SAFETY & RELIABILITY SOCIETY

REVEALING WEAK SIGNALS OF POTENTIAL MAJOR ACCIDENTS IN THE NORTH SEA: KEY FINDINGS FROM 147 OFFSHORE INSPECTIONS

BY
DAVID JAMIESON AND EUGENE YASINSKIY OF SALUS TECHNICAL

15TH MARCH 2023

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SaRS SAFETY AND RELIABILITY SOCIETY

- Introduction
- Presentation by David Jamieson and Eugene Yasinskiy
- Q&A session
- Accessing the webinar recording
- Feedback

Note: the Webinar is being recorded

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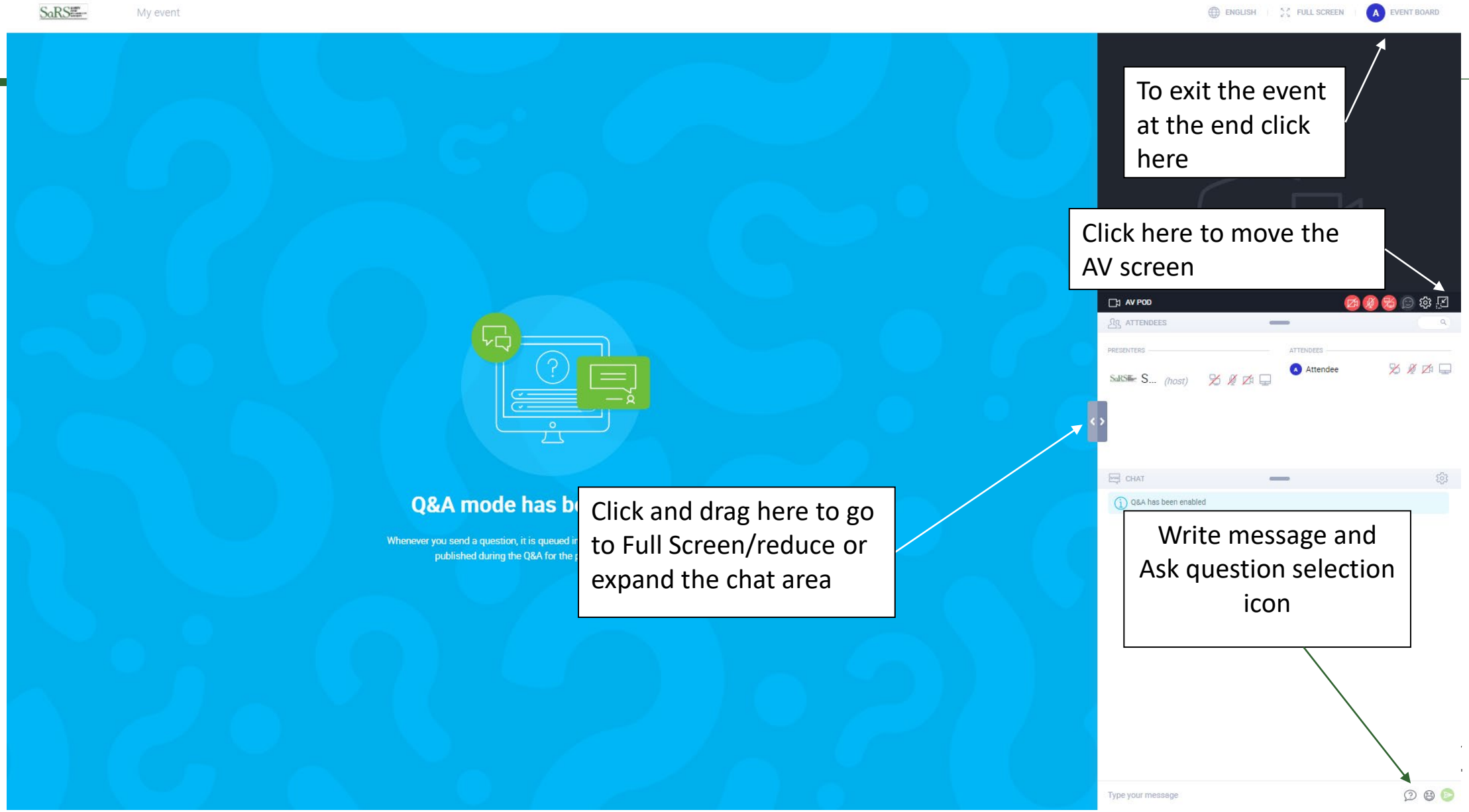
VIEWING IN FULLSCREEN AND Q&A FACILITY



PRESENTATION

Revealing weak signals of potential Major Accidents in the North Sea: Key findings from 147 Offshore Inspections

