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HIGH VALUE LEARNING

High Value Learning

Offshore Deluge Systems

Who could be interested in this?

Professionals involved in Process Safety Leadership, Asset Integrity Management, Operations & Maintenance, and Health & Safety.

What is this all about?

Active Fire Protection (AFP) is a critical safeguard across offshore installations, designed to protect personnel in the event of an emergency.

Following decades of performance testing on carbon steel deluge systems using raw seawater, offshore platforms were experiencing inconsistent test results. Investigations across a range of system components, from pump caisson to discharge nozzles, revealed multiple performance issues.

A key finding was the buildup of internal corrosion, which had led to scale detachment and, consequently, poor system performance during testing. In one instance, the absence of a chemical dosing system had also allowed marine growth to develop within the pipework, further compromising flow rates and nozzle discharge.

Internal Corrosion

Marine Growth

Of particular concern was the presence of deadlegs, sections of pipework where stagnant seawater can accumulate. These areas are highly susceptible to internal corrosion and biofouling, especially in systems lacking continuous chemical dosing. Such conditions significantly increase the risk of blockages forming between testing intervals.

To preserve the integrity and operational readiness of deluge systems, whether constructed from carbon steel or corrosion-resistant materials, it is suggested that duty holders should implement proactive strategies to prevent internal degradation.

A robust maintenance and integrity assurance program would also include:

- Routine external visual inspections of valves, cabinets, nozzles, and exposed pipework
- Regular borescope inspections to assess internal pipe condition and identify any signs of corrosion or marine growth

Addressing the root cause is essential to ensuring deluge systems remain fully operational and capable of performing as intended during an emergency. System integrity can be enhanced by upgrading to corrosion-resistant materials, such as Elastopipe or CuNi or reviewing the use of other technological solutions. Alternatively, a comprehensive internal retro-jetting intervention of existing carbon steel pipework with appropriately located drain points can be carried out. Coupling these measures with an improved preservation and maintenance regime, including the application of a corrosion-inhibiting coating, will significantly improve system performance.

Low Point Drain

Corrosion Inhibitor Foam Application

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Some things to consider?
Consider how you manage the integrity of your Deluge System (managing corrosion of carbon steel system and management of marine growth) Consider a requirement for monitoring the internal condition of the deluge header and branch pipework system Consider introducing a chemical inhibition solution post testing on carbon steel systems As your last line of defence, is your IVB/ICP reviewing the correct areas? • Are multi-year trends in nozzle blockages, corrosion rates, and flow performance being reviewed and challenged? • Is the scope of verification aligned with the actual degradation mechanisms observed in carbon steel systems (e.g. internal corrosion, marine fouling)? • Are inspection findings being used to inform risk-based inspection (RBI) strategies and update performance standards? • Is there a process to ensure feedback loops from testing and inspection are influencing future verification scopes? Are your arrangements for inspection and maintenance sufficient in light of the points raised in this alert?
Useful guidance: HSE Energy Division Offshore Inspection Guide – Active Fire Protection (2021) HSE Report – Corrosion and cleaning of offshore deluge (RR1046) (2015) Energy Institute 3378 – Guidelines for the corrosion management of firewater deluge systems (2018)

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