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Australian Transport Safety Bureau

Fire on board *BBC Rhonetal*

Port Hedland, Western Australia on 25 March 2021



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Addendum

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Safety summary

What happened

In the early hours of 25 March 2021, a fire broke out in the lower cargo hold of the general cargo ship *BBC Rhonetal* while it was alongside Port Hedland number two berth. The fire started during hot work to remove sea fastenings from the tween deck in preparation for cargo discharge operations.

Immediate efforts by the crew to extinguish the fire with deck hoses were unsuccessful and all persons safely evacuated the area before the hatch covers were closed and carbon dioxide using the ship's fixed fire extinguishing system was released into the cargo hold. Shoreside fire authorities responded to the emergency and monitored the situation until the fire was declared extinguished on the morning of 28 March.

What the ATSB found

The ATSB found that the risk of fire had not been adequately assessed by the crew prior to commencement of the hot work. As a result, a continuous fire watch was not maintained and proper precautions were not taken to sufficiently protect vulnerable cargo from catching alight.

The ATSB also found that *BBC Rhonetal's* managers had not effectively implemented the shipboard safety management system procedures to prevent the fire, which was the tenth such fire on a ship managed under the same parent company in the past 14 years, and the fourth investigated by the ATSB, identifying similar contributing factors.

What has been done as a result

BBC Rhonetal's managers advised the ATSB that shipboard procedures for hot work will be amended to better describe the fire watch role, emphasising its importance in fire prevention. Fire watch requirements will be integrated into the hot work permit procedure and additional equipment for the fire watch is to be distributed across the fleet. The company also intends to educate ship crews on the amended procedures and the additional equipment through a training video with shore-based staff further reiterating safe hot work practices during shipboard inspections.

The ATSB considers that the proposed safety action has the potential to address the safety issue concerning the hot work procedures. However, as no timeline for implementation was provided, the ATSB issued formal recommendations to *BBC Rhonetal's* managers, and the parent company, that the proposed safety action be implemented across their fleets.

Safety message

The continuing incidence of fires in the cargo holds of ships while performing hot work highlights the importance of adhering to shipboard procedures and recognised safe work guidelines for hot work.

Ship operators and managers must ensure that their safety management system protocols for hot work are suitable and properly implemented on board their ships. This requires regular verification that ships' crew understand and follow prescribed safe work practices for hot work.

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The occurrence

Overview

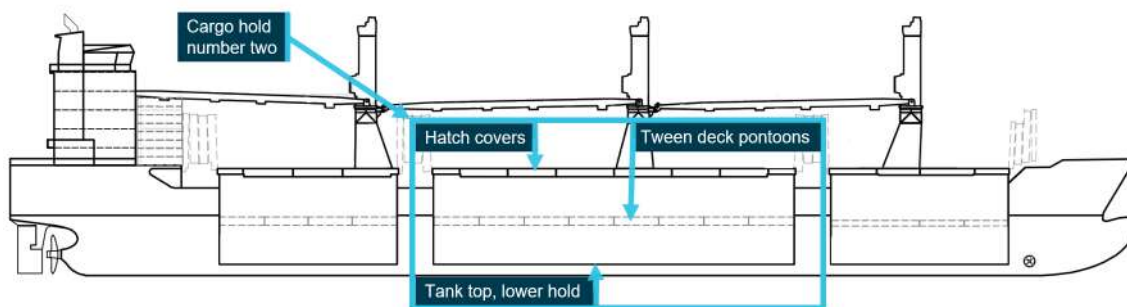
At 0420 Australian Western Standard Time¹ on 24 March 2021, the geared general cargo ship *BBC Rhonetal* (Cover image) berthed at number two berth in Port Hedland, Western Australia. The ship was to discharge cargo which consisted of project cargo² and large metal structures of various shapes and sizes.

While the ship had been at sea, the cargo had been lashed to sea fastenings; metal D-ring brackets that had been welded to the ship's cargo areas at various locations to keep it from shifting (see the section titled *Cargo securing arrangements*). These fastenings needed to be removed through hot work such as cutting and gouging before the cargo could be discharged.

