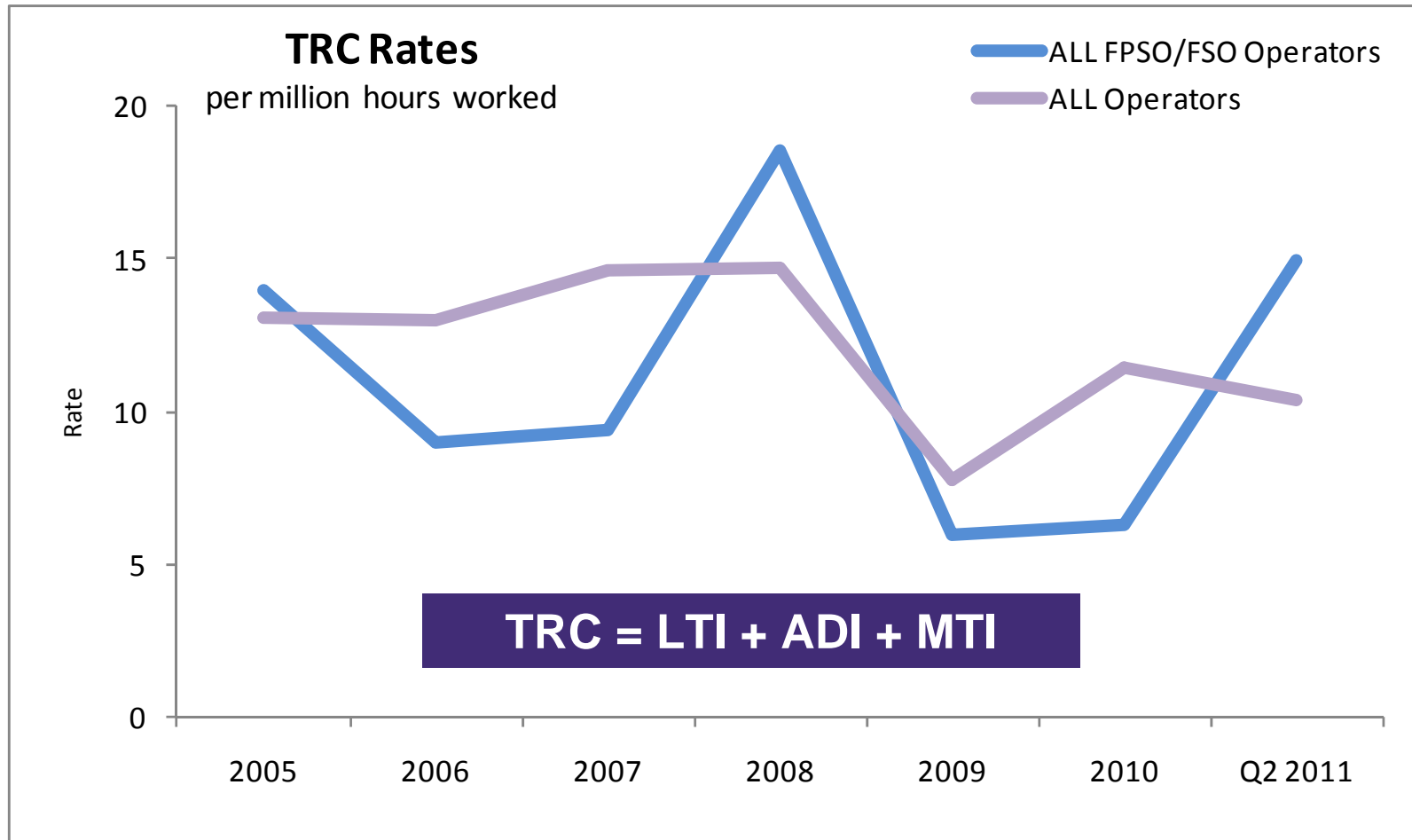
More than half of all unplanned events (alarms, medivacs etc.) occur on FPSOs

