INTERNAL USE ONLY

Notifiable incident

Incident ID	6364
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	03/02/2020 01:40 PM (WST)
Notification date	04/02/2020 10:43 AM (WST)
NOPSEMA response date	04/02/2020 11:00 AM (WST)
Received by	[redacted]
Nearest state	WA
Initial category type *(based on notification)*	Dangerous Occurrence
Initial category *(based on notification)*	Unplanned event - implement emergency response plan
3 Day report received	07/02/2020
Final report received	01/05/2020
All required data received	01/05/2020
Final category type *(based on final report)*	Dangerous Occurrence
Final category *(based on final report)*	Unplanned event - implement emergency response plan
Brief description	OHS - UPE - Activation of Smoke alarms, Deluge and water Mist systems resulting in GA/Muster
Location	
Subtype/s	Alarm, Emergency response, Muster
Summary *(at notification)*	03 Feb - 13.40 Water Mist activation in Port Aft Main Deck Paint Store Initiated GA resulting in Muster Full Muster in 7 Minutes ERT confirmed no fire heat or smoke 03 Feb - 15.45 Deluge system activation in forward machinery space and aft substructure Initiated GA resulting in Muster Full Muster in 9 minutes ERT confirmed no smoke fire or heat 03 Feb - 16.50 Smoke detectors activated in 3rd deck Aft AHU room Initiated GA resulting in Muster Full Muster in 7 minutes ERT confirmed as false alarm. Likely activation due to humidity and steam in area 04 Feb - 03.10 Smoke detectors and water mist activation in thruster spaces A & C (Aft Substructure) Initiated GA resulting in Muster Full Muster in 10 minutes ERT confirmed no heat, smoke or fire Likely activation due to low ambient air pressure in the area. Shorebased IMT has been mobilised to assist. Facility will downman approximately 100 personnel today. Essential services and utilities have all been reinstated. Investigation ongoing

Details *(from final report)*	03 Feb - 13.40 Water Mist activation in Port Aft Main Deck Paint Store Initiated GA resulting in Muster Full Muster in 7 Minutes ERT confirmed no fire heat or smoke 03 Feb - 15.45 Deluge system activation in forward machinery space and aft substructure Initiated GA resulting in Muster Full Muster in 9 minutes ERT confirmed no smoke fire or heat 03 Feb - 16.50 Smoke detectors activated in 3rd deck Aft AHU room Initiated GA resulting in Muster Full Muster in 7 minutes ERT confirmed as false alarm. Likely activation due to humidity and steam in area 04 Feb - 03.10 Smoke detectors and water mist activation in thruster spaces A & C (Aft Substructure) Initiated GA resulting in Muster Full Muster in 10 minutes ERT confirmed no heat, smoke or fire Likely activation due to low ambient air pressure in the area. Shorebased IMT has been mobilised to assist. Facility will downman approximately 100 personnel today. Essential services and utilities have all been reinstated. Investigation ongoing ** As Supplied by Duty Holder** This is a combined report for five unplanned General Alarms which occurred on Prelude FLNG and are included under one notification to NOPSEMA (6364) 1. UAC - Loss of main power leading to general alarm At 1058 on 03/02/2020 FLNG lost main power generation resulting from high lube oil temperatures within the Essential Diesel Generators (EDG) leading to a general muster. The muster accounted for all personnel within 9 minutes. 2. UAC - Water mist activation in paint store and general alarm At 13:40 on the 03/02/2020 water mist activated within the paint store on the Main Deck Port AFT side of FLNG. A muster was completed within 7 mins. The ERT confirmed water mist activation only - no heat, fire or smoke was detected or observed and likely cause of deluge activation was loss of instrument air 3. UAC - Deluge activated FWD Machinery Space structure At 15:48 on the 03/02/2020 an activation of deluge occurred in the FWD machinery space and the AFT substructure. A general alarm was activated, and muster occurred in 9 minutes. The ERT confirmed no fire, smoke or heat and likely cause of deluge activation was loss of instrument air 4. UAC - Third Deck AFT Air Handling Unit Smoke detectors activated At 16:50 on the 03/02/2020 smoke detectors activated resulting in a general alarm. Full muster was achieved within 7 minutes. Investigation by the ERT found this to be a false detection and likely caused by excess humidity, heat and steam in the area 5. UAC - smoke detection and water mist activation At 0310 on 04/02/20 there was an activation of water mist within Thruster A and C spaces within the AFT substructure. The GA activated and a full muster was achieved within 10 minutes. The ERT was deployed and verified no fire, smoke, or heat. Activation of the deluge was likely due to continued issues was loss of instrument air Work or activity being undertaken at time of incident - Switching power from Steam Turbines Generators to Essential Diesel Generators and subsequent loss of essential services What are the internal investigation arrangements? Causal Investigation Action taken to make the work-site safe - ERT deployed for all events. All personnel mustered and accounted for as per descriptions included under question 8 of this form How effective was the emergency response? Effective ERT Response and full muster achieved.