After arriving, the ship's chief mate convened a safety meeting at 0430 to discuss removal of the sea fastenings using a plasma torch and to review the existing hot work risk assessment and procedure.³ This 10-minute meeting was attended by the master, chief mate, second mate, a junior officer, the bosun, two ordinary seaman (OS), two able seaman and two deck cadets. A safety meeting form was printed out and each crew member signed it to confirm their attendance. The chief mate then issued a hot work permit which was to commence at 0500 and remain in effect for the following 24-hour period.

At about 2358 on 24 March, the bosun and an OS, along with the second mate as supervisor, arrived on deck to assume the cargo watch. Shortly after, they started preparations as planned to cut the sea fastenings. In anticipation of this hot work, several crew members on the earlier watch had opened the hatch covers to number two cargo hold and prepared firefighting equipment on the tween deck in the hold (Figure 1).

Figure 1: Profile view of *BBC Rhonetal*



Source: Briese Schifffahrts, modified and annotated by the ATSB

The firefighting equipment included three fire hoses which were pressurised (using the ship's fire main line) and ready for immediate use by opening their fire nozzles. There were also two fire extinguishers, two spark arrester drums and four fire blankets close by. The fire blankets each measured about 2 m in length and were to be used to cover the gaps in the tween deck (Figure 2)

¹ Australian Western Standard Time (AWST): Coordinated Universal Time (UTC) + 8 hours

² Project cargo usually comprises oversized, high value items that require specialised planning and equipment for transportation as they cannot fit within standard transport units such as pallets or containers. Such items are typically components of larger structures or infrastructure for projects in the mining and construction sectors.

³ A plasma torch, also known as a plasma arc or a plasma cutter, is a commonly used metal cutting tool. It works by forcing a fine jet of gas, such as oxygen, nitrogen or argon at extremely high pressure past an electrical arc, superheating the gas so that it ionizes and becomes plasma. The resulting 'plasma jet' cuts metal more easily and accurately than most other metal cutting processes.

near the work areas to prevent sparks and molten metal produced by the cutting work from falling through to the lower hold.

