

Notifiable incident

Incident ID [6241](#)

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	08/11/2019 06:30 AM (WST)
Notification date	10/11/2019 09:46 AM (WST)
NOPSEMA response date	10/11/2019 09:52 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	12/11/2019
Final report received	09/12/2019
All required data received	09/12/2019
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 - Impairment of a control valve and an adjacent shutdown valve on the vaporiser during start-up.
Location	
Subtype/s	Other, Valve failure
Summary <i>(at notification)</i>	<p>The OIM of the Prelude FLNG facility reported in the process of starting the 'cool end' of the plant and as part of the startup process to sending cool liquids to the Knock Out drum, cool fluids in the vaporiser vessel reached the high-high trip.</p> <p>The control valve and shutdown valves were supposed to function to stabilise the high-high level, but both valves did not function as required.</p> <p>The cause of the above malfunction of both valves attributed to the temperature of the cool liquids in the line of -95degC. On analysis, it was realised that both the control and shutdown valves do not operate at such low temperatures.</p> <p>Subsequently the liquid levels backed up and came down as the Panel / DCS operator took control of the process.</p> <p>Note: The OIM informed the late reporting of the incident was due to trying to analyse and understand what the problem was.</p>
Details <i>(from final report)</i>	<p>The OIM of the Prelude FLNG facility reported in the process of starting the 'cool end' of the plant and as part of the startup process to sending cool liquids to the Knock Out drum, cool fluids in the vaporiser vessel reached the high-high trip.</p> <p>The control valve and shutdown valves were supposed to function to stabilise the high-high level, but both valves did not function as required.</p> <p>The cause of the above malfunction of both valves attributed to the temperature of the cool liquids in</p>

the line of -95degC. On analysis, it was realised that both the control and shutdown valves do not operate at such low temperatures. Subsequently the liquid levels backed up and came down as the Panel / DCS operator took control of the process.

Note: The OIM informed the late reporting of the incident was due to trying to analyse and understand what the problem was.

**** As Supplied by Duty Holder****

Brief description of incident:

- LNG panel sending cold liquid to V63002 DRY HP knock Out Drum
- This liquid was draining to V63005 Dry Flare Vaporizer Vessel via 630KSV1506 & 630UZV2081; temperature dropped to ~-95 DegC
- Both valves didn't close when required most likely due to the higher torque requirements that are known of these valves when they experience sub -60 DegC temperatures
- Panel operator acted by stopping liquid flow to V63002 and situation was contained and control regained.

Work or activity being undertaken at time of incident - Start up of cold end of the production process.

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

Action taken to make the work-site safe:

- Investigate immediate cause of valves failing to close
- Assure operation of valves at normal plant conditions and temperatures, by means of stroke testing and mechanical inspection of the valves (confirmed ok)
- Confirmed that these operating conditions are limited to start up, and safe to continue normal operation
- Commenced documentation of Operational Risk Assessment and RLMU of start-up procedures to prevent reoccurrence

Immediate action taken/intended, if any, to prevent recurrence of incident - Pending outcome of further investigation

What were the immediate causes of the incident? The cause of the valves' failure to close is still being investigated.

**** As Supplied by Duty Holder****

Has the investigation been completed? Yes

Root cause analysis - 630UZV-2081 did not close on command when temperature was below - 90degC

Full Report:

Investigation undertaken by the Offshore Process Engineer.

Investigation identified that during an extended period of flaring from the cold end during start-up activities, V-63005 Flare vaporiser vessel overfilled due to draining of V-63002 HP dry flare KO drum through 630UZV-2081. The overfilling occurred as the valve did not close on command when temperature was below -90degC. However, it should be noted that the valve closed after temperature was warmed up to approx. -80degC.

The performance of the [REDACTED] valve is believed to be related to the known issue of the actual running to close / running to open torque values provided by [REDACTED] valve being 2-3 times lower resulting in an undersized actuator.

The undersized [REDACTED] valves issue has been amalgamated into a broader investigation managed under the Prelude Manage Threats and Opportunities (115160) engineering process.

Actions to prevent recurrence of same or similar incident:

Action - Undertake Operational Risk Assessment (ORA) to address 630UZV-2081 unavailability.

Responsible - Production Coordinator. Completion Date - Completed

Immediate cause/s

valves not designed to operate at cooler temperatures.

Root cause/s	
Root cause description	Root cause analysis - 630UZV-2081 did not close on command when temperature was below - 90degC

Duty inspector recommendation

Date	10/11/2019
Duty inspector	
Recommendation	Do not conduct Major Investigation
Reasoning	Does not meet MI threshold based on information received
Supporting considerations	

Major investigation decision

Date	10/11/2019
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	11/11/2019
Inspector	
Risk gap	Moderate
Type of standard	Established
Initial strategy	Investigate

Recommended follow up strategy

Recommended strategy	Investigate
Supporting considerations	<p>Low Temperature Liquid's (-95°C) from the HP Dry Flare KO drum (V-63002) to the Dry Flare Stabiliser Vessel (V-63005) caused the level control valve for V-63005 to fail. The subsequent increase in level in V-63005 caused a high level trip, however the shutdown valve also failed due to the low temperature. An operator responded to prevent a further increase in level in V-63005 by reducing flow to V-63002. The ultimate consequence could have been a high level in the HP Dry Flare KOD and possible liquids to flare, however it would have also required a failure of the high high drip in HP Flare KO drum, V-63002, and so the ultimate consequence is extremely unlikely. However, it is recommended that this be investigated to verify ensure that the root cause is rectified and validate the status of the high high trip on the flare KO drum.</p> <p>This will be follow up on 13/11/2019 as part of the Prelude planned inspection 2051.</p>

Non-major investigation decision

Date	11/11/2019
RoN	
RoN review result	Agree with recommendation
Strategy decision	Investigate
Supporting considerations	

Associated inspection

Inspection ID	2051
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