Notifiable incident

Incident ID	5444
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	10/06/2018 08:52 AM (WST)
Notification date	10/06/2018 11:00 AM (WST)
NOPSEMA response date	10/06/2018 11:20 AM (WST)
Received by	[redacted]
Nearest state	WA
Initial category type *(based on notification)*	Dangerous Occurrence
Initial category *(based on notification)*	Uncontrolled HC release >1 - 300 kg
3 Day report received	13/06/2018
Final report received	18/07/2018
All required data received	18/07/2018
Final category type *(based on final report)*	Dangerous Occurrence
Final category *(based on final report)*	Uncontrolled HC release >1 - 300 kg
Brief description	OHS-HC1-Confirmed gas leak from flange face.
Location	Deck
Subtype/s	Facility integrity
Summary *(at notification)*	The OIM of the Prelude FLNG facility reported a general platform alarm was set off by confirmed gas detection around the area of the marine loading arms. At the time of gas detection, transfer of LNG was ongoing from one tank to another tank. All executive actions following the incident were implemented and worked as per design, with gas detection reduced within the first period. Once safe, visual and manual checks were conducted near the area where the gas leak alarmed to ensure the area was under control. The facility returned to normal state and operations on hold. Information on my call back - Leak was from 2 flange faces.

Details *(from final report)*	The OIM of the Prelude FLNG facility reported a general platform alarm was set off by confirmed gas detection around the area of the marine loading arms. At the time of gas detection, transfer of LNG was ongoing from one tank to another tank. All executive actions following the incident were implemented and worked as per design, with gas detection reduced within the first period. Once safe, visual and manual checks were conducted near the area where the gas leak alarmed to ensure the area was under control. The facility returned to normal state and operations on hold. Information on my call back - Leak was from 2 flange faces. On the morning of 10th June, preparations to transfer LNG from tank six to tank one using the stripping pump were occurring. The LNG Offloading Header was being cooled by cold LNG vapour from the LNG Stripping Header as per procedure. Production Technicians were monitoring the cool-down of the header via temperature instruments. At 8:52 AM a leak was detected around the LNG Offloading Header triggering the facility GA, and at 8:53 ESD2 was initiated including sequenced blowdown (EDP) of the facility topsides (which were preserved under nitrogen). The LNG Offloading Header quickly deinventorised within 4 minutes and the release stopped. All personnel mustered and no one was injured. After the release, it was found that there was some tape on the two flanges either side of a venturi flow meter of the LNG Offloading Header that had originally been put in place for previous leak testing, which had been disturbed. This indicated that the leaks were in the lower part of these two flanges.
Immediate cause/s	During the commissioning of the LNG Offloading Header, a mix of liquid and vapour LNG filled this line per design. Due to the design of the venturi type flow meter 340FQI-1001 in this large line (creating a weir at the reduction of the venturi), cold liquid pooled in the bottom of the large LNG offloading header causing significant temperature gradient between the top and bottom of the line. This led to thermal bowing of the piping near the flow meter increasing the stress on the flanges, leading to observed leak.
Root cause/s	HPD - PROCEDURES - Wrong - situation not covered, ED - DESIGN - Design specs - problem not anticipated
Root cause description	There were inadequacies with the operating procedure which led to a significant temperature differential across the cross section of the line. The design of the line was similar to standard LNG Carrier designs (i.e. not novel). However, the design contractor (GTT) confirmed that with this standard design, thermal bowing had not been considered as a design case. Venturi flowmeter 340FQI-1001 is a flanged flow meter as it was originally included in the design as a custody transfer meter. Custody transfer meters need to be flanged so that they can be removed for regular calibration.
Release type	Hydrocarbon gas

Duty inspector recommendation	
Date	11/06/2018
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	11/06/2018
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	11/06/2018
Inspector	[redacted]
Risk gap	Moderate
Type of standard	Established
Initial strategy	Investigate

Recommended follow up strategy	
Recommended strategy	Investigate
Supporting considerations	Gas leak from a flange connection during commissioning. Reported that all executive actions following the incident were implemented and worked as per design, with gas detection reduced within the first period. Moderate risk gap.

Non-major investigation decision	
Date	12/06/2018
RoN	[redacted]
RoN review result	Agree with recommendation
Strategy decision	Investigate
Supporting considerations	

Associated inspection	
Inspection ID	1772