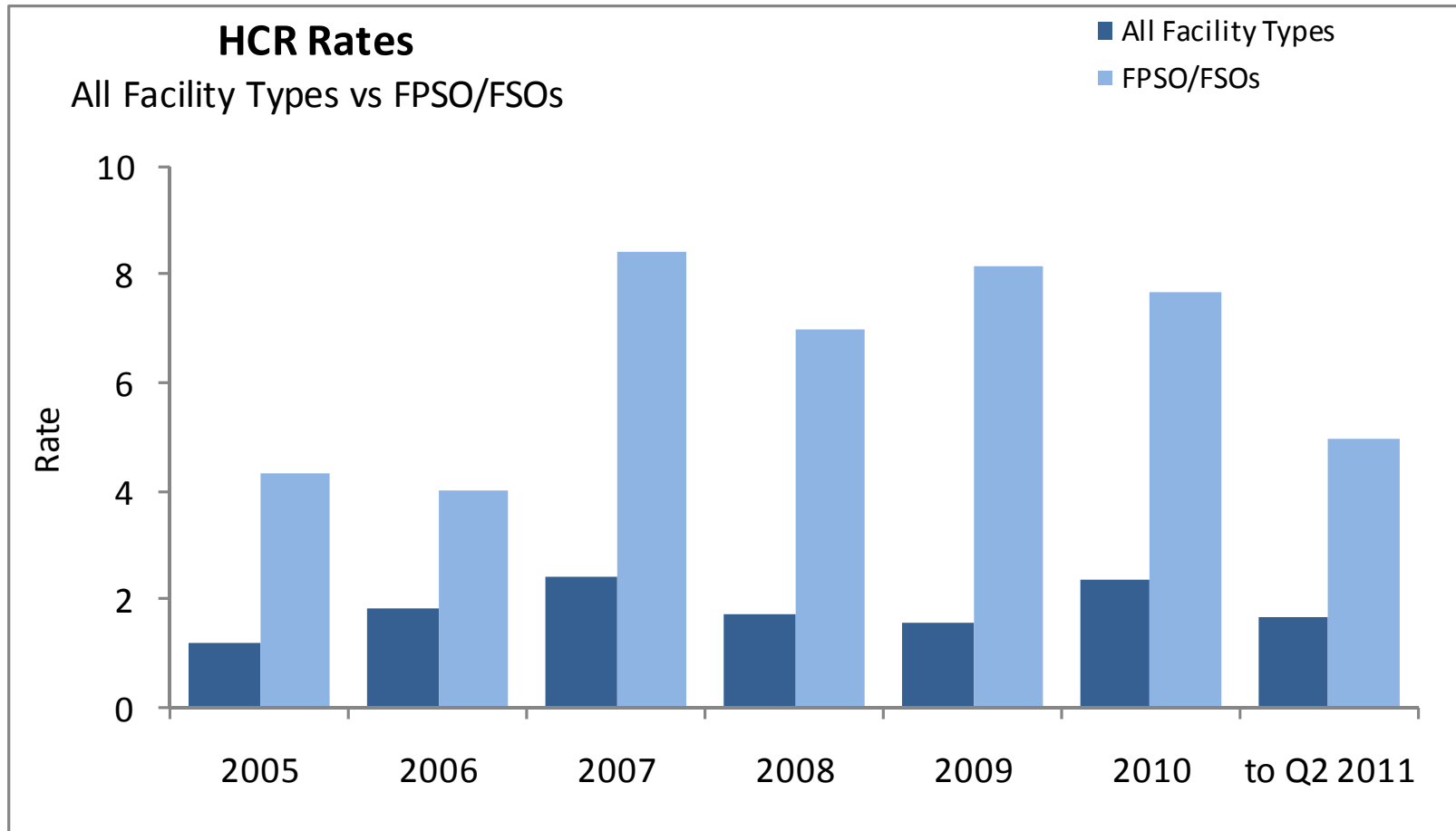




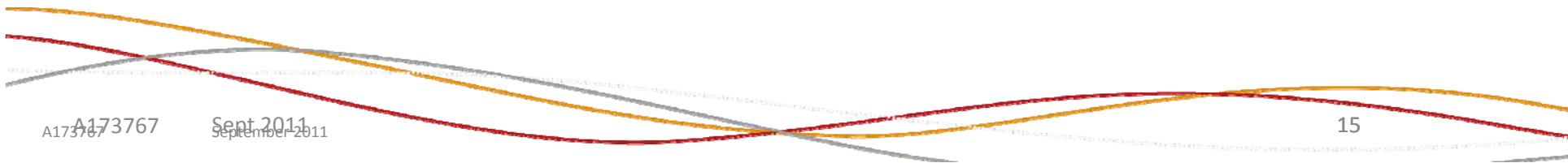
1/3 of all incidents reported to NOPSA occur on FPSO/FSOs