by
David Jamieson and Eugene Yasinskiy,
Salus Technical

Revealing weak signals of potential major accidents in the North Sea

Key findings from 147 Offshore Inspections

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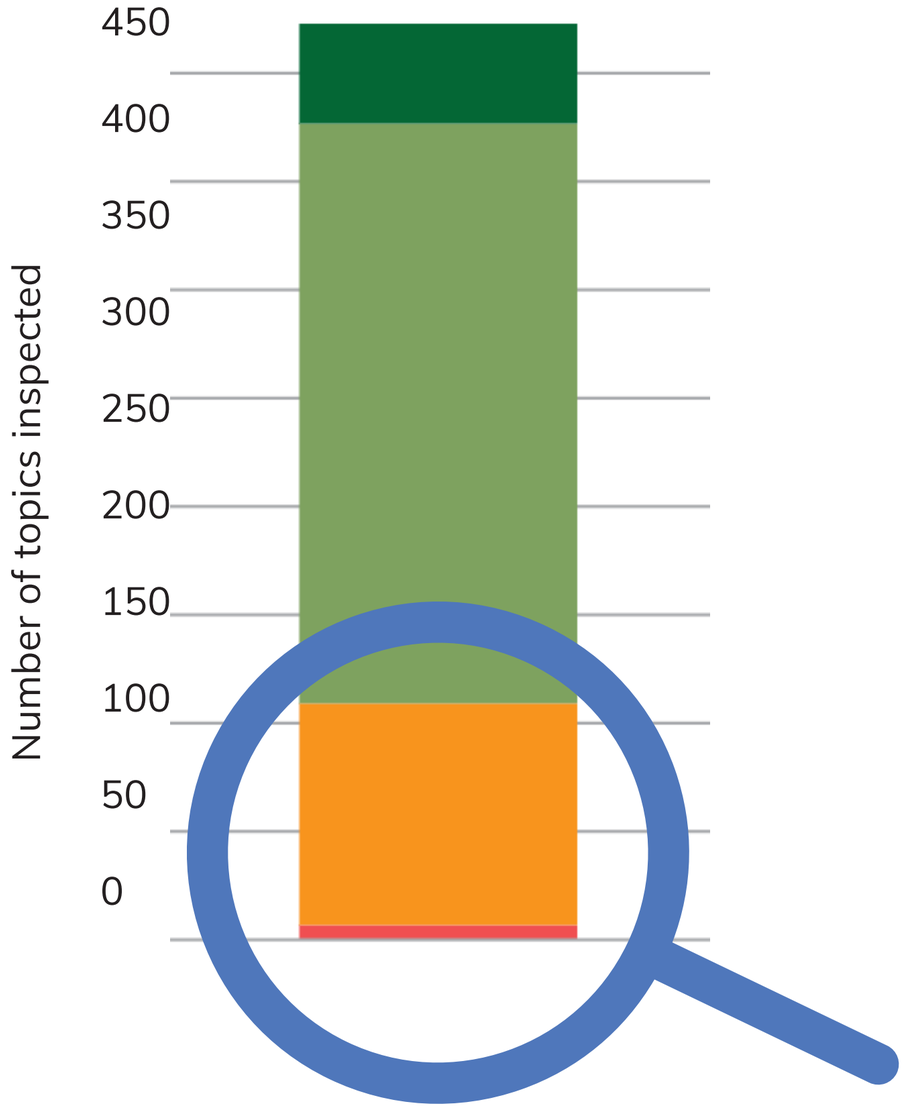
What can we learn from offshore inspection scores?

2019



https://bit.ly/hse-doc

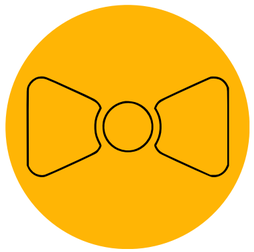
Who are we?

Engineering

Process Safety engineering support, workshop facilitation and general UK Offshore Safety Regulations support

Training

Bespoke Process Safety training courses and videos



Software

Suite of cloud-based Process Safety software products related to bowtie diagrams and human factors

Agenda

- Introduction
- What is an offshore inspection?
- What is a letter from the HSE?
- Regulations with sub-standard compliance
- Focus Areas
  1. SECE Management & ORAs
  2. Human Factors
  3. Loss of Containment
- Action for Leaders

“Process Safety is not the absence of incidents, it is the presence of effective barriers”

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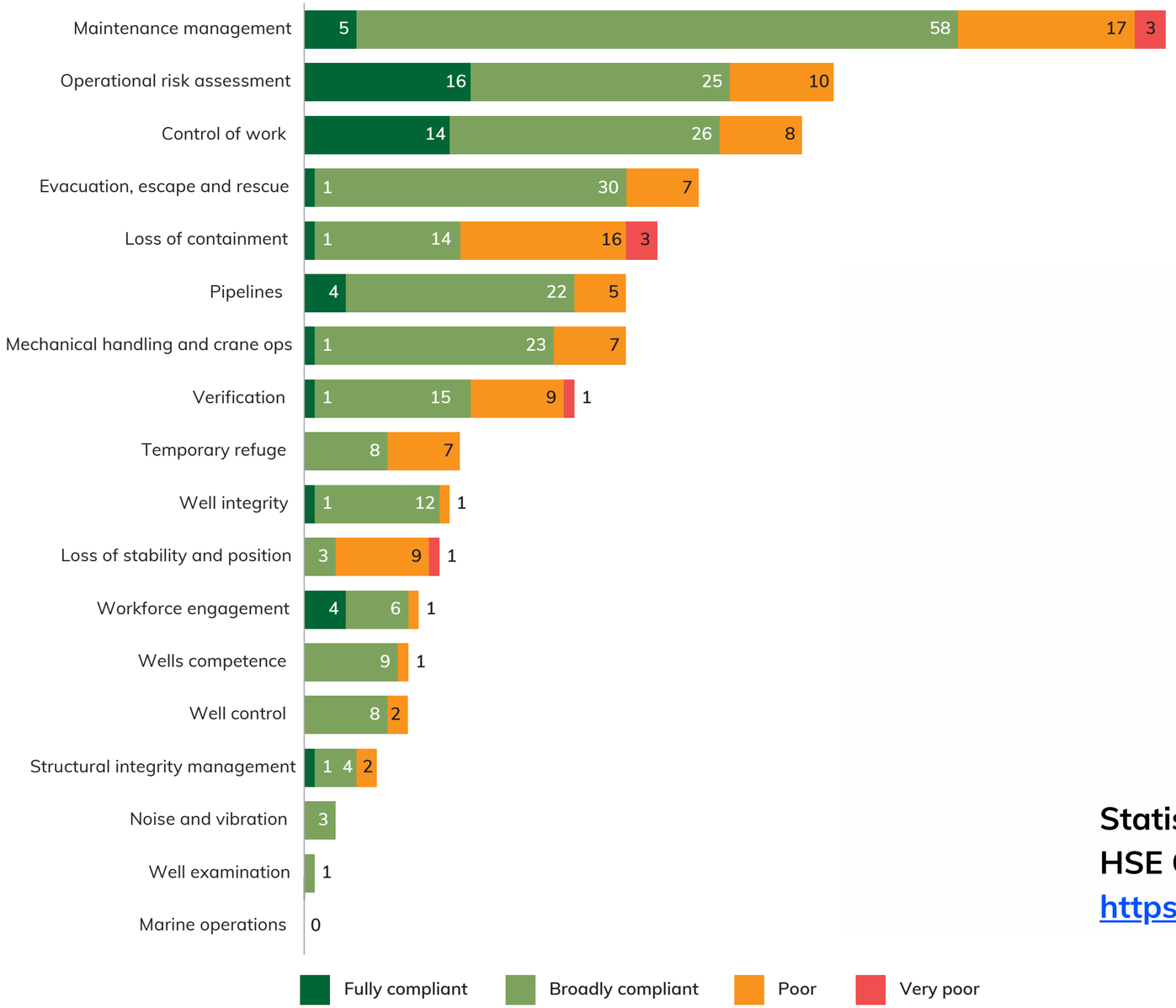
What topics does the offshore HSE inspection cover?

