

Health and Safety  
Executive



**Perspective from the Regulator**  
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**Materials & Corrosion Specialist**



# Introduction

- Our perspective on corrosion threats
  - Inspection findings
  - HCR releases



# UKCS challenges

- Mature industry in a hostile environment
- Ageing assets
  - maintaining infrastructure
  - life extension
- Downturn in oil price
  - Efficiency drives
  - Staffing levels
- End of life assets
- Decommissioning



# Regulating the offshore industry

- Permissioning (assessing safety cases)
  - ensure that risks are addressed and suitable measures are in place
- Inspection
  - to check that the measures described in the safety case are in place
  - to take action to promote and achieve sustained compliance
- Work with stakeholders – produce guidance
- Research – to fill knowledge gaps

# Corrosion –our findings offshore

## Key issues:

- Atmospheric external corrosion
- FM in later life assets
- CUI
- Deck penetrations
- bolting corrosion
- corrosion of / at pipe supports (in particular trunnion supports)

Fairly common during investigations to find the RBI process has not been fully followed

# Corrosion related enforcement

17 Improvement Notices served relating to corrosion in past 5 years

- CUI – 6
- HCR release due to external corrosion – 3
- Failure to adequately inspect – 3
- Failure to adequately maintain – 5

2 prosecutions where corrosion was the root cause

# CUI



# CUI – the cost of getting it wrong



## Corrosion Under Insulation

2003.

Catastrophic failure of 4”  
gas compression line.

1200kg gas release, but  
fortunately no ignition or  
Injuries.

£250,000 fine.

Revised sentencing guidelines

Similar failures now likely to  
result in fine of £1m - £3m



# Major Gas Release “CUI”

## Press and Journal:

Oil giant fined £1.2million after pipe rupture exposed staff to ‘unacceptable risk’ of ‘death from fire and explosion’



# Major Gas Release “CUI”



# Major Gas Release “CUI”



Devastation – shrapnel everywhere

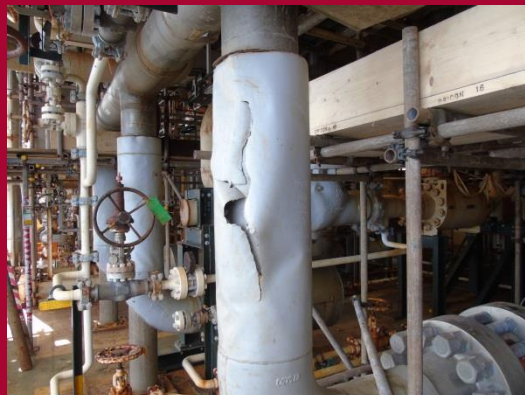
# This is the condition of clad piping “After being stripped for inspection”

Old  
Cladding  
reinstated  
after being  
stripped for  
inspection  
Very Poor  
Seals !!!!

Will this last  
till next  
inspection?



# “CUI” Condition of Insulation



**Remember cladding can be damaged very easily during ongoing activities**

# Deck Penetrations & Denso Tape on Flanges



Lack of maintenance on deck penetrations; note the use of Denso Tape on flanges is bad practice, recommend the inspection of penetrations and removal of Denso Tape and inspection of flanges and bolting underneath.

# Corrosion Under Pipe Supports



GVI will not confirm the condition or Integrity of a pipe at the contact point of a support!

# Spring Hanger Supports





# Pipe Support ?



# Pipe Support ?



# Contact Point corrosion



Do you really need that  
Personnel protective mesh?

Contact point corrosion can  
be a real threat

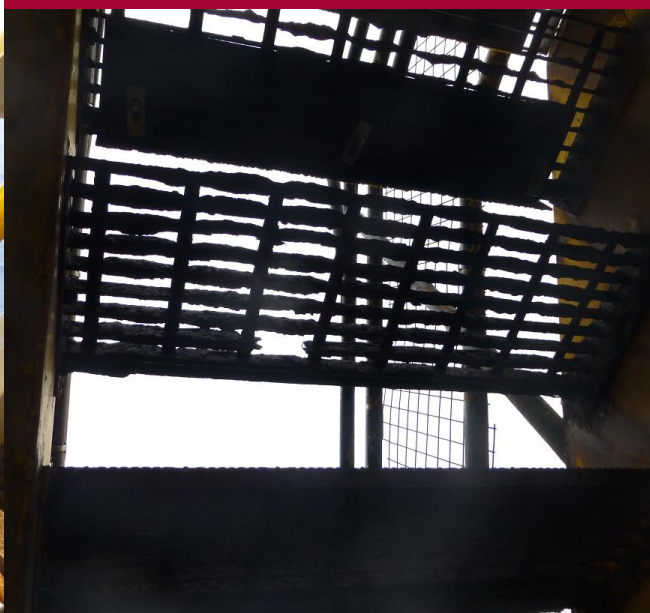
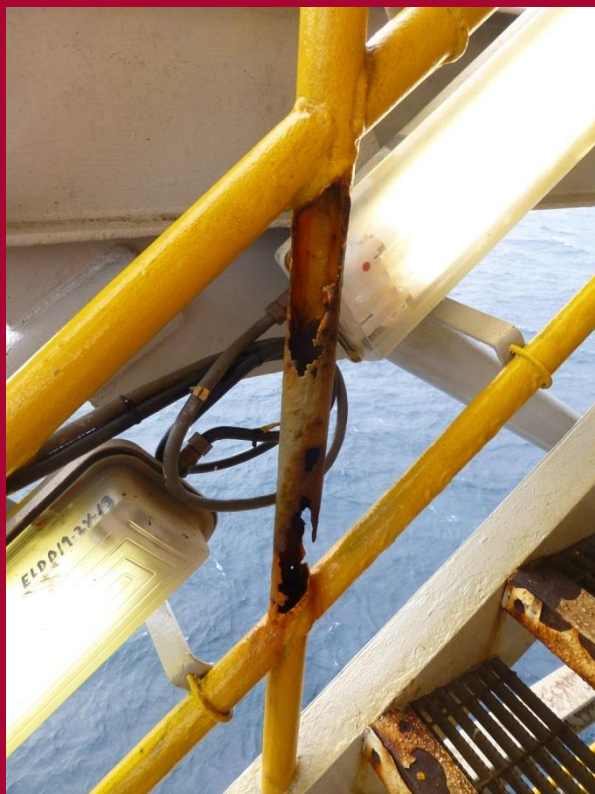
Don't assume the protection  
is actually needed.