Figure 2: Tween deck gaps



Source: Pilbara Ports Authority

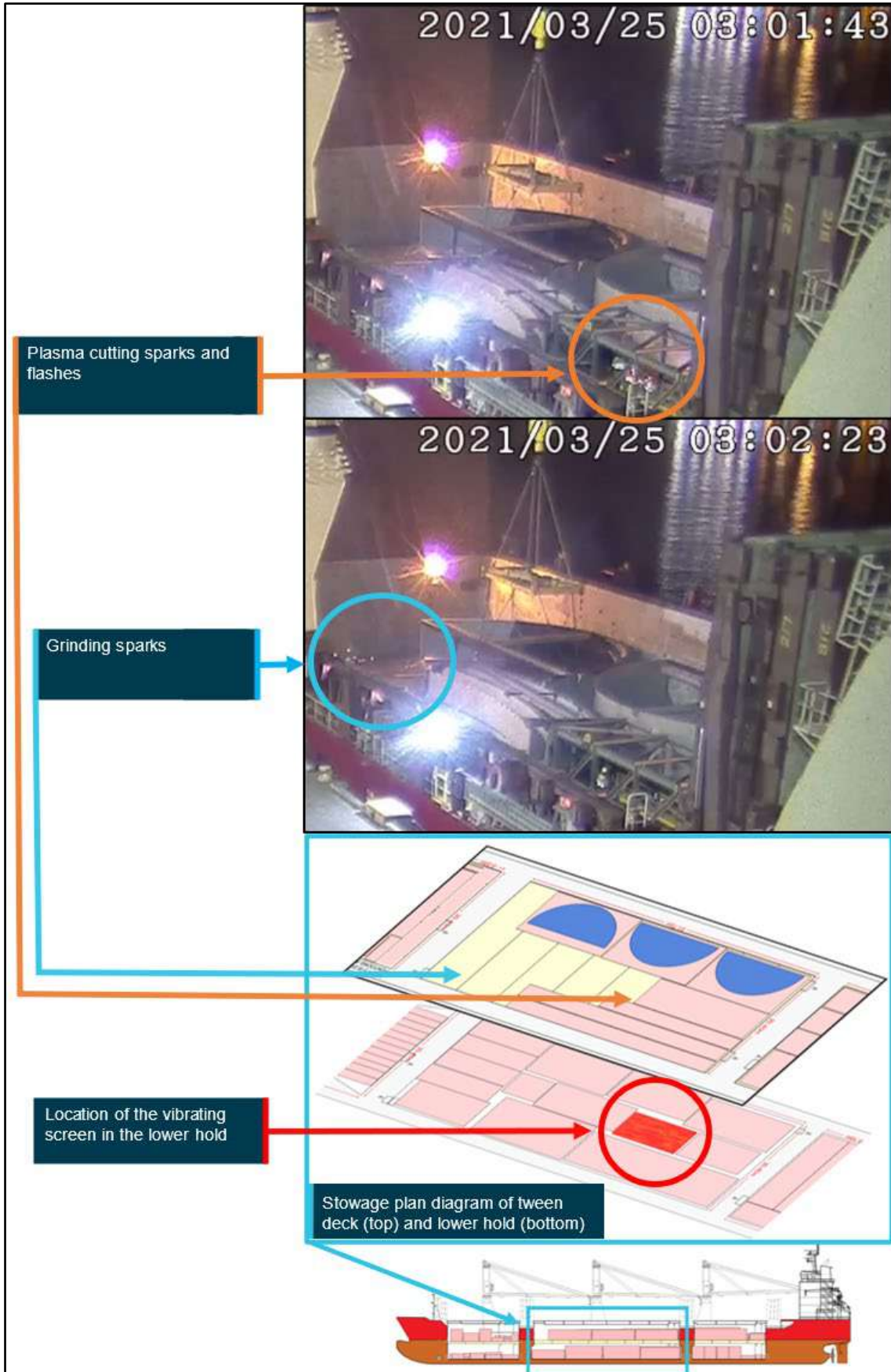
Cargo in the lower hold consisted of various metal structures as well as two large, linear vibrating screen assemblies with rubber internal components. The assemblies were located in the aft section of the hold and had been wrapped in protective plastic coverings for shipping (Figure 3).

At 0030 on 25 March, the bosun began using the plasma torch to remove sea fastenings at the forward end of the tween deck. The cutting gradually progressed towards the aft end of the deck. Stevedores followed the bosun's progress aft, using the ship's crane to discharge items of cargo as the fastenings were removed. Meanwhile, the OS maintained a fire watch in the lower hold, directly below the hot work progressing on the tween deck. He was ready with a fire extinguisher, two buckets of water, a flashlight and a handheld radio. During this time, the OS saw sparks from the plasma cutting above falling into the lower hold and extinguishing before reaching the bottom of the hold. As the work continued, the second mate remained on the tween deck to supervise and oversee both the hot work and the cargo operations.

At about 0250, the bosun called the OS using a handheld radio and instructed him to conduct a final inspection of the lower hold and then go to the tween deck to assist with removing the sea fastenings. At 0300, having checked that there were no sparks or signs of fire in the lower hold, the OS started working at the forward part of the tween deck, using a grinder to remove remnants of the fastenings left after the plasma cutting.

Meanwhile, the bosun continued using the plasma torch and had progressed to the aft part of the tween deck, located above the plastic-wrapped screen assemblies in the lower hold below. At that time, sparks from the plasma cutting were spreading across a broad area. A smaller quantity of sparks was also generated by the grinding work forward (Figure 3).