- Maintenance Management
- Operational Risk Assessment
- Control of Work
- Evacuation, Escape and Rescue
- Loss of Containment
- Workforce Engagement
- Well Control
- Noise and Vibration
- Marine Operations
- and more...

HSE topics of offshore inspections include



Statistics taken from:
HSE Offshore Statistics & Regulatory Activity Report 2020
https://www.hse.gov.uk/offshore/statistics/hsr2020.pdf

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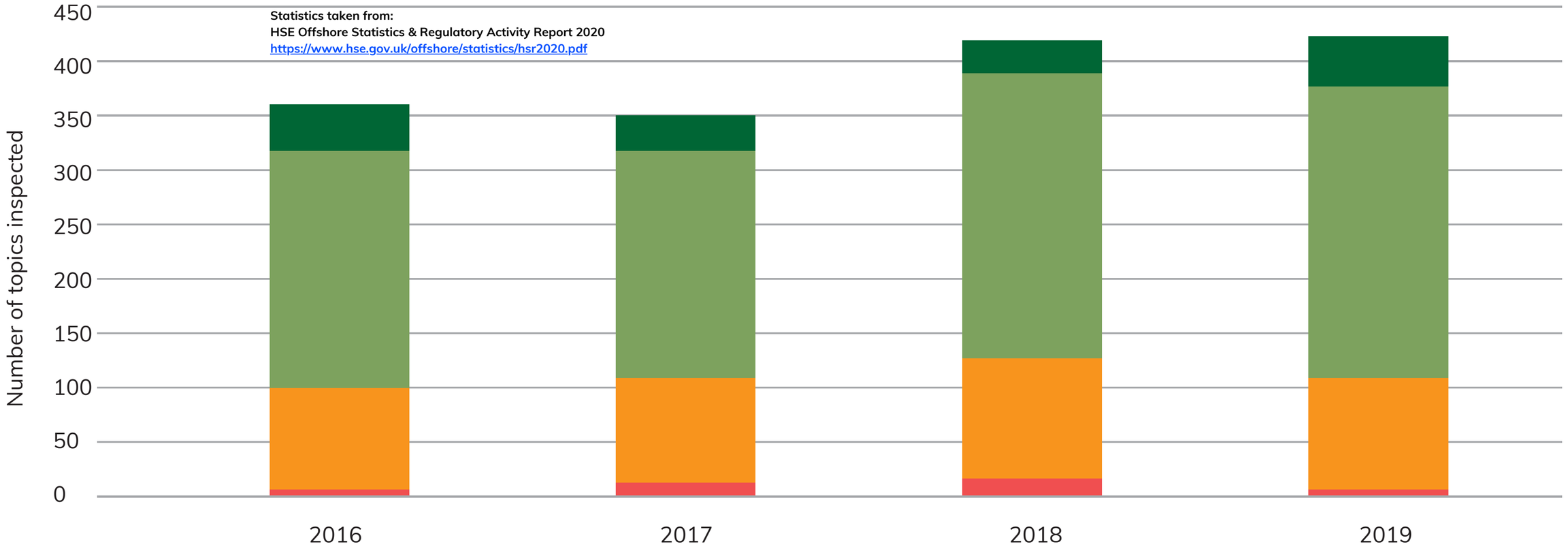
What is an Offshore Inspection?

EXTREME	SUBSTANTIAL	MODERATE	NOMINAL	NONE	NONE
Topic Performance Score					
60	50	40	30	20	10
Unacceptable	Very Poor	Poor	Broadly Compliant	Fully Compliant	Exemplary
EMM Initial Enforcement Expectation					
Prosecution / Enforcement notice	Enforcement notice / Letter	Enforcement notice / Letter	Letter / Verbal warning	None	None

What can we learn from offshore inspection scores?



Very poor
Substantially below the relevant minimum legal requirements.
Initial enforcement expectation: enforcement notice / letter.

Poor
Significantly below the relevant minimum legal requirements.
Initial enforcement expectation: enforcement notice / letter.

Broadly compliant
Meets most of the relevant legal requirements.
Initial enforcement expectation: letter / verbal warning.

Fully compliant
Meets the relevant minimum legal requirements.
Initial enforcement expectation: none.

