Notifiable incident

Incident ID	6362
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 06:15 AM (WST)
Notification date	03/02/2020 10:34 AM (WST)
NOPSEMA response date	03/02/2020 10:45 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	31/03/2020
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 Loss of Emergency Power resulting in GA and Muster
Location	
Subtype/s	Emergency response, Muster, Power failure
Summary *(at notification)*	While Restoring power to essential services and life support systems Emergency Diesel Generators 10 and 30 tripped, leading to a loss of emergency power, resulting in a GA and muster Muster was completed and 8 minutes and power restored
Details *(from final report)*	While Restoring power to essential services and life support systems Emergency Diesel Generators 10 and 30 tripped, leading to a loss of emergency power, resulting in a GA and muster Muster was completed and 8 minutes and power restored At approximately 11:40 on 06/02/2020 [redacted] of Shell Australia advised [redacted] that there was a further trip of the Essential Diesel Generators (at 10:58 on 03/03/2020) that was not described in the original notification. This trip and subsequent GA and Muster was identical in cause and consequence as the earlier trip (at 06:15 on 03/03/2020) and therefore has in considered to be part of the original notification. Both events will be included in the three day report. ** As Supplied by Duty Holder** General alarm triggered initiating Emergency Response Plan. Full muster within 8 minutes. Work or activity being undertaken at time of incident - Restoring life support and essential services post previous trip. What happened: EDG10 tripped on low frequency. New loads were being introduced to system at the time What are the internal investigation arrangements? Causal Reasoning Investigation

	How effective was the emergency response? Effective Response and full muster achieved. Immediate action taken/intended, if any, to prevent recurrence of incident: Action - Trip investigated and EDG power restored to support life support and essential services. Responsible - Prelude OIM. Completion Date - Completed What were the immediate causes of the incident? EDG 10 tripped on high bearing temperature due to lube oil temp (cooling water SW1 issues) and then EDG 30 tripped on overload ** As Supplied by Duty Holder** Has the investigation been completed? Yes Root cause 1 High drive end bearing temperature caused the EDG-10 trip Root cause 2 Increasing the load on EDG-10 caused the bearing temperature to increase Root cause 3 Restricted flow through the heat exchangers prevented the cooling water system from effectively cooling the bearing. Other root causes The load being carried by EDG-10 was instantaneously transferred to EDG-30, which exceeded what EDG-30 could handle, causing it to also trip. Root cause - Power loss at 10:58 The overspeed relay sent a spurious signal to the local panel resulting in the trip 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. As detailed within the root causes area above the investigation team identified that the power loss occurred when both EDG 10 and 30 sequentially tripped due to high drive end bearing temperature (due to restricted flow through the heat exchangers preventing the cooling water system from effectively cooling the bearing) and load exceedance respectively. For the 10:58 Loss of Main Power: (Also included in Report 3*) 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. *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: Action - Complete separate ECU reliability investigation (bus duct covers, gearboxes, ECU pump, line cleaning). Responsible - EPST Team Lead, Engineering Manager. Completion Date - 30 June 2020 Action - Ensure that a process is established to regularly review the SW1 Performance, and carry out remedial activities (e.g. intrusive cleaning) as required to maintain performance at specified levels. Responsible - Utilities Surveillance Team Lead. Completion Date - 1 June 2020 Action - Check and align the operation of SW1 system with Basis of Design. Responsible - Utilities Surveillance Team Lead. Completion Date - 1 July 2020
Immediate cause/s	TBC
Root cause/s	
Root cause description	Root cause 1 High drive end bearing temperature caused the EDG-10 trip Root cause 2 Increasing the load on EDG-10 caused the bearing temperature to increase Root cause 3 Restricted flow through the heat exchangers prevented the cooling water system from effectively cooling the bearing. Other root causes The load being carried by EDG-10 was instantaneously transferred to EDG-30, which exceeded what EDG-30 could handle, causing it to also trip. Root cause - Power loss at 10:58 The overspeed relay sent a spurious signal to the local panel resulting in the trip

Duty inspector recommendation	
Date	03/02/2020
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	03/02/2020
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	03/02/2020
Inspector	[redacted]
Risk gap	Nominal
Type of standard	Established
Initial strategy	Inclusion in annual stats/data analysis

Recommended follow up strategy	
Recommended strategy	Investigate
Supporting considerations	Note that the failure/trip was from the Essential Diesel Generators, not Emergency Diesel Generators. The inspectors understand that the Emergency Diesel Generators have remained functional. Emergency power has not been lost. Investigate as part of notification 6360 (HP Steam Leak / Trip). Risk is not serious/significant, but this has resulted in a serious of cascading General Alarms and Musters (including 6362) . It is recommended that this be included in the investigation for 6360.

Non-major investigation decision	
Date	09/07/2020
RoN	[redacted]
RoN review result	Agree with recommendation
Strategy decision	Inclusion in annual report stats / data analysis
Supporting considerations	

Associated inspection	
Inspection ID	