Will the facility be shut down? Yes – All process shut down following ESD & EDP (including all boilers/steam system)
Facility shutdown:
Date 03/02/2020
Time 03:00 (24 hour clock)
Duration Ongoing

Immediate action taken/intended, if any, to prevent recurrence of incident:
Action - Initial investigation to review cause of EDG trip. Responsible - MITL. Completion Date - Completed
Action - IMT (Perth) activated to assist with response. Responsible - OIM / Incident Commander. Completion Date - Completed
Action - Initiate Causal learning investigation into loss of power and subsequent general alarm activations. Responsible - Operations Manager. Completion Date- 30 March 2020 (TBC)

What were the immediate causes of the incident?
For event #1 - 10:58 Loss of Main Power: EDG 30 tripped on overspeed and then EDG 10 went on Overload

For all subsequent events #2 -#5- In all cases, no fire, smoke was observed. It is believed that the spurious activations were triggered by loss of instrument air resulting in systems failing to a safe condition i.e. deluges released, or the high temperatures and humidity levels experienced during HVAC chiller outage

** As Supplied by Duty Holder**

Has the investigation been completed? Yes
Root cause 1, Event 1 - The overspeed relay sent a spurious signal to the local panel resulting in the trip
Root cause 2, Events 2-5 - Loss of power to the HVAC and Instrument Air systems allowed excessive heat and moisture to build up in these areas.

Full Report:
A Causal Learning investigation was conducted by a team facilitated by the Senior Incident Investigation Coach and composing of onshore and offshore personnel including; Technical Health and Safety Manager, Electrical Engineer, Energy and Utilities Engineer, and a Production Technician.

The team gathered data through interviews with personnel directly involved in the incident as well as witnesses and subject matter experts from Operations, Maintenance, and Engineering; review of operational logs; and photos of the relevant areas of the asset.

For event #1 - 10:58 Loss of Main Power: (Also included in Report 2*)
EDG-30 tripped on a spurious overspeed signal from a faulty relay. The rate of transfer of load to EDG-10 caused it to also trip. The temporary loss of power during change over to the EMDGs caused a false heli foam release signal (energized fail-safe signal) which triggered the PAGA.

For all other events:
• #2 (13:40 Water mist activation in paint store),
• #3 (15:48 Deluge activated in FWD Mech space),
• #4 (16:50 3rd Deck AFT AHU detectors), and
• #5 (03:10 {4 Feb} Water mist in Thrusters A and C)
detectors were triggered by excessive heat and moisture due to loss of instrument air and HVAC systems. No fire or smoke was observed in any of these areas upon attendance by the emergency response team.

*Note: 10:58 Loss of power was originally included in 03 day report for report#3 (NOPSEMA ID 6364), upon request by NOPSEMA to include in report #2 (NOPSEMA ID6361), it is now included in report#2 and #3 for transparency.

Actions to prevent recurrence of same or similar incident:
Actions - Review ways to enhance the robustness of the instrument air supply. Responsible - Engineering Manager. Completion Date - 15 October 2020
Action - Create and resource a position (e.g., Operations Maintenance Coordinator) dedicated to coordination and prioritisation of Corrective Maintenance work. Responsible - Operations Manager. Completion Date - Completed

	Action - Review and rectify the heli foam confirmed release signal (energized fail-safe signal). Responsible - Instrument Engineering Team Lead. Completion Date - 15 June 2020 Action - Conduct fault finding on the overspeed relay on EDG-30. Note: There is an MOC currently in place to manage the overspeed relay issue on EDG-30. Responsible - Maintenance Coordinator. Completion Date - 15 Nov 2020.
Immediate cause/s	TBC
Root cause/s	
Root cause description	Root cause 1, Event 1 - The overspeed relay sent a spurious signal to the local panel resulting in the trip Root cause 2, Events 2-5 - Loss of power to the HVAC and Instrument Air systems allowed excessive heat and moisture to build up in these areas.

Duty inspector recommendation	
Date	04/02/2020
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	04/02/2020
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	04/02/2020
Inspector	[redacted]
Risk gap	None
Type of standard	Established
Initial strategy	Inclusion in annual stats/data analysis

Recommended follow up strategy	
Recommended strategy	Investigate
Supporting considerations	Investigate as part of ASAP inspection 2156 and notification 6360. Multiple GA and musters due to cascading events from loss of power following an HP Steam leak.

Non-major investigation decision	
Date	06/02/2020
RoN	[redacted]
RoN review result	Agree with recommendation
Strategy decision	Investigate
Supporting considerations	

Associated inspection	
Inspection ID	