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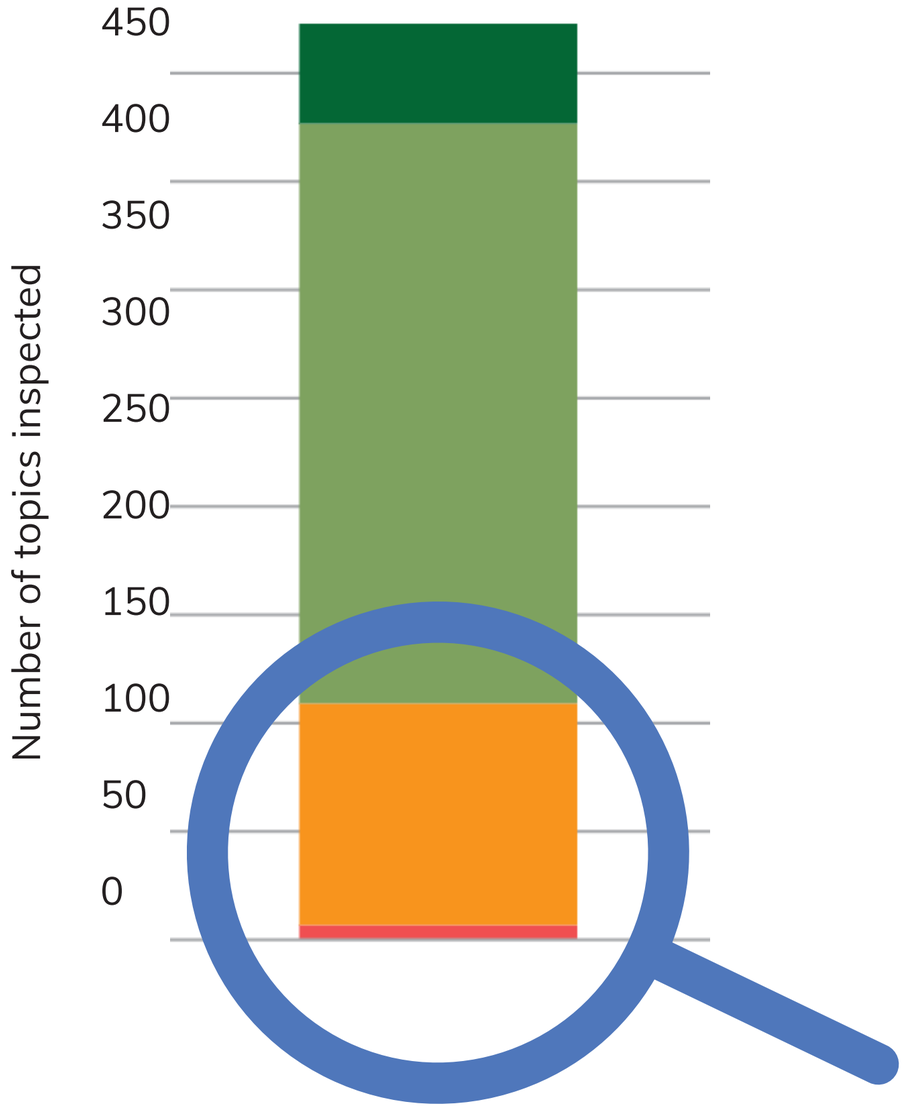
What can we learn from offshore inspection scores?

2019



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What's in each letter?

Offshore Safety Directive Regulator

Department for Business, Energy & Industrial Strategy

HSE

[redacted]
Energy Division – Offshore
Lord Cullen House
Fraser Place
Aberdeen
AB25 3UB

Tel: 020 3028 [redacted]
[redacted]@hse.gov.uk

http://www.hse.gov.uk/osdr

H M Principal Inspector of Health & Safety
[redacted]

[redacted]

Company Address

Date: 27 March 2019

Reference: [redacted]

Attn: [redacted]

Dear Sirs,

[redacted] **OFFSHORE INSPECTION: 29TH – 31TH JANUARY 2019**

HEALTH AND SAFETY AT WORK ETC ACT 1974

My colleagues, [redacted], HM Inspector of Health and Safety (IMT), [redacted], HM Inspector of Health and Safety (Mechanical), [redacted], HM Inspector of Health and Safety (Material) and I undertook a regulatory inspection on the above installation. We discussed our findings with [redacted] the Offshore Installation Manager, other members of the offshore management team, and the Elected Safety Representatives before leaving the installation. Our findings were further discussed with you on 6 February 2019, at your offices.

I am now writing to you, on behalf of the Competent Authority, to require you take a number of actions following the inspection. In doing so, I have quoted the legislative basis for this. You should reply in writing to me within 28 days of receipt of this letter stating what measures you are taking in response to the actions below, including any timescales for implementation as appropriate.

In addition, please send an electronic copy of your signed letter to my email address above, and to ED-Offshore.Intervention-Responses@hse.gov.uk.

I have sent a copy of this letter to the installation's elected safety representatives in accordance with the requirements of Section 28(8) of the Health and Safety at Work etc Act 1974. This letter has also been shared with BEIS.

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What's in each letter?

A) Inspection findings in the areas regulated by the Competent Authority

MANAGEMENT OF HEALTH AND SAFETY AT WORK REGULATIONS 1999

1. **Regulation 3 (1)** **Risk Assessment: Operational Risk Assessment**

The regulation requires that every employer to make a suitable and sufficient assessment of the risks to the health and safety of his employees to which they are exposed whilst they are at work.

Our inspection revealed that:

a) The Operational Risk Assessment (ORA) ([redacted] relating to the fragments of bursting disk entrapped within the HP flare header has been open since May 2018.

b) The length of time this ORA has been in place has not be assessed, the residual risk in [redacted] is given as medium which the [redacted] ORA procedure [redacted] outlines a maximum ORA time of 30 days. There is no evidence that the ORA has been subject to a 30 day review and that an adequate risk review has taken place to consider the high number of extensions needed.

c) [redacted] initial risk was identified as medium [redacted] however when the ORA was extended under [redacted] the initial risk was identified as high [redacted], no explanation is given as to why the risk has increased and whether this justifies an extension.

d) Furthermore [redacted] shows the initial risk was identified as [redacted] and the residual risk has been reduced to [redacted] this shows an increase in likelihood, again no reason is given as to why this is the case.

