

Notifiable incident

Incident ID [5491](#)

Duty holder: Shell Australia Pty Ltd
Facility/Activity: Prelude FLNG
Facility type: Floating liquefied natural gas facility

Incident details	
Division	Occupational Health and Safety
Notification type	Incident
Incident date	15/07/2018 08:20 PM (WST)
Notification date	16/07/2018 07:19 AM (WST)
NOPSEMA response date	16/07/2018 12:00 AM (WST)
Received by	[REDACTED]
Nearest state	WA
Initial category type <i>(based on notification)</i>	Dangerous Occurrence
Initial category <i>(based on notification)</i>	Damage to safety-critical equipment
3 Day report received	19/07/2018
Final report received	09/09/2018
All required data received	09/09/2018
Final category type <i>(based on final report)</i>	Dangerous Occurrence
Final category <i>(based on final report)</i>	Damage to safety-critical equipment
Brief description	OHS - DSCE Fire main deluge valve
Location	Process deck
Subtype/s	Valve failure
Summary <i>(at notification)</i>	<p>Water was observed in the machinery space on Deck 4, leaking from above. The source was found to be the high expansion foam room on Deck 2. The area on Deck 4 was cleared by public address and the machinery room entered, and was found to be flooded with a large volume of water (12m x 12m room, 0.5m deep).</p> <p>The leak source was a deluge valve 3-way bleed connected to the fire main, which acts on the deluge valve to regulate it. This had failed and was passing fire water (seawater). An investigation is ongoing, but it is suspected that the failure could have been triggered by routine fire pump testing done yesterday.</p> <p>The leaked water is being pumped into the bilge system and cleaned up. Inspections are being conducted on the lower deck to check for any water damage, e.g. to electrical equipment.</p> <p>The high-expansion foam package A has been taken out of service for repairs - this is linked by a cross-over line to package B, which does not represent full redundancy but provides some back-up for the fire system.</p>

Details <i>(from final report)</i>	<p>Water was observed in the machinery space on Deck 4, leaking from above. The source was found to be the high expansion foam room on Deck 2. The area on Deck 4 was cleared by public address and the machinery room entered, and was found to be flooded with a large volume of water (12m x 12m room, 0.5m deep).</p> <p>The leak source was a deluge valve 3-way bleed connected to the fire main, which acts on the deluge valve to regulate it. This had failed and was passing fire water (seawater). An investigation is ongoing, but it is suspected that the failure could have been triggered by routine fire pump testing done yesterday.</p> <p>The leaked water is being pumped into the bilge system and cleaned up. Inspections are being conducted on the lower deck to check for any water damage, e.g. to electrical equipment.</p> <p>The high-expansion foam package A has been taken out of service for repairs - this is linked by a cross-over line to package B, which does not represent full redundancy but provides some back-up for the fire system.</p> <p>The functionality of the fire water system has been fully restored.</p> <p>Inspection of the deluge valves found that the fittings installed were not the correct fittings. The correct materials should be Monel for seawater service, instead Stainless fittings were installed in these deluge valves. The Stainless fittings showed evidence of slow minor leaks prior to failure. It was hence concluded that the failure of the fittings was caused by corrosion.</p> <p>A survey was conducted for the remainder of the Inbal deluge valves (Supplied by the EPC Contractor on the same Purchase Order) and found similar installation on the Inbal valves on the 2nd deck. A mix of Stainless and Monel fittings were installed, instead of Monel only fittings. All other Inbal deluge valves surveyed had Monel fittings and tubes on the water side of the valves.</p> <p>The Inbal valves with stainless steel fittings installed on the water side of the valves have been identified, and are undergoing replacement to Monel fittings.</p>
Immediate cause/s	Incorrect fittings installed in deluge valves (stainless) which are incompatible for seawater service and therefore resulted in corrosion.
Root cause/s	ED - DESIGN - Design specs - design not to specs
Root cause description	Inspection of the deluge valves found that the fittings installed were not the correct fittings. The correct materials should be Monel for seawater service, instead Stainless fittings were installed in these deluge valves. The Stainless fittings showed evidence of slow minor leaks prior to failure. It was hence concluded that the failure of the fittings was caused by corrosion.

Duty inspector recommendation

Date	16/07/2018
Duty inspector	[REDACTED]
Recommendation	Do not conduct Major Investigation
Reasoning	Does not meet MI threshold based on information received
Supporting considerations	

Major investigation decision

Date	17/07/2018
Decision	Do not conduct Major Investigation
Reasoning	Does not meet MI threshold based on information received
Supporting considerations	

Non-major investigation review and recommendation

Date	18/07/2018
Inspector	Percy Dhanbhoora
Risk gap	[REDACTED]
Type of standard	Established
Initial strategy	Investigate

Recommended follow up strategy

Recommended strategy	Investigate
Supporting considerations	Possible serious consequence due to unavailability of the deluge system. Moderate risk gap - Investigate.

Non-major investigation decision

Date	18/07/2018
RoN	
RoN review result	Agree with recommendation
Strategy decision	Investigate
Supporting considerations	

Associated inspection

Inspection ID	1829
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