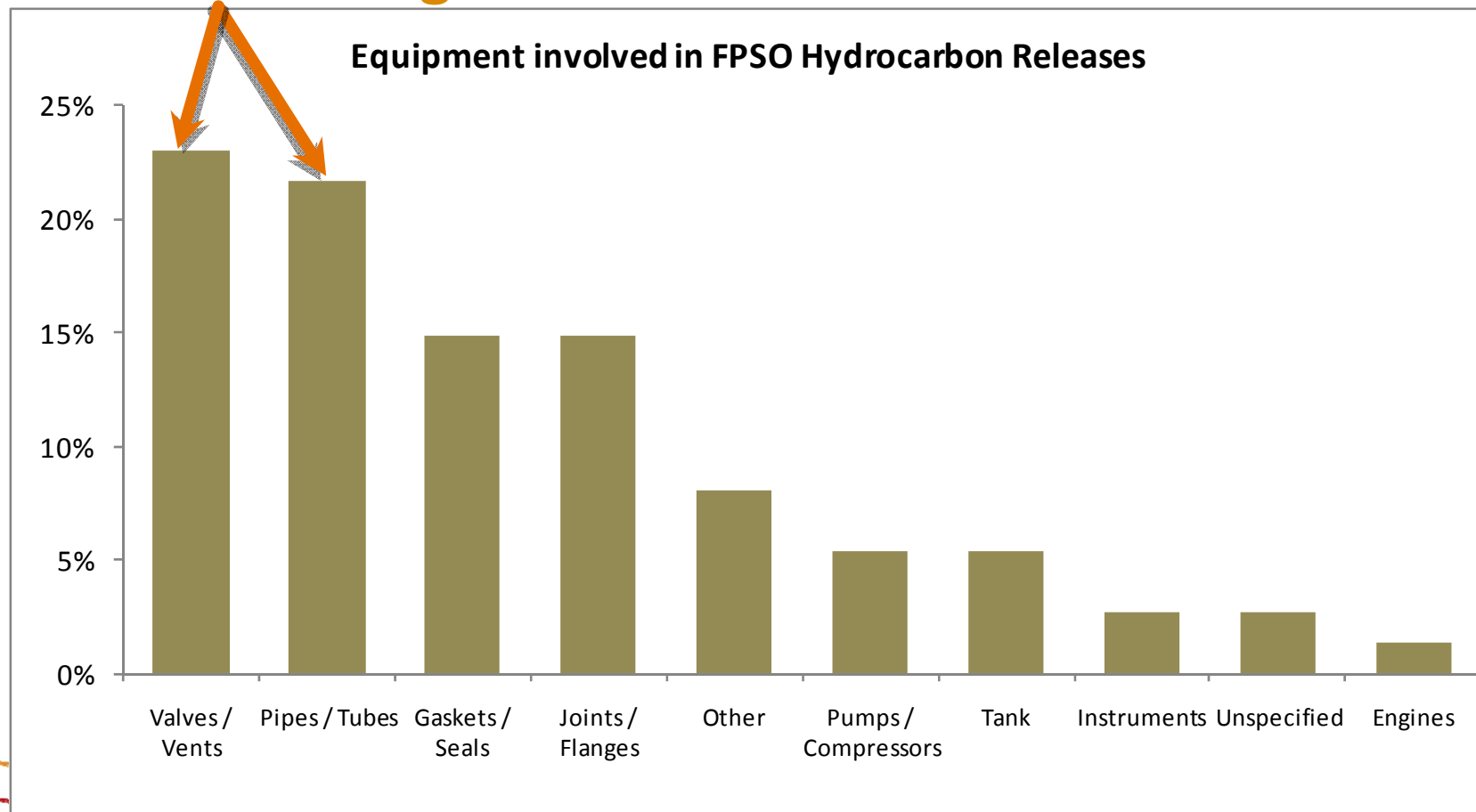
NB: Rates are per milion hours worked