Relevant Regulation

You must:

Re-visit the process by which you carry out the operational risk assessment to take account of the following:

a) The risk assessment should consider the length of time an ORA needs to be in place and the periodic review required in line with the determined residual risks.

b) Extension of ORAs should be justified and reasons for increase in risk should be clarified.

c) Independent audits on the ORA process should be carried out periodically.

d) Subsequent ORA extensions should involve senior management authorisation and this should be attached to the ORA with clear justification.

Repeat the cycle

https://bit.ly/hse-doc

If we scratch below the surface, the weak signals from 2019 reveal themselves...

1 in 4

offshore inspections found aspects of the duty holders' operation which were significantly below the standard expected in the regulations, on average *

Once every 2 weeks

an enforcement action was raised against duty holders by the regulator (either prohibition or improvement notices), on average *

Once every 5 days

there was an unplanned hydrocarbon release (classified as major, significant or minor based upon their severity), on average *

Statistics taken from:
HSE Offshore Statistics & Regulatory Activity Report 2020
https://www.hse.gov.uk/offshore/statistics/hsr2020.pdf

2019 successes

0	Fatalities
3	Major releases

2020 successes

0	Fatalities
0	Major releases

2019 weak signals

218	Dangerous occurrences
61	Hydrocarbon releases topsides
18	Pipeline releases
17	Well releases
113	Non-hydrocarbon releases

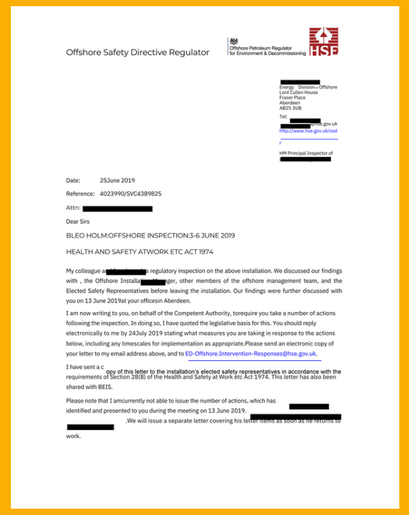
% of Poor or Very Poor Scores in Offshore Inspections

2020 weak signals

172	Dangerous occurrences
63	Hydrocarbon releases topsides
16	Pipeline releases
7	Well releases
86	Non-hydrocarbon releases

Statistics taken from:
HSE Offshore Statistics & Regulatory Activity Report 2020
https://www.hse.gov.uk/offshore/statistics/hsr2020.pdf

What did we do?



Offshore Safety Directive Regulator

Offshore Petroleum Regulator for Environment & Decommissioning

[redacted]
Energy - Division - Offshore
Lord Cullen House
Fraser Place
Aberdeen
AB25 2UB
Tel [redacted]
[redacted]@hse.gov.uk
http://www.hse.gov.uk/xxx/

[redacted]
HM Principal Inspector of [redacted]

Date: 25June 2019

Reference: 4023990/SVC4389825

Attn: [redacted]

Dear Sirs

BLEO HOLM OFFSHORE INSPECTION 3-6 JUNE 2019

HEALTH AND SAFETY ATWORK ETC ACT 1974

My colleague a[redacted] regulatory inspection on the above installation. We discussed our findings with , the Offshore Installa[redacted]ger, other members of the offshore management team, and the Elected Safety Representatives before leaving the installation. Our findings were further discussed with you on 13 June 2019at your officesin Aberdeen.

I am now writing to you, on behalf of the Competent Authority, torequire you take a number of actions following the inspection. In doing so, I have quoted the legislative basis for this. You should reply electronically to me by 24July 2019 stating what measures you are taking in response to the actions below, including any timescales for implementation as appropriate.Please send an electronic copy of your letter to my email address above, and to ED-Offshore.Intervention-Responses@hse.gov.uk.

I have sent a c[redacted]opy of this letter to the installation's elected safety representatives in accordance with the requirements of Section 28(8) of the Health and Safety at Work etc Act 1974. This letter has also been shared with BEIS.

Please note that I amcurrently not able to issue the number of actions, which has [redacted] identified and presented to you during the meeting on 13 June 2019. [redacted] .We will issue a separate letter covering his le[redacted]ssible to support to work.

147 HSE Offshore Inspection Letters issued to 56 Duty Holders

PDF extraction

Database to analyse findings

18
inspection topics assessed

1062
non-compliances found

“Action is the foundational key to all success”

Pablo Picasso

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Main Failings raised - Regulations Perspective

1	The Offshore Installations (Prevention of Fire and Explosion, and Emergency Response) Regulations 1995	Raised over 260 times!
2	Management of Health and Safety Regulations 1999	Raised almost 200 times!
3	The Provision and Use of Work Equipment Regulations 1998	Raised over 110 times
4	The Offshore Installations and Wells (Design and Construction etc.) Regulations 1996	Raised over 85 times
5	The Offshore Installations (Offshore Safety Directive) (Safety Case etc.) Regulations 2015	Raised over 50 times

SECE Management

Safety and Environment Critical Elements (SECEs) are those parts of the plant whose failure could cause or contribute substantially to a major accident or is present to prevent, or limit the effect of a major accident hazard.

It is essential for good safety management that SECEs are maintained in good working order.

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Operational Risk Assessment (ORA)

An ORA is required where there is an intention to operate safety and environment critical equipment outside its normal operating envelope, or with control devices not functioning as designed.

This includes any changes to organisational capability that may compromise the safe operation of the installation. The most common trigger for an ORA is the identification of an impairment to a Safety and Environmental Critical Element (SECE).

