



Australian Government
Australian Transport Safety Bureau

Serious injury on board *Northwest Stormpetrel*

Dampier, Western Australia | 8 November 2014



Investigation

ATSB Transport Safety Report
Marine Occurrence Investigation
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Cover photo: Shell International Trading and Shipping Company (Shell)

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Addendum

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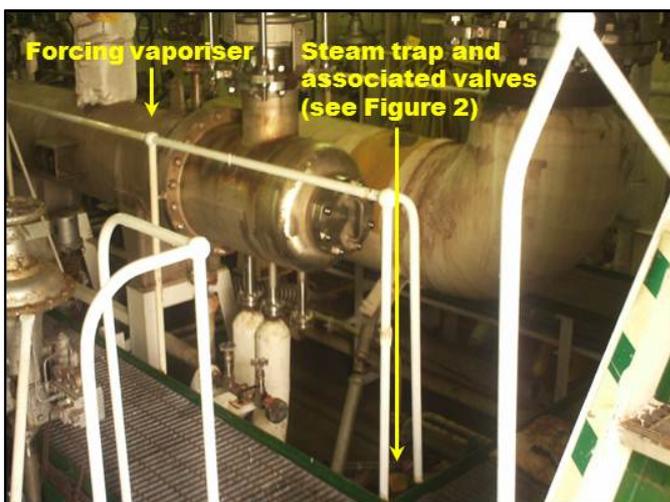
The occurrence

A limited-scope, fact-gathering investigation into this occurrence was conducted in order to produce this short summary report and allow for greater industry awareness of potential safety issues and possible safety actions.

What happened

On 6 November 2014, the liquefied natural gas (LNG) tanker *Northwest Stormpetrel* (cover) completed loading cargo and left its berth in Dampier, Western Australia. The ship was then anchored in the harbour to allow the use of excess time in the schedule for its voyage to Japan for in-water lifeboat drills and other maintenance tasks.

Figure 1: LNG forcing vaporiser



Source: Shell (photograph annotated by ATSB)

Figure 2: Steam trap and associated valves



Source: Australian Maritime Safety Authority (annotated by ATSB)

The lifeboat drills and some maintenance tasks were carried out on 7 November. One of the tasks planned for the following day (before the ship sailed from Dampier) was to check the LNG forcing vaporiser's¹ steam trap to resolve recurrent drainage issues with the system (Figures 1 and 2).

At 0745² on 8 November, *Northwest Stormpetrel's* engineers discussed the planned task. The cryogenic engineer (cargo engineer) routinely carried out vaporiser-related maintenance and was familiar with its systems and the task.

At 0800, the cargo engineer and the integrated rating (IR) assigned to assist him met on the ship's main deck. They discussed the task, reviewed its risk assessment and completed a toolbox talk.³ The cargo engineer then went to the cargo machinery room (CMR) on the starboard side of the main deck (where the vaporiser was located) to isolate the system before work on it could start. Meanwhile, the IR went to the engine room to fabricate a new gasket for the steam trap.

In the CMR, the cargo engineer isolated and locked out the forcing vaporiser's steam supply, outlet, drain and bypass valves. After checking that the system was depressurised, he went to get a permit to work for the task.

¹ When there is insufficient natural boil-off from LNG in the cargo tanks, the forcing vaporiser utilises steam to generate LNG vapour for consumption in the ship's boilers.

² All times referred to in this report are local time, Coordinated Universal Time (UTC) + 8 hours.

³ A toolbox talk is a safety focussed discussion undertaken by a work team before starting work to cover key elements of the task and the risks involved.

The cargo engineer completed the permit to work with the chief engineer, who signed the permit to authorise the work. The cargo engineer then returned to the CMR and started dismantling the steam trap located below the vaporiser (Figure 2).

At about 0900, the IR came to the CMR with the new gasket for the dismantled and cleaned steam trap. The cargo engineer discussed the remaining work with him before re-assembling the trap. The system then needed to be de-isolated and returned to its normal operational condition.

Shortly before 1000, the cargo engineer walked around the vaporiser to check if everything was in order for de-isolating the system. Satisfied with the checks, he removed all the valve lock outs.

The cargo engineer then began carefully opening and closing steam valves, regularly checking if everything was normal. The IR stood by and kept watch for abnormal signs. After the vaporiser's steam supply valve had been fully opened, the regulator was set to its normal working pressure.⁴

At about 1000, the cargo engineer decided to fully open the steam trap's inlet valve that he had earlier cracked open. He had turned the hand wheel of the valve⁵ about one turn when the valve's bonnet came away from the valve body. A jet of steam (about 50 mm wide) erupted from the top of the valve's open body, scalding the cargo engineer's hands, forehead and neck before he could move clear. After getting clear of the steam, he took off his gloves, safety glasses and hardhat. The IR helped him out of the CMR and, once outside, his boots and overalls were removed. They then hurried to the nearest safety shower and began cooling the cargo engineer's burns.