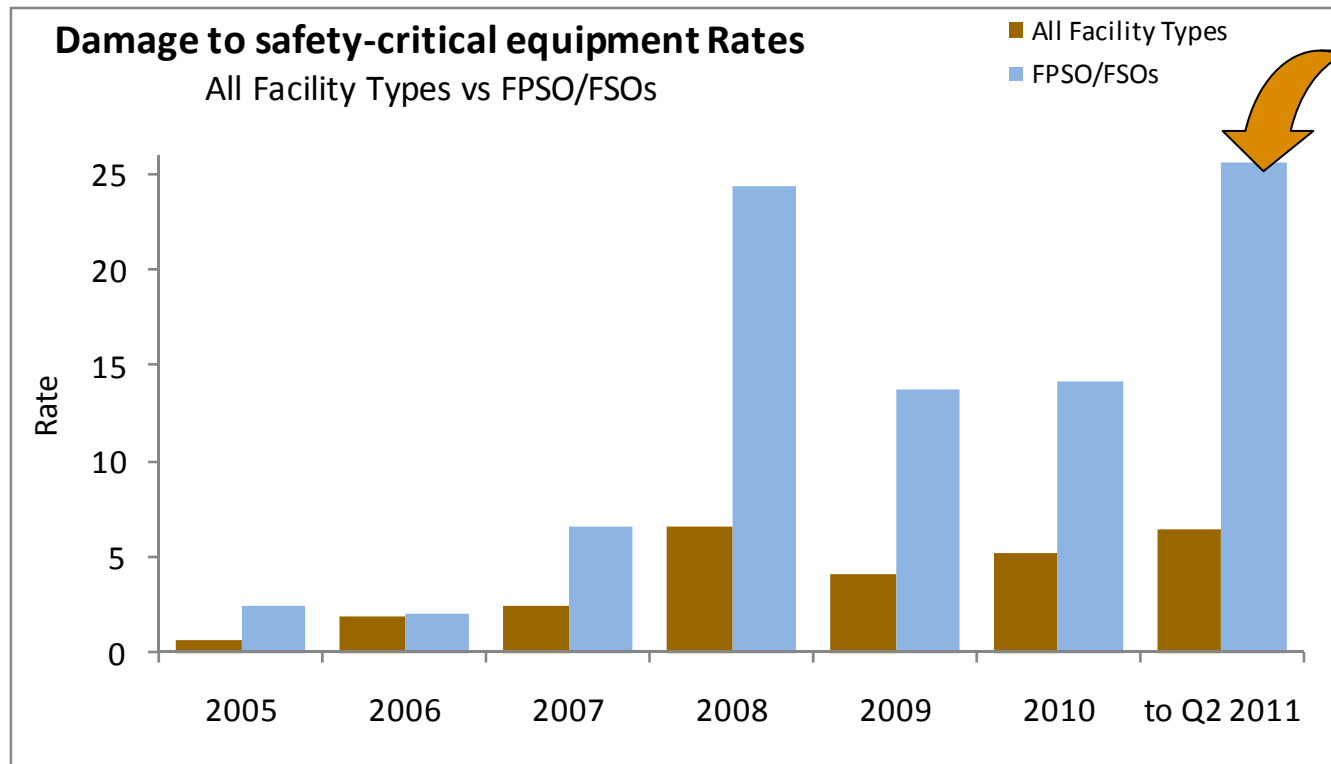
Almost half of all HCRs involve either Valves/Vents or Pipes/Tubes...