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SECE management / ORAs

Success Criteria	Reoccurring Findings
SECE review should consider all aspects of SECE’s condition e.g., Operational Risk Assessments (ORAs).	Following a SECE's degradation and PS failure, ORAs were either not being conducted at all or had failed to provide clear information on the mitigations that were in place.
There should be means of demonstrating SECE suitability based on their function, reliability, and availability.	SECE suitability and compliance with PS objectives **could not be demonstrated.**
The duty holder shall undertake availability and reliability assessments of SECEs.	Assessment on availability and reliability written in SECE PS **could not be demonstrated** that they were being conducted.

SECE management / ORAs

Success Criteria	Reoccurring Findings
There should be alignment between the performance standards and the assurance activities and there should be a clearly defined pass or fail criteria for testing.	Performance standards or assurance activities did not contain clear guidance on pass or fail criteria for any of the testing or maintenance.
A SECE review should consider all aspects of SECE condition e.g., maintenance deferrals.	There were many overdue SECE work orders falling into backlog **without being risk assessed** and deferred due to incorrect prioritisation of safety instrumented functions in the MMS.
The standard of performance should be held within the MMS, and there should also be alignment between the SECE performance standard and the MMS.	MMS were **not aligned** with the SECE PS.

SECE management / ORAs

Success Criteria	Reoccurring Findings
An ORA procedure should detail: • When it is to be used. • Shortcomings and impairments that trigger an ORA. • A clear methodology to be followed when assessing the risks. • Roles, responsibilities including approval of ORAs. • ORA action tracking, monitoring, review and close out. • An assessment of cumulative risk.	There was a lack of ORAs for degraded safety critical equipment even when this was a requirement stated in the ORA procedure. No criteria were in place to determine when it is necessary to carry out a cumulative risk assessment, how it is assessed and who is responsible for carrying out and approving such assessments.
There should be a practical application of ORA procedure including onshore (technical authority) involvement and awareness of roles and responsibilities.	There are no formal training in the ORA procedure, leading to individuals not following the ORA process.

SECE management / ORAs

Success Criteria	Reoccurring Findings
Inspection of ORA output – the assessment should make clear any time limits on adopting temporary remedial measures and when the fault or failure must be rectified including its priority.	The validity period of the ORA was based upon the time taken to make the repair, rather than being risk-based.
Monitoring and auditing of ORA remedial actions should be put in place.	The mitigation measures identified through the ORAs were not being implemented.

Human Factors (HF)

HF is an integrated discipline which applies psychological and physiological principles to the engineering and design of products, processes and systems with the goal of managing the risk of human error.

The primary goal of HF is to reduce the likelihood and consequences of human failure where it could lead to, or fail to mitigate, a Major Accident Hazard (MAH).

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Human Factors

Success Criteria	Reoccurring Findings
There should be a formal process for managing Safety and Critical Task Analysis (SCTA).	There was no corporate methodology for SCTA in line with relevant good practice using an appropriate methodology.
There should be a full range of tasks identified for the installation.	Safety critical task lists were either not created or had been created too early in the asset's life cycle.
The duty holder should be able to demonstrate that the HF methods used to analyse tasks on the installation are well understood.	Task analysis and human reliability analysis had not been used to understand which key steps are vulnerable to human error.

Human Factors

Success Criteria	Reoccurring Findings
The output of the SCTA process should be adequate.	Performance influencing factors were not identified within the SCTA process.
There should be experience and training in place for HF for the lead analyst and the participants.	There was a lack of HF awareness training for personnel.

Loss of Containment

Major fires and explosions are initiated by releases of hydrocarbons. As such, the effective design and implementation of measures to prevent hydrocarbons' releases is fundamentally important.

Releases can occur from either failure of the asset itself due to corrosion, abrasion or fracture, or because of failures of maintenance e.g., poor practice when breaking and re-making joints, or insufficient operational controls.

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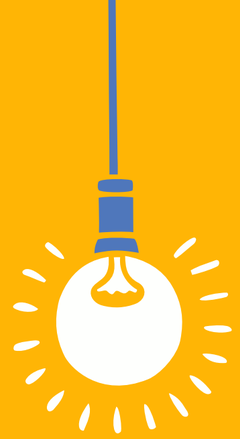
Loss of Containment

Success Criteria	Reoccurring Findings
It is essential that any changes to the design, arising during the construction phase, are subject to formal management of change controls including risk assessment and are well documented and controlled.	MOC procedures were not being implemented following changes to installation hardware and software, and personnel were developing their own set of rules and work arounds.
The duty holder should have an alarm management strategy which takes into account the guidance set out in EEMUA 191 or BS EN 62682.	Alarm rates were in excess of those recommended by relevant industry guidance.

Loss of Containment

Success Criteria	Reoccurring Findings
Duty holders should have arrangements in place to ensure effective process operator handover including a procedure which specifies the requirements for handover.	There were either no shift handovers procedures in place, or procedures were not being followed adequately such that handovers were being conducted ineffectively.
The duty holder should have carried out appropriate hazard identification and assessment studies so that all process hazards have been identified, assessed and suitable measures selected.	The existing Hazard and Operability (HAZOP) studies (and other safety studies) did not fully assess all foreseeable hazardous conditions and suitable control measures.
There should be effective process safety leadership on the installation.	Personnel with leadership responsibilities had not received training in either safety leadership or human factors.

Ask yourself:

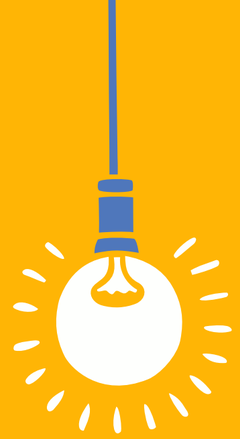


How confident are you that these findings wouldn’t apply to your operation?

For each key inspection topic, have you defined Key Performance Indicators (KPIs) that are visible and understood throughout your organisation?

Is your workforce aware of your asset’s Major Accident Hazards (MAHs)?

