

Notifiable incident

Incident ID [5590](#)

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	21/09/2018 04:30 PM (WST)
Notification date	21/09/2018 04:10 PM (WST)
NOPSEMA response date	21/09/2018 05:00 PM (WST)
Received by	[REDACTED]
Nearest state	WA
Initial category type <i>(based on notification)</i>	Dangerous Occurrence
Initial category <i>(based on notification)</i>	Fire or explosion
3 Day report received	24/09/2018
Final report received	19/10/2018
All required data received	19/10/2018
Final category type <i>(based on final report)</i>	Dangerous Occurrence
Final category <i>(based on final report)</i>	Fire or explosion
Brief description	OHS - FIREX - Insulation on steam pipe caught fire
Location	Deck
Subtype/s	Fire
Summary <i>(at notification)</i>	<p>Smouldering under newly installed insulation on high pressure steam line. When insulation was peeled back smoulder caught fire and resulted in flames. Insulation is non-combustible , suspected tape used may have been combustible. Used 1 x Powder extinguisher. Water used to wet insulation. Situation under control. Being investigated. Could not contact by phone.</p>
Details <i>(from final report)</i>	<p>Smouldering under newly installed insulation on high pressure steam line. When insulation was peeled back smoulder caught fire and resulted in flames. Insulation is non-combustible , suspected tape used may have been combustible. Used 1 x Powder extinguisher. Water used to wet insulation. Situation under control. Being investigated.</p> <p>On the 12th of June 2018, Punch T155548 for remediation works for the High-Pressure steam distribution system was created. The Punch was created as it was identified, through thermography around Boiler 30, that installed insulation did not meet specification.</p> <p>On the 30th of June, the requested work scope was assessed by Cape and a remedial work method was agreed.</p> <p>On Thursday 20th September 2018 at approximately 0700 hours (hrs.), an insulation team (Cape Insulators) consisting of a Leading Hand and three insulators commenced remediation work on Punch Closure T155548.</p>

The insulation team worked on Punch test point 40 of the Work Pack with an approved and endorsed Permit to Work AU.PRL-03-113608 Insulation and Cladding- Removal, reinstalment, hand painting (4P1, 4P2). The Permit Holder for the day shift task was one of the insulators within the work crew.

The remedial work at Process Deck - High Pressure System (HPS) valve insulation 4P2 Deck A2 required the removal of the existing flat edge box and replacement with a larger 'T' box and then insulate to the specification.

At the completion of the day shift (approx. 1730 hrs.) on Thursday 20th September 2018 the insulation team tidied the work area, suspended the permit and completed work for the day.

On Friday 21st September at 0632 hrs. the Permit Holder revalidated the Permit and the same insulation crew attended the work location. Throughout the day shift the insulation crew continued works on the High-Pressure System (HPS) valve insulation at 4P2 Deck A2.

At approximately 1240 hrs. the work crew completed the required remedial work excluding cladding and tidied the work area before moving to a lower level to commence another task. The insulation team had applied 5 layers of Pyrogel over the existing 2 layers of rock wool insulation.

At about 01:00 pm one of the insulators re attended the HPS work site they had been working on previously. There was an increase in the ambient temperature due to the radiant heat coming from the HPS.

(Note: The HPS had 2 layers of Rockwool and 5 layers of Pyrogel installed).

All three of the insulating crew returned to the HPS work site and communicated the increase in heat to the Shell Area Authority (AA). The Insulating work crew informed the AA they intended to add an additional two layers of Pyrogel to the system.

At approximately 1615 hrs. the insulation team were completing the seventh layer of Pyrogel when they observed a red glow and smouldering of tape used to secure insulation. They immediately alerted Technip HSE and the operations team who responded to the area to investigate. Upon arrival, the Operations team investigated the source of the smouldering material. Fire response equipment (Hose and extinguishers) were prepared at site as a contingency. Subsequently the outer layer of insulation was removed. Small flames were then observed and immediately extinguished. Area was made safe.

No Fire and Gas detection systems were activated, and no facility muster was initiated.

The status of Prelude FLNG at the time of this event was:

- Warm and cold end process vessels (topsides) have not had hydrocarbons introduced at this point
- Boiler 10 was online and remained online during event (on diesel fuel)
- LNG & LPG in tanks in service at near atmospheric pressure
- Vaporiser online being supplied by 2 stripping pumps at 6 barg and the vapourised gas going to flare.
- Fuel Gas system was pressurized at 5 barg but not supplying users

Permit did not capture all the hazards associated with the task. Below is a list of hazards not identified:

- Working on and around hot surfaces
- Work site - changing conditions – pipe and valves increasing in heat when valve operates.
- The use of adhesive tape prohibited on hot systems over 250 degrees Celsius.
- No reference to 2000-111-G000-GE00-G00000-QA-6180-00035_02A-C Method Statement Pyrogel

Learnings:

- Planning the work (changing conditions), did the work require equipment to be shut down for insulation scope
- Hazard identification (hazards not listed on JHAS) and
- Work methods – use of tape unsuitable for over 250 degrees Celcius.