What is this telling us?



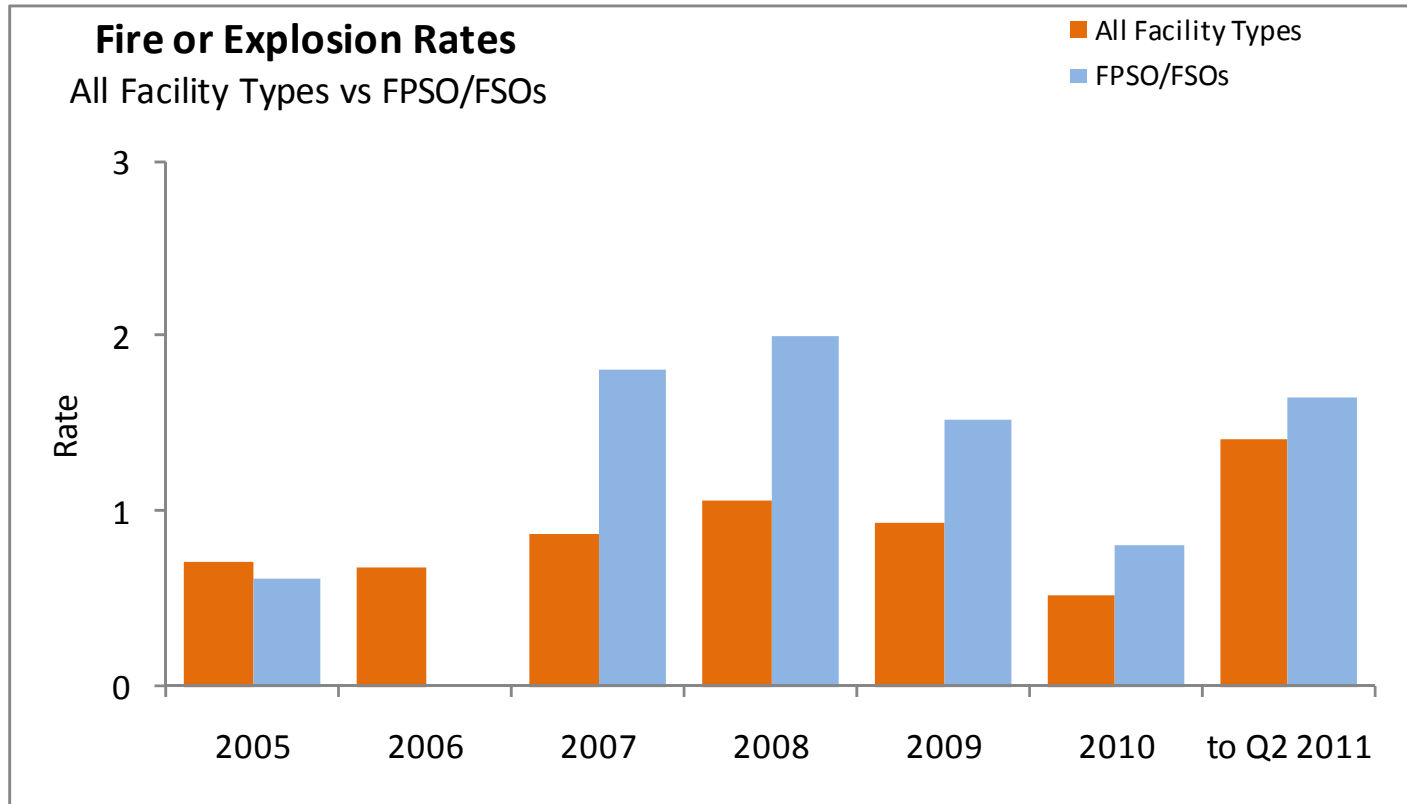


- Control measures relied on to reduce the risk of one or more MAEs to ALARP

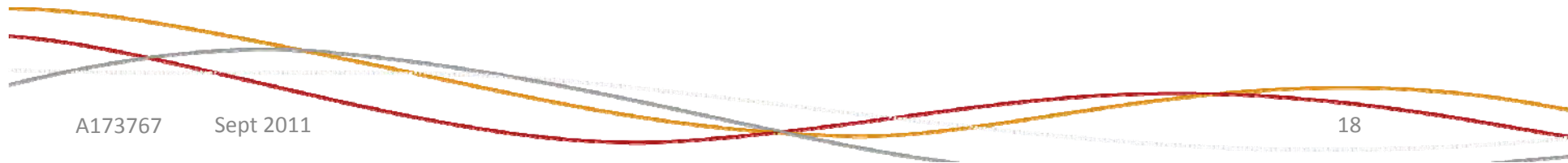


WARNING
What is this telling us?

NB: Rates are per milion hours worked



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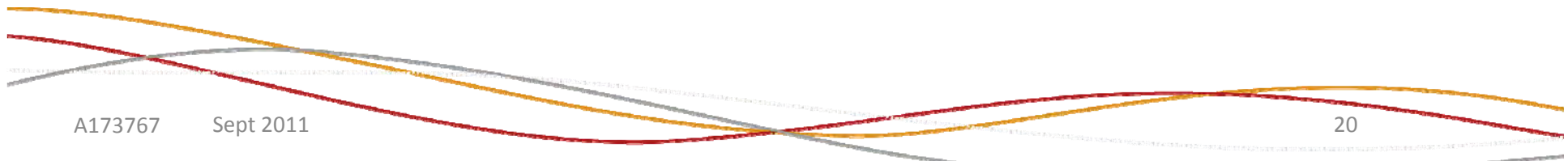




Top TapRoot® Root Causes for FPSO/FSOs						
2005	2006	2007	2008	2009	2010	ytd 2011
Work Direction 9.2%	Human Engineering 12.1%	Design Specs 13.7%	Equipment Parts / Defects 14.2%	Procedures - Not Followed 20.0%	Design Specs 17.2%	Design Specs 15.3 %
Procedures - Not Followed 8.2%	Work Direction 10.1%	Equipment Parts / Defects 10.3%	Procedures - Not Followed 13.0%	Equipment Parts / Defects 15.3%	Procedures - Not Followed 10.5%	Equipment Parts / Defects 11.9%
Training 5.1%	Mgmt System - Human 10.1%	Preventive Maintenance 9.7%	Design Specs 12.3%	Design Specs 14.2%	Preventive Maintenance 9.6%	Procedures - Not Followed 11.0%
Preventive Maintenance 5.1%	Preventive Maintenance 10.1%	Procedures - Not Followed 8.0%	Preventive Maintenance 11.7%	Preventive Maintenance 11.6%	Equipment Parts / Defects 8.8%	Mgmt System - Human 9.3%
Equipment Parts / Defects 5.1%	Procedures - Not Followed 9.1%	Human Engineering 5.7%	Tolerable Failure 5.2%	Training 6.3%	Training 6.7%	Mgmt System - Equipment 8.5%



FPSO CASE STUDY





- Incident: Fire and explosion
- Issues:
 - Facility Design
 - Commissioning, QA/QC, carry-over into operations
 - Competency and training
 - Control room alarm flooding
 - Maintenance management



- Regulatory intervention: Inspections
- Major deficiencies identified in:
 - Maintenance backlog management
 - Effectiveness of operational control
 - SCEs not meeting performance standards
 - Reportable incidents
 - Housekeeping
- Enforcement action included:
 - Improvement Notices
 - Prohibition Notice



- Initial response to intervention:
 - Delegation to contractor
 - Completion dates not fully met
 - Over reliance on NOPSA to identify health and safety issues
- Intervention options:
 - Inspections
 - Potential escalation of enforcement
 - notice of intent to withdraw safety case
 - request revised safety case



LESSONS FROM INSPECTIONS

**Design
Commissioning
Operations**



- Alarm management
 - Address during design / commissioning
- Material selection
 - Souring of the reservoir is a common outcome of facilities that conduct produced water reinjection.
 - This generally results in a higher than anticipated H₂S content in well, process & rundown streams



- Critical Function Testing (CFT)
 - SCEs not meeting performance standards
 - SCE often requires a production shutdown to CFT with frequency implications
 - Systems should allow for performance tracking / reporting of SCE during unscheduled shutdowns.