Ask yourself:



Are you providing frontline workers with the right level of resources, time, competence and procedures to tackle these issues?

Has the workforce been suitably engaged with your management of process safety?

Through robust audit and assurance, can you find your own areas of improvement before the regulator?

Actions for Leaders

Training and Competence	No one deliberately acts unsafely. There must be a general awareness of process safety throughout an organisation so that personnel can understand how their actions can impact on safety. The workforce must be competent to perform their role and be provided with adequate support and resources.
Risk Assessment	Risk assessments must be robust, performed at the right time, and with the right people present. The cumulative risk across an installation must be understood at all times.
SECE	There should be a clear link between performance standards and the Maintenance Management System (MMS). There should be robust procedures in place to risk assess Safety and Environmentally Critical Equipment (SECE) impairments and backlog.
Human Factors	Human factors should be implemented across the organisation and clear training provided for those that need it. There should be a procedure in place for Safety Critical Task Analysis (SCTA). Safety critical procedures should be subject to SCTA as appropriate.
Emergency Response	Emergency response risk assessments and plans should be up to date, understood by all personnel, and regularly drilled.

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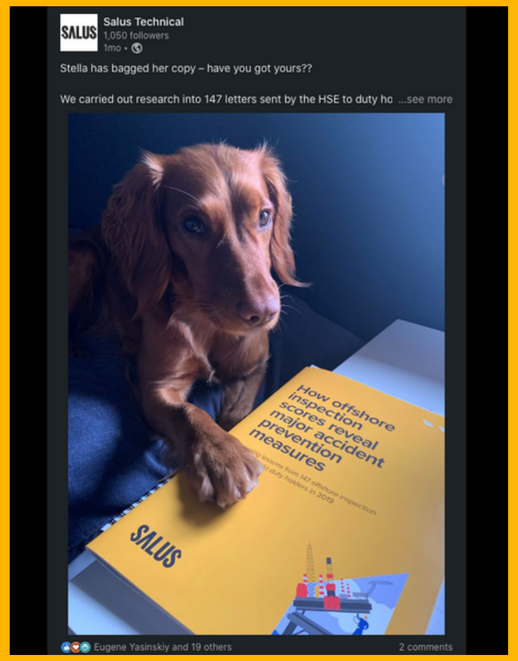
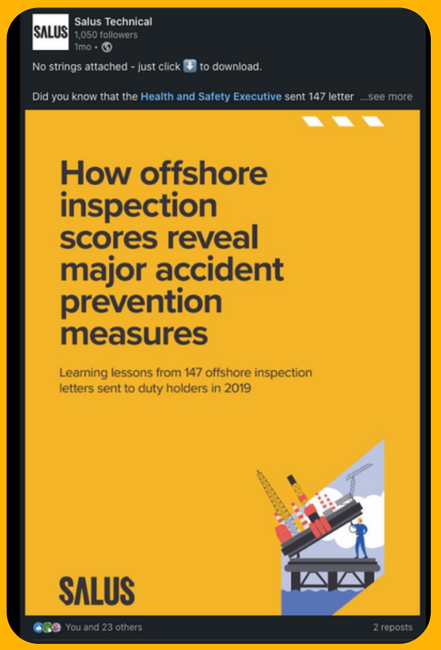
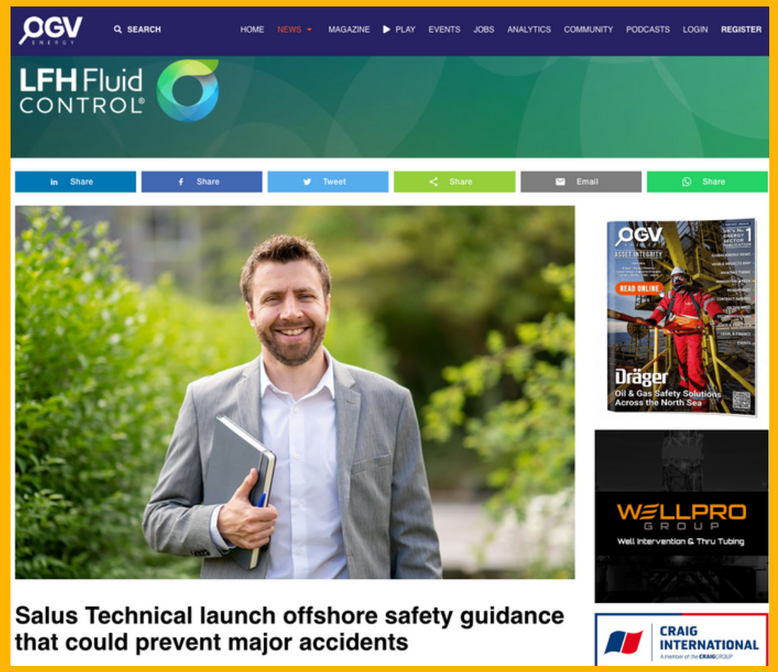
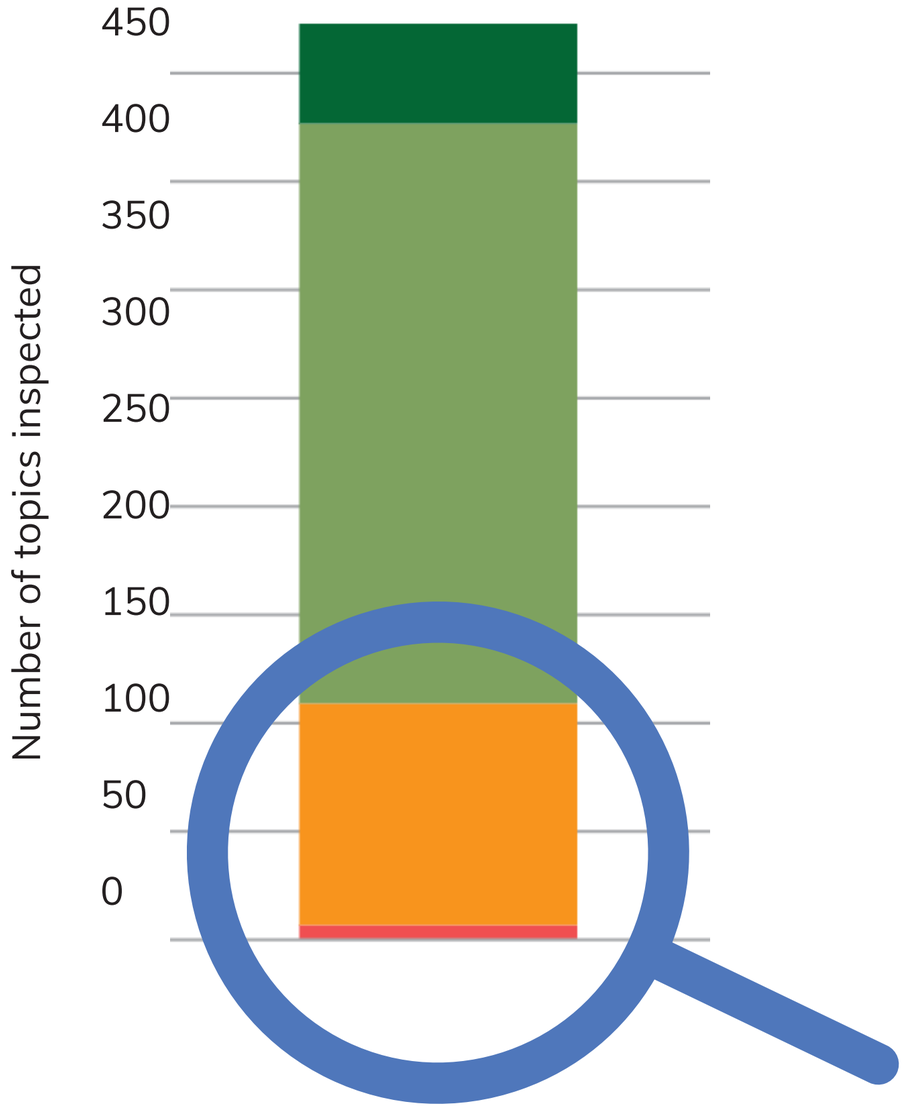