At about 1002, the IR called *Northwest Stormpetrel's* navigation bridge and reported the incident. The ship's master initiated an emergency response and a shipboard medical team was tasked to attend the injured cargo engineer. The master then notified authorities ashore of the incident. At 1005, he asked for a medical evacuation to be arranged and then requested medical advice.

At about 1010, the cargo engineer was moved to the ship's hospital where first aid continued. Over the next hour, he was treated as per medical advice obtained while awaiting evacuation.

At 1122, a helicopter with a paramedic on board landed on the ship. At 1142, the helicopter left with the cargo engineer on board. He was taken to the local hospital, where a doctor assessed his injuries as superficial and admitted him to a treatment ward.

Later that afternoon, representatives from the Australian Maritime Safety Authority (AMSA) and *Northwest Stormpetrel's* managers, Shell International Shipping and Trading Company (Shell), boarded the ship to conduct their respective investigations.

The investigations found that the bonnet locking clip on the steam valve was missing (Figures 3 and 4) and this had allowed the bonnet to unscrew and come away from the valve body. The missing clip was not found, nor could it be established when or how it had been lost.

Figure 3: Valve with locking clip missing



Source: AMSA (annotated by ATSB)

Figure 4: Similar valve with locking clip



Source: AMSA (annotated by ATSB)

⁴ A steam pressure setting of 0.2 MPa that equates to a steam temperature of approximately 120°C.

⁵ A screw lift globe valve with a threaded bonnet that is secured with a locking clip.

On 9 November, after a replacement cargo engineer had joined *Northwest Stormpetrel* and Shell's safety investigation was completed, the ship sailed from Dampier.

ATSB comment

The steam valve's bonnet had several threads and unscrewing it to the point of release would have required turning it several times. However, it was reported that the bonnet came away after the valve's hand wheel was turned only one turn (to open). Therefore, it is likely that when the cargo engineer began to fully open the valve, the bonnet was already partially unscrewed and being held by very little thread. The nearly unscrewed bonnet and its missing locking clip may have been more readily apparent visually and by touch/feel, had the valve's location been less confined, the lighting been better and greater vigilance been exercised.

Safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following proactive safety action in response to this occurrence.

Australian Maritime Safety Authority (AMSA)

As the ship's flag State Administration, AMSA conducted a regulatory investigation and issued *Northwest Stormpetrel's* master with an Improvement Notice that required the following action:

Improvement Notice

- Conduct a detailed analysis and review of procedures and precautions whilst working with pressurised systems.
- Specifically address isolation and de-isolation procedures to ensure adequate protection from injury.

Shell International Shipping and Trading Company (Shell)

Shell's safety investigation identified a number of safety actions to avoid this type of incident.

Procedures and work practices

The safety actions covered shipboard procedures and practices dealing with risk awareness, risk assessment and work planning, permits to work, defective equipment and safety reporting.

Focus areas identified for better risk awareness included joining ship briefings, familiarisation, work site assessments, personal protective equipment and audits. The development of effective risk assessments, their review and using them for work planning and toolbox talks were also identified. An increased focus on permits to work, particularly for invasive and pressurised systems, and the completion and verification of permits were other identified focus areas. Checking for defective equipment and better reporting through training were also noted.

Safety message

Work on pressurised shipboard systems can potentially have a high risk of serious injury. Familiarity with repetitive tasks on these systems can sometimes reduce the perception of that risk. Therefore, it is important that the associated risk controls, such as risk assessments and permits to work, are periodically reviewed and carefully completed to effectively identify and mitigate all risks – including the presence of defective system components.

The ATSB SafetyWatch highlights the broad safety concerns that come out of our investigation findings and from the occurrence data reported by industry. Marine work practices is one of those safety concerns – www.atsb.gov.au/safetywatch/marine-work-practices.aspx



General details

Occurrence details

Date and time:	8 November 2014 – 1000 (UTC +8)	
Occurrence category:	Serious incident	
Primary occurrence type:	Serious injury (scalding)	
Location:	Anchorage WS2, Dampier, Western Australia	
	Latitude: 20° 30.45' S	Longitude: 116° 44.70' E

Vessel details

Name:	<i>Northwest Stormpetrel</i>	Year built:	1994
IMO number:	9045132	Deadweight:	66,875 t
Flag:	Australia	Summer draught:	10.95 m
Classification society:	Lloyd's Register	Length overall:	273.50 m
Owner(s):	BHP Billiton Petroleum, Australia and joint venture partners	Moulded breadth:	47.20 m
Manager:	Shell International Trading and Shipping Company, United Kingdom	Main engine(s):	Mitsubishi turbo-electric steam turbine, MS24-2 (17,140 kW)

About the ATSB

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The ATSB is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; and fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

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