- Safety-critical elements: performance non-compliance: BDVs / SDVs
- Incomplete commissioning
 - construction debris
 - excessive punch list items
 - lack of Quality Assurance/Quality Control



- Inadequacies in competency / training
 - Restart of plant and processes: cyclone disconnection is a complex task requiring technical skills and experience
- Operators must ensure sufficient time for required competencies to be acquired



- Procedures Incorrect / Not Followed
 - Procedures take time to achieve and should be considered as dynamic.
 - Procedures should be validated or reviewed to reflect the current, best practice.
 - Use Management of Change (MOC), otherwise procedures can be undermined, resulting in shortcuts and risk taking.



- Failure to complete Corrective Actions
 - "Case to Operate", "Deviations", "Temporary Operating Procedures", and such are used to justify continued operations
 - Such permissions to operate should be time-limited and tracked to ensure permanent rectification is applied and maintained



A topical issue

LIFEBOAT LOADING



IMO SOLAS, Lifeboats are designed for **75kg/person**

Offshore NOPSA found average = **92kg-100kg/person**

= some lifeboats **25%-30% overloaded** based on their SWL

NOPSA has made Operators aware of the problem of lifeboats exceeding their SWL and have required them to take action.

Some Operators have :

- reduced the number of POB per lifeboat;
- changed the lifeboats and davits – bigger boats & increased SWL
- added extra lifeboats;



**See also NOPSA
Safety Alert No.47**



PROCESS SAFETY CULTURE



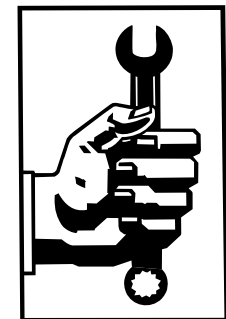
Safety Culture Survey TOPIC AREA	Areas of concern - FPSOs
Safety Values / Commitment	Pressure to work overtime - loyalty to their own work unit
	Process safety programmes don't have adequate funding
Reporting	Hazard identification, control and reporting training not adequate
Training	Contractors don't receive adequate training to do their job safely
Worker Professionalism / Empowerment	Workers don't actively participate in incident investigations