A review of the RA/JHA AU.PRL-03-113609 identified:

- Some hazards associated with the task were not captured within the JHA as it was not aligned with specific hazards and controls captured within the Cape procedure for the task:
 - Offshore Phase Safe Work Method Statement – Insulation 2000-111-G000-GE00-G2000-QA-6180-00051-02A - Specifically, the JHA did not capture the thermal hazard due to the insulators working on hot

surfaces. Note: The Safe Work Method term used here is an installation procedure risk assessment designed to be used under a permit and incorporated into the JHA

A review of Method Statement -Pyrogel - 2000-111-G000-GE00-G2000-QA-6180—0035-02A – identified:

- the specific requirements and restrictions for use of tape to secure Pyrogel was not captured within the JHA/Permit and the Method Statement was not at the work location.

See extract from Method statement:

Section 6.1

Once wrapped around the pipe, the Pyrogel[®] may be held in place using tape, wire, adhesive spray, or banding. The use of tape and spray adhesives is limited to application temperatures below 250°C (480°F).

During the investigation it was acknowledged all personnel involved in the task were trained, competent and had completed all the required training as represented by the Cape Training Matrix.

Procedures / Work Method Statements are approved and available for insulation

The insulation team did not use or have a copy of the Method Statement - Pyrogel available to them or accessible at the work site. Additionally, the JHA- did not capture the requirement.

The insulation team should have used the Method Statement however appear to be unaware of its existence.

The information collated indicates a failure by management to communicate the requirements of the Method Statement (see above requirements within 6.1 of the MS) to the insulation team.

The increase in temperature and associated thermal hazard was not documented within the Permit /JHA or known to the insulation team.

Assess potential for use of filament tape on other insulation in hot service.

Commission separate onshore QA/QC assessment of hot service insulation areas to verify the compliance of scope completed in Geoje and propose remedial actions (if required)

Note: The majority of the HPS system is live, at operational conditions and has been in service for >1 year.

Cape to revise Insulation and Cladding

JHA to include relevant hazards/controls associated with working on high temperature equipment. This revision shall align with Cape/TSC SWMS's:

- 2000-110-G000-GE00-G00000-RA-7755-00011_06A - Specification for Hot Insulation
- 2000-111-G000-GE00-G00000-QA-6180-00035_02A-C Method Statement Pyrogel
- 2000-111-G000-GE00-G00000-QA-6180-00036_02A-C Method Statement Rockwool
- 2000-111-G000-GE00-G00000-QA-6180-00051_02A-C Safe Work Method Statement – Insulation
- Pipe & Equipment – Install Manual Pyrogel

Cape management to communicate to all FLNG insulators:

- 2000-110-G000-GE00-G00000-RA-7755-00011_06A - Specification for Hot Insulation

	<ul style="list-style-type: none"> • 2000-111-G000-GE00-G00000-QA-6180-00035_02A-C Method Statement Pyrogel • 2000-111-G000-GE00-G00000-QA-6180-00036_02A-C Method Statement Rockwool • 2000-111-G000-GE00-G00000-QA-6180-00051_02A-C Safe Work Method Statement – Insulation • Pipe & Equipment – Install Manual Pyrogel
Immediate cause/s	Suspected tape used under insulation on high pressure steam line smouldered and caught fire.
Root cause/s	HPD - MGMT SYS - Stds, policies, admin controls not used - enforcement NI, HPD - MGMT SYS - Stds, policies, admin controls not used - SPAC comm NI, HPD - WORK DIRECTION - Preparation - work package / permit NI
Root cause description	<p>Management, supervision and Permit Holder did not ensure employees (Cape) were compliant to procedures (JHA and method statements).</p> <p>Procedures were not communicated from management down through organisation.</p> <p>The work scope risk assessments were not adequately detailed for the task being undertaken.</p>

Duty inspector recommendation

Date	22/09/2018
Duty inspector	[REDACTED]
Recommendation	Do not conduct Major Investigation
Reasoning	Does not meet MI threshold based on information received
Supporting considerations	Awaiting 3 day report.

Major investigation decision

Date	27/09/2018
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	27/09/2018
Inspector	[REDACTED]
Risk gap	Substantial
Type of standard	Established
Initial strategy	Investigate within 45 days

Recommended follow up strategy

Recommended strategy	Investigate within 45 days
Supporting considerations	Consequence (lagging fire) = significant. Benchmark likelihood = remote , potential likelihood = possible. Standard - Established as per SoV

Non-major investigation decision

Date	28/09/2018
RoN	[REDACTED]
RoN review result	Agree with recommendation
Strategy decision	Investigate within 45 days
Supporting considerations	Agreed.

Associated inspection

Inspection ID	1884
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