What can we learn from offshore inspection scores?

2019



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“Your future hasn’t been written yet. No one’s has! Your future is whatever you make it. So, make it a good one!”

Doc Brown, Back to the Future III

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- A full version of this webinar recording will be available to SaRS members and also a version with the chat redacted will be made publicly available to all. It should be on the website in the next couple of days.

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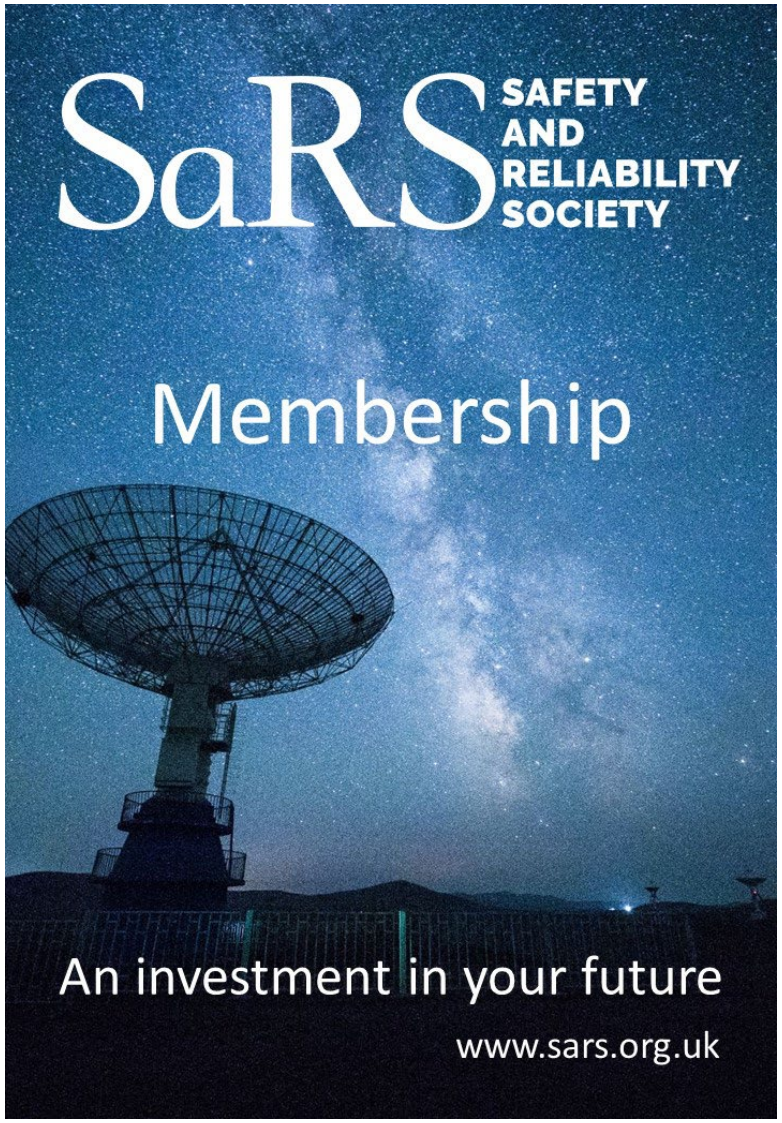

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More information available at www.sars.org.uk SaRS SAFETY AND RELIABILITY SOCIETY

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- The information is vital for us to improve our offering
- Please take two minutes to fill it in and click Submit
- Your CPD Certificate will be sent to you if you requested one at registration
- Thank you very much for attending

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