TOPIC BASED INSPECTIONS



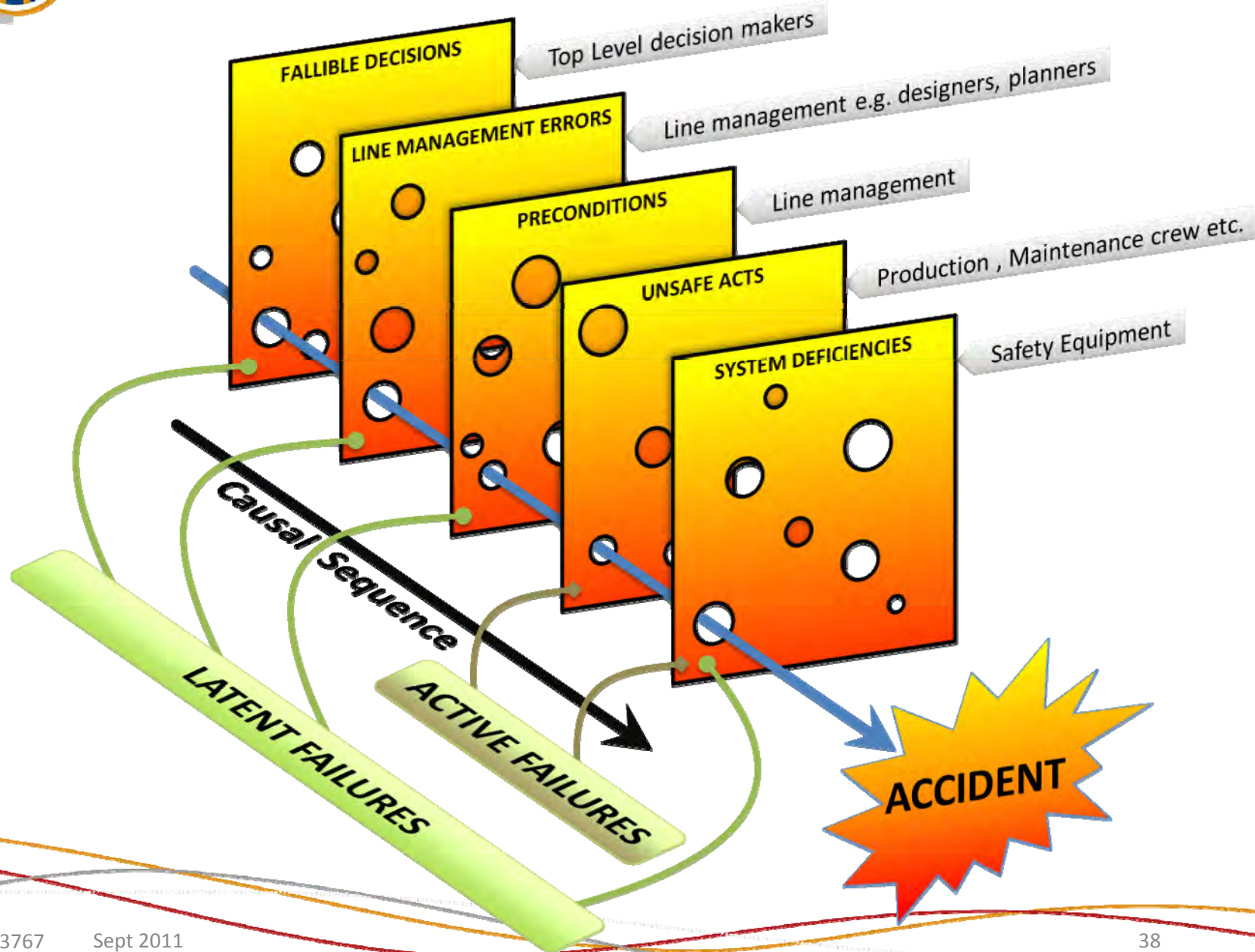
- Variation between documented maintenance system and how maintenance is actually conducted
- Formal deferrals process not used – risks not assessed
- 3rd party competency – EHS assessed but not technical competencies
- **Auditing – inadequate**





- Drills being undertaken with limited number of scenarios
- 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**







- Where those operating equipment were unaware of the actual situations they were 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 conditions



- 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
 - 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
 - circumstances were not recognised or understood by senior personnel at the time
- Commission recommended:
 - existing well control training programs should be reviewed, with a focus on well control accidents that have occurred



- 15 fatalities
- Overfilling of a tower during start-up releasing flammable liquid to atmospheric vent
- 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



- 2 fatalities, 8 injuries
- loss of hot lean oil flow with subsequent flow causing brittle fracture and hydrocarbons release
- Commission findings included:
 - ‘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’



- **No fatalities or injuries**
- Coolant pumps failed, relief valve stuck open with a partial meltdown of reactor core
- Commission concluded:
 - inappropriate operator action
 - deficiencies in training and 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.”



- Ensure staff are competent, and supported by effective procedures to **diagnose and respond to abnormal conditions**
- **Share and learn lessons** from past incidents both within and outside the industry
- **Organise** yourselves in such a way that you are better able to notice the **unexpected** in the making and halt its development

(paraphrase of Hopkins, 2009 from Weick and Sutcliffe, 2001)



Thank you