Notifiable incident

Incident ID	6114
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	25/08/2019 12:00 AM (WST)
Notification date	26/08/2019 01:21 PM (WST)
NOPSEMA response date	26/08/2019 01:28 PM (WST)
Received by	[redacted]
Nearest state	WA
Initial category type *(based on notification)*	Dangerous Occurrence
Initial category *(based on notification)*	Damage to safety-critical equipment
3 Day report received	29/08/2019
Final report received	24/09/2019
All required data received	24/09/2019
Final category type *(based on final report)*	Dangerous Occurrence
Final category *(based on final report)*	Damage to safety-critical equipment
Brief description	OHSE - DSCE - SDV failed to operate on demand
Location	
Subtype/s	Valve failure
Summary *(at notification)*	Failure of SDV (630USV2091) due to problem with actuator Equipment had failed to operate on previous occasion see Notification 5826 SDV functionality has been transferred to down stream valve which has been converted to perform the same function. Continue to operate under deviation. Replacement actuator is on board date and time of actual event was not available, OIM to include in the 3 day report.

Details *(from final report)*	Failure of SDV (630USV2091) due to problem with actuator Equipment had failed to operate on previous occasion see Notification 5826 SDV functionality has been transferred to down stream valve which has been converted to perform the same function. Continue to operate under deviation. Replacement actuator is on board date and time of actual event was not available, OIM to include in the 3 day report. *as supplied by duty holder* During function testing, shutdown valve, 630UZV-2091 was found to be not functional, only closing to approximately 38%. This is a shutdown valve on the liquid outlet of the wet flare stabiliser vessel (V-63006) and is used for isolation of the line in case of low temperature, high temperature, high level in downstream tank or general shutdown. This vessel is emptied of liquid via this line to the offspec condensate tank, approximately once per week. This valve had malfunctioned earlier in the year, and even though its' performance had allowed it to return to service, all of mitigations from when it was not functional were still in place while 2-weekly testing was taking place to confirm its' sustained performance. It was during a 2-weekly test the valve failed to close. The mitigations that were in place at the time the valve failed to close and remain in place: - 630KSV-1516 (on same line as UZV) has been put in manual to reduce demand on UZV, and manual draining of vessel using KSV-1516 (from DCS) is done via a temporary work instruction. - Functionality of UZV-2091 has been transferred to KSV-1516 via DCS, such that a signal to close the UZV will also close the KSV. Work or activity being undertaken at time of incident Testing of 630UZV-2091 What are the internal investigation arrangements? Valve performance has been analysed. For the previous failure, it had been assumed that debris had been stuck in the valve, but for the latest failure it was more quickly ascertained that the issue is most likely associated with actuator force. The design of the actuator will be reviewed and modified accordingly. What were the immediate causes of the incident? Valve performance was not satisfactory. *as supplied by duty holder* As per report submitted to NOPSEMA on 28th February 2019, shutdown valve 630UZV-2091 on the liquid outlet of wet flare stabiliser vessel V-63006 was unable to close beyond 30%. In preparation for an intrusive intervention, the valve was stroked and found to be closing within the required process safety time. Further testing the following day lead to four successful tests and ultimately demonstration to the technical authorities that the valve functionality was restored. At this time, the root cause of the failure was assessed as a foreign object being trapped in the ball, which was dislodged during stroke testing. The function testing frequency for this valve was increased to 2-weekly to monitor the performance and observe any degradation. On 2nd August 2019, during one of these 2-weekly function tests, the valve failed to close beyond 38%, however once again was able to close after a subsequent stroke. Repeated testing appeared to indicate a similar pattern of failure. Analysis of valve signature from DVC positioner taken during commissioning; and subsequently during June 2019 EDP Event, shows that the actuator supplied with this valve is marginally undersized; and a larger actuator will increase the safety margin and drive the valve past this friction point. This implies that the actuator may run out of torque and be unable to fully close the valve under certain conditions. Note, the "as-commissioned" valve signature indicates that this valve has always seen a larger than expected friction band; however, the condition is exacerbated by increased valve friction in the valve body due to operating temperature, debris in the line and valve trim wear. A larger size actuator has now been fitted onto this valve. Preliminary testing indicates valve is now able to overcome friction and fully seat the valve at process conditions.
Immediate cause/s	TBC
Root cause/s	
Root cause description	Marginally undersized actuator

Duty inspector recommendation	
Date	26/08/2019
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	26/08/2019
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	29/08/2019
Inspector	[redacted]
Risk gap	Moderate
Type of standard	Established
Initial strategy	Investigate

Recommended follow up strategy	
Recommended strategy	Investigate
Supporting considerations	This same valve had been reported under notification #5826. This was investigated during Inspection 1923, and a recommendation raised. This recommendation is still open. Recommend investigate at the next PI to monitor progress. 1923-13 Shell to ensure that the valve (630UZV2091) proof test frequency is reviewed and adjusted accordingly (revised planned inspection frequency), so that it can be demonstrated that the reliability of the valve (i.e. probability of failure on demand) is consistent with assumptions made in the SIL verification. (Ref. IEC 61511-1, section 16.3.1.5)

Non-major investigation decision	
Date	29/08/2019
RoN	[redacted]
RoN review result	Agree with recommendation
Strategy decision	Investigate
Supporting considerations	

Associated inspection	
Inspection ID	2051