Take the actual  
temperature of the pipe  
work - don't assume the  
drawing is correct

# External corrosion - flowlines



# External corrosion - fabric



# Trunnion supports



# Dropped Object Potential

- Redundant Pipework left to rot at height
- Angle Iron Cable supports and Brackets
- Secondary steel work supporting ducting etc.
- General lack of Fabric Maintenance increasing the risk of dropped objects.
- HVAC Ducting
- **NOTE DROPPED OBJECTS IMPACT ON DECOMMISSIONING**

# Human Factors

Corrosion Risk Assessments and RBI outputs only part of the process for effective integrity management

I would recommend looking at HOIS Human factors guidance (HF-NDT for visual inspection for external corrosion)



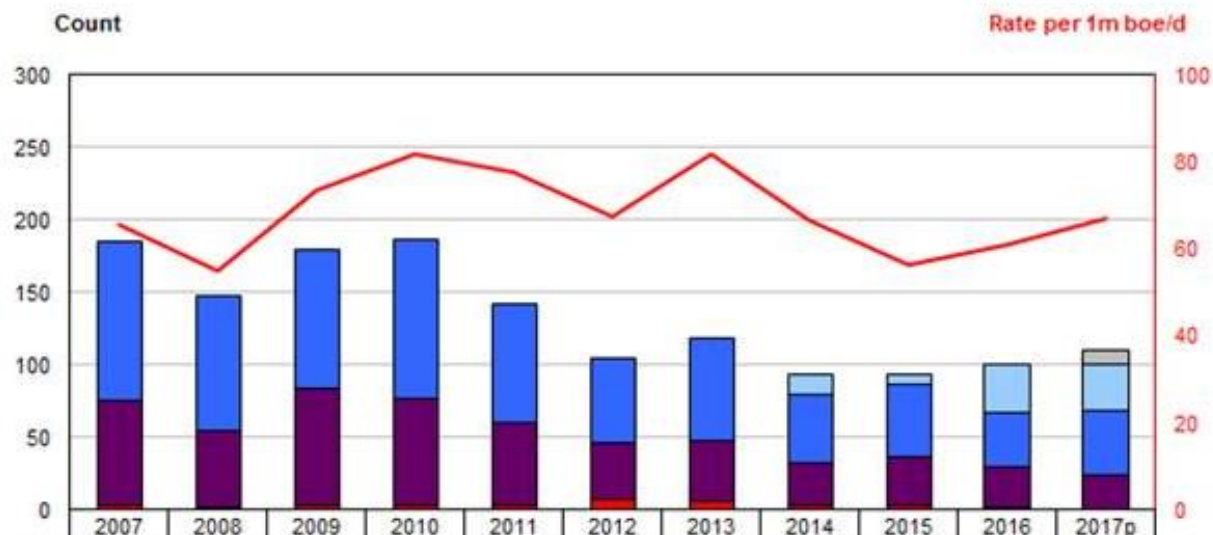
# Some HSE stats - HCR

Figure 11: Hydrocarbon releases (offshore), 2007 - 2017p\*

Source: HCR database

p = Provisional

The HCR release rate is based on the level of production in million barrels of oil equivalent per day (boe/d); latest data is available at [oilandgasuk.co.uk/businessoutlook.cfm](http://oilandgasuk.co.uk/businessoutlook.cfm)



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017p
Awaiting Classification	0	0	0	0	0	0	0	0	0	0	10
Non Process	0	0	0	0	0	0	0	14	7	33	31
Minor	110	93	95	109	82	58	70	47	50	37	45
Significant	71	52	81	73	57	39	42	30	33	28	23
Major	4	2	3	4	3	8	6	3	3	2	1
Release rate per 1 m boe/d	66	55	74	82	78	67	82	66	56	61	67

# Legal status of guidance

***“When all appropriate standards are met, the likelihood of harm is remote”***

Hierarchy of ‘Appropriate’ standards:

Defined: Legislation, ACoP

Established: CoPs, CEN standards and guidance

Interpretive: research, published papers etc.

# Summary

Corrosion is still a big threat to Asset Integrity and the health and safety of offshore workers in UKCS

Still more work to do to improve corrosion management

HSE recognise corrosion remains a big challenge for the industry

Finally,



Thank you for your attention