

Notifiable incident

Incident ID [6283](#)

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	03/12/2019 02:40 PM (WST)
Notification date	05/12/2019 09:30 AM (WST)
NOPSEMA response date	05/12/2019 09:35 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	08/12/2019
Final report received	17/01/2020
All required data received	23/01/2020
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 - Two ESDVs failed to meet it's function as per performance standards.
Location	
Subtype/s	Facility integrity, Valve failure
Summary <i>(at notification)</i>	<p>The OIM of the Prelude FLNG facility reported that during an event that was previously reported to NOPSEMA of a spurious shutdown on 03/12/2019. On further analysis / investigation during the facility shutdown / blow down operations on 3/12/2019, two emergency shutdown valves did not achieve the requirement of 'valve closure time' as per the performance standard. This issue came to light on 4/12/2019 after analysis of the shutdown / blowdown valve data from DCS. On 4/12/2019, both valves were tested several times and both meet the function as per requirement of the performance standard.</p>
Details <i>(from final report)</i>	<p>The OIM of the Prelude FLNG facility reported that during an event that was previously reported to NOPSEMA of a spurious shutdown on 03/12/2019. On further analysis / investigation during the facility shutdown / blow down operations on 3/12/2019, two emergency shutdown valves did not achieve the requirement of 'valve closure time' as per the performance standard. This issue came to light on 4/12/2019 after analysis of the shutdown / blowdown valve data from DCS. On 4/12/2019, both valves were tested several times and both meet the function as per requirement of the performance standard.</p> <p>** As Supplied by Duty Holder**</p> <p>At 14:40 two flame detectors were initiated in 4S1 module on A deck which resulted in a General Alarm (GA) and full facility shut down (GPSD). An additional four flame detectors came in to alarm in the subsequent 10 minutes in the 4S1 module. All executive actions from the flame detection were initiated as per the cause and effects including GPSD and deluge activation in 4S1.</p> <p>Further detailed review of UZV closure time post event identified two UZV's in U10000 (UZV-2211 and</p>

UZV-2222) did not meet performance standard for closure time as per below:

100UZV-2211: 4 mins to fully close versus performance standard of 6 seconds
The function of 100UZV-2211 is to isolate the liquid hydrocarbon stream from V-10006.
100UZV-2222: 6 mins to fully close versus performance standard of 6 seconds
The function of 100UZV-2222 is to isolate the gas stream from the LP separator to K-10011.

Work or activity being undertaken at time of incident - Normal plant operations and mooring procedure.

What are the internal investigation arrangements? 5 Why Causal Reasoning Investigation

Action taken to make the work-site safe - Facility muster and emergency response. Mooring operations ceased but vessel remained along side.

Immediate action taken/intended, if any, to prevent recurrence of incident.
Action - Both UZVs were function tested and achieved performance standard with repeatability.
Responsible - Production Coordinator. Completion Date - 4/12/2019 (completed)
Action - Test frequency increased for both UZVs. Initially they are to be re-tested every 2 weeks.
Responsible - Maintenance engineer (with support of technical authority). Completion Date - 12/12/2019
Action - Operational risk assessment . Responsible - OIM. Completion Date - 6/12/2019 (completed)

What were the immediate causes of the incident? This cause is still being investigated.

** As Supplied by Duty Holder**

Has the investigation been completed? Yes

Root cause 100UZV-2211 Booster not set correctly
Root cause 100UZV-2222 Bug vent partially blocked

Full Report:

100UZV-2211 Root cause - Booster not set correctly
Reviewing the Demand Stroke, which occurred on the 3rd December 2019, it is evident that there was slight movement; indicating that pressure was vented from the actuator but at a slow rate. A restriction in air Vent-flow was suspected. Block vents on Booster/ SOV Valve; faulty booster or booster Bypass setting has too much gain.

This scenario caused a back pressure in the booster signal line, preventing the booster from activating and dump the air. It appears that after 5.683 Minutes, the Booster valve reacted, as the booster valve has by this time, reached switching point. The booster then dumped a large volume of air and; due to restriction and the air taking the path of least resistance, the pressure in the booster signal line, got to equilibrium state (in this case @ $\pm 33.4\%$ Travel) and slowly repeated the process until the Booster reached switching pressure again and actuator is completely saturated.

- See diagrams in report -

The following recommendations were executed directly after the event.

1. Inspect Volume Booster and Solenoid Valve for blocked vents.
2. Ensure the Booster By-pass screw is opened one full turn from the seat (counter-clockwise), to ensure the Booster will have greater sensitivity when the SIS solenoid valve is de-energised. This is a general recommendation applicable to all On/Off ESD/ isolation valves fitted with Bifold boosters

100UZV-2222 Root cause - Bug vent partially blocked
Investigation completed by offshore technicians after the valve failed identified the bug vent to be partially blocked.

After the booster setting modification and checking the vent port of the solenoid, numerous Demand strokes after the event have confirmed that the valve and actuator assembly is performing satisfactorily.

Actions to prevent recurrence of same or similar incident - Replace bug vent / modify booster setting.
Responsible - Offshore techn. Completion Date - Completed.

Immediate cause/s	tbc
Root cause/s	
Root cause description	Root cause 100UZV-2211 Booster not set correctly Root cause 100UZV-2222 Bug vent partially blocked

Duty inspector recommendation

Date	05/12/2019
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	05/12/2019
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	06/12/2019
Inspector	[REDACTED]
Risk gap	Moderate
Type of standard	Established
Initial strategy	Investigate

Recommended follow up strategy

Recommended strategy	Investigate
Supporting considerations	This has been reported before and is a known issue. It is under investigation - inspection #2051. The issue is with valves and actuators supplied by a specific OEM, "[REDACTED]". Investigation is ongoing, to be followed-up at the next PI.

Non-major investigation decision

Date	09/12/2019
RoN	[REDACTED]
RoN review result	Agree with recommendation
Strategy decision	Investigate
Supporting considerations	

Associated inspection

Inspection ID	2129
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