Figure 3: CCTV images of the hot work with the locations indicated on the stowage plan



At 0309, the second mate on the tween deck saw smoke rising from the aft part of the lower hold. The smoke intensified quickly and began billowing over the cargo hold and the wharf (Figure 4). The stevedores also saw the smoke and quickly left the ship, leaving behind an item of cargo on the tween deck connected to the crane hook in preparation for discharge.

Figure 4: Intensifying smoke from the lower hold (CCTV frames at 0309 and 0310)



Source: Pilbara Ports Authority, annotated by ATSB.

The second mate, bosun and OS immediately directed water towards the area where the smoke was rising using the available fire hoses. Shortly after, they also saw flames coming through gaps in the tween deck.

At about 0312, the second mate rushed up to the navigation bridge, sounded the general alarm and made an announcement on the public address system. At about the same time, Port Hedland vessel traffic service (VTS) received a telephone call from security personnel on the wharf reporting the fire. At about 0315, the master and chief mate arrived on the bridge, and the master called VTS via VHF radio and requested harbour tugs to assist the firefighting efforts.

The crew's attempts to extinguish the fire with hoses were unsuccessful, so the master ordered them to evacuate the hold, intending to use the ship's fixed carbon dioxide (CO₂) extinguishing system for the holds. The hatch covers, however, could not be closed due to the cargo connected to the crane's hook. A short time later, the chief mate, wearing a self-contained breathing apparatus, climbed up to the crane operator cabin and landed the cargo onto the wharf.

Meanwhile, three harbour tugs had arrived and began directing water on to the ship for boundary cooling (Cover image). At 0337, firefighters from local units of the Western Australia Department of Fire and Emergency Services (DFES) also arrived.

At 0410, on the master's orders, the ship's crew closed the hatch covers and then released carbon dioxide into the hold. At about this time, the second mate began feeling unwell due to smoke inhalation and was taken to hospital (he was treated and discharged shortly afterwards).

Later that day, at 1530, a DFES contingent from Perth arrived to assist with the response, including planning entry to the hold for inspection and assessment.

Over the following 2 days, firefighters conducted routine monitoring of the temperatures and CO₂ levels inside the hold. The tugs continued boundary cooling along the ship's hull.

In the early hours of 27 March, DFES personnel entered the hold and reported that the fire appeared to have been extinguished. Following the assessment, they started ventilation by partially opening the hatch covers and stopped the boundary cooling.

Post-fire damage assessment

At 0804 on 28 March, DFES firefighters declared the fire extinguished. Post-fire inspections identified that the fire started on one of the linear vibrating screen assemblies stowed in the lower hold, directly below where the bosun was last seen plasma cutting before the smoke and flames were sighted (Figure 5).

Figure 5: Burnt remains of the vibrating screen assembly



Source: Western Australia Department of Fire and Emergency Services

The fire destroyed the vibrating screens. Photos taken after the fire showed that the intense heat from the blaze had left scorch marks on surrounding areas in cargo hold number two and on several items of cargo on the tween deck above the fire. The firefighting efforts had resulted in the accumulation of 600 cubic metres of water in the bottom of the hold. This wastewater was transferred into the ship's water ballast tanks and later disposed of in compliance with marine pollution prevention regulations.

The ship remained in Port Hedland until 22 April to complete its cargo operations and to await the Australian Maritime Safety Authority's confirmation of the ship's seaworthiness.

Context

BBC Rhonetal

BBC Rhonetal is a 161.5 m, multi-purpose, heavy-lift, general cargo ship registered in Antigua and Barbuda. The ship was built in 2013 by Taizhou Sanfu Ship Engineering, China and classed with DNV GL. It has three cargo holds with tween decks and can carry containers and/or general cargo. Each of the ship's three cranes have a SWL of 80 t and two cranes can be used in tandem to lift loads up to 350 t.

At the time of the fire, *BBC Rhonetal* was owned by Briese Schiffahrts, managed by Briese Heavylift and operated by BBC Chartering & Logistic, all of Leer, Germany. Briese Schiffahrts