

Maintaining the Integrity of Offshore Installations

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Topsides UK 2021 Conference

The Importance of Asset Integrity



SAFETY

Asset integrity is the key initial prevention barrier (LHS) – integrity of topsides equipment, fixed or floating structure

Also important as mitigation barrier (RHS) – integrity of shutdown systems, detection equipment etc

ECONOMICS

Vital for efficient production

Planned, proactive maintenance much lower cost than unplanned reactive

Health and Safety Executive

Control measures for major accident risks

HSE expects dutyholders to understand that major hazard risks have to be managed in a multi-layered way and that the layers of protection or control measures will address technical, managerial and procedural arrangements.

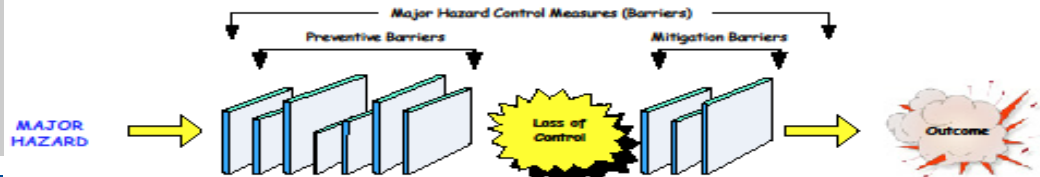


Figure 1 Layers of protection

Layers of protection can be depicted as a 'bow-tie' to emphasise the way barriers link in sequence in relation to each major hazard scenario.

HSE Focus on Asset Integrity



HSE KP3 report (2004 to 2007) defined asset integrity as ‘...the ability of an asset to perform its required functions effectively and efficiently whilst protecting health, safety and the environment’

Other HSE programs with strong asset integrity focus:

- **KP4 Ageing and Life Extension (2011-2013)**
- **Maintenance Management Inspection Guide (2014)**
- **Maintaining Safe Operations (2015-18)**
- **Process Safety Leadership (commencing Q1 2022)**

KP3 Findings (2004-7)

Out of the 16 management system elements examined those most likely to perform badly were:

- Maintenance of Safety Critical Equipment (SCEs)
- Maintenance backlogs and deferrals (particularly corrective maintenance)
- Measuring compliance with performance standards

For more than 50% of installations inspected, the state of plant element was considered to be poor.

Leadership

‘...senior management in the industry had failed to adequately monitor the status of asset integrity. In several cases in KP3 inspections, few key performance indicators (KPIs) existed for asset integrity which led to poor decision making’

KP3 Underlying Issues



The Engineering Function

'...the influence of the engineering function had declined to a worrying level. It was found that technical authorities were under pressure, often reacting to immediate operational problems than taking a strategic role to provide expertise and judgement on key operational engineering issues'

OGUK Progress Report 2009 *"There has been considerable investment in hardware, management systems and the resources available; however, it is recognized that this is not a task that will ever be 'finished', and continuing investment in effective asset integrity management is something that will always be required during the remaining life of the North sea oil and gas industry"*

Current Asset integrity Challenges

- **Ageing offshore assets, many beyond originally envisaged design life**
- **Varying levels of inspection and maintenance throughout operational life**
- **Several transfers of ownership in some cases**
- **Increasing challenges posed by extreme weather events**
- **Increased focus on transition from hydrocarbons**
- **High demand for oil and gas / high prices**
- **...COVID 19 Pandemic**

Where are we now regarding Asset Integrity?



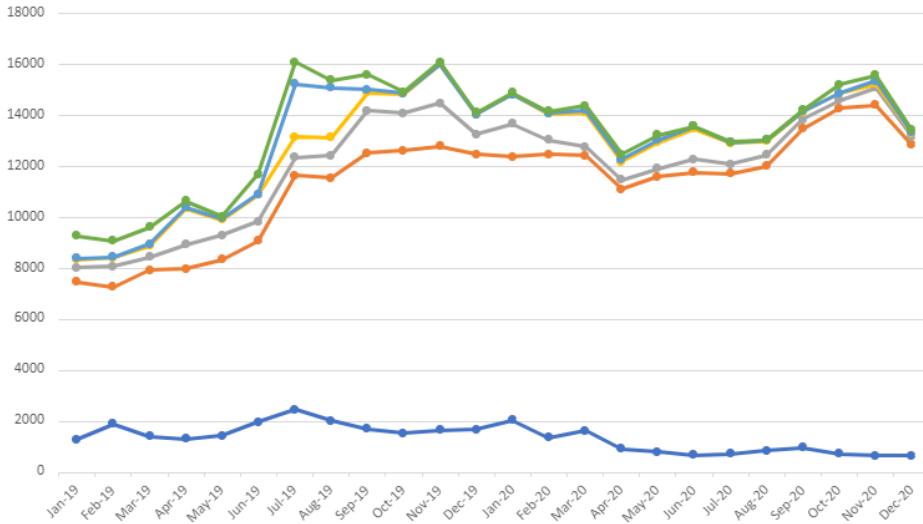
Backlog Information Requested December 2020 – April 2021

- Need to evaluate the impact of the pandemic on asset integrity
- Many restrictions including shutdown postponements, POB limitations etc
- A sample of 23 duty holders from 34 'production' duty holders in the UKCS

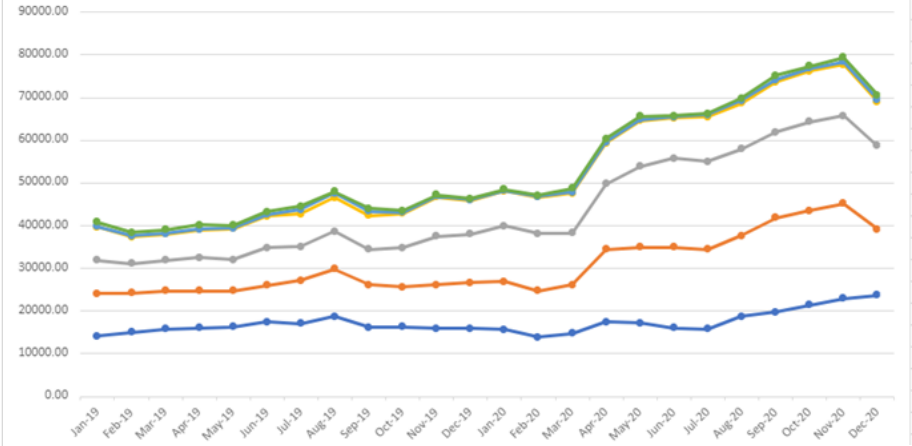
Asset Integrity – Data Summary



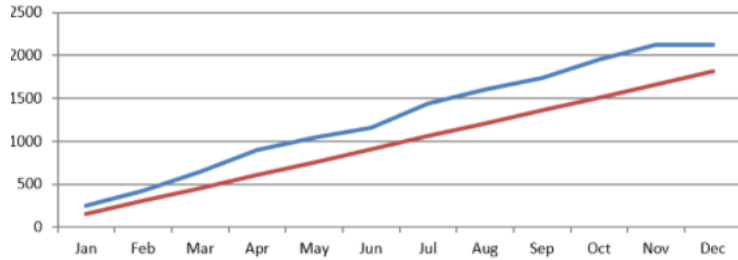
All SECE Maintenance Backlog



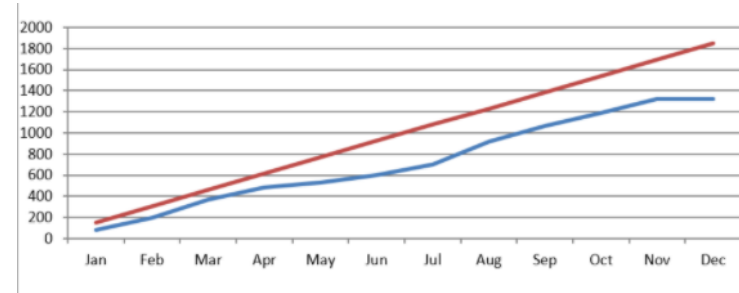
All Non-SECE Maintenance Backlog



Asset Integrity – Data Summary



2019 anomalies closed out (blue) vs target (red)



2020 anomalies closed out (blue) vs target (red)

Asset Integrity – Summary Q1 2021



- **Generally:**
 - Backlog of work trending upward
 - Deferrals increasing
 - Operational Risk Assessments increasing
 - Where inspection hours delivered; anomaly count increasing & not rectified
 - Some DHs reported doubling of fabric maintenance backlog over 2019 and 2020
- POB constraint has always been a recognised issue
- COVID-19 has exacerbated the issue

All this means the cumulative risk associated with asset integrity is increasing....

What next?



- 2021 TARs have been executed but this has not eliminated the backlog issue
- Sustained asset integrity campaigns for late life installations are required
- Solutions:
 - Flotels or jack-up drilling rigs in accommodation mode alongside
 - More frequent maintenance campaigns
 - More extended shutdowns
 - FPSOs off station for extensive maintenance

What has HSE been doing?



In addition to the programs described earlier and asset integrity focus during ongoing inspections:

- Asset Integrity Task Group (AITG) focussing on topsides asset integrity
- Previously under OGA Asset Stewardship Task Force / now OGUK sponsored
 - Restarted in earnest last few weeks after break during pandemic
 - Previous topics covered include live line blasting, risk-based inspection
- HSE input on key asset integrity issues, incidents, guidance, safety alerts etc
- Current focus on process safety leadership improvements by the integrity community


What has HSE been doing?




In addition to the programs described earlier and asset integrity focus in ongoing inspections:

- OGUK group specifically focussed on backlogs and KPIs with HSE support
- Enforcement action on maintenance backlogs
- Enforcement action on FPSO integrity issues
- Extreme weather joint industry/HSE research work for fixed structures


Principles of Process Safety Leadership (PSL)




Clear and positive process safety leadership is vital




Engagement of the workforce




Process safety leadership requires involvement, understanding and competence




Robust and regular auditing of the safety management system and barriers




Constant active engagement and vigilance



Publication of process safety performance information



Senior leadership team visibility and promotion



Sharing good practice and implementing lessons

Martin Temple CBE
Chair
Health & Safety Executive



Wendy J. Kennedy OBE
Chief Executive
Offshore Petroleum Regulator for
Environment and Decommissioning



Deirdre Michie OBE
Chief Executive
OGUK



Steve Rae
Executive Director
Step Change in Safety



Matthew Brodie
Chair North Sea Chapter
International Association of
Drilling Contractors



PSL

Asset Integrity

Operating Integrity

Remediation Work

Contracting Strategy - Duty Holder Model

Isolations & Reinstatement

Inspection

Deferrals

Risk Management

Procedural Deviation / Not in place

Fabric Maintenance Condition

Defined Life Repairs

Monitoring, Audit & Review

Equipment Maintenance

Late Life Management

Management of Change

Investigations & Lessons Learned

HSE Process Safety Leadership Interventions



What, When

- Interventions will start Q1 2022 and run into 2023 (up to 8)
- Parallel networking with industry bodies (OGUK/AITG) to encourage action - self audit / benchmark
- Useful guidance documents exist on this eg EI PSM framework, Step Change Asset Integrity Toolkit, OECD Process Safety Guidance for Senior Leaders

How, Who

- An inspection guide will be developed and shared, based on the PSL principles
- Duty holders & licensees will be selected based on a range of criteria
- Engagement will be required at duty holder/licensee Senior Management level
- A measure of the line of sight between 'Boardroom and Control Room' will be sought
- Similar approach and learnings taken from the Buncefield initiated Process Safety Leadership Group
One of the key improvements – ensuring effective leadership and understanding of the risks

Changing the Attitude to Asset Integrity



Maintaining the integrity of the asset needs to be viewed as a value adding activity rather than an inconvenient and expensive overhead

*'The perception may be that millions of dollars were 'wasted' on a corrosion under insulation (CUI) program because there weren't many findings...
The reality is that you've gained a lot of certainty because you've stripped insulation, inspected and recoated the piping'*

- Many lessons from KP3 around 15 years ago resonate as much as ever now
- Asset integrity function and key asset indicators need high level visibility, support and action
- Use of technology to improve efficiency is vital to optimise analysis, targeting of resource and execution BUT ultimately doesn't replace the need of remedial work to be carried out

The UKCS Asset Integrity challenge is as great, if not greater, than at any point in its history. The safe future viability of this industry depends on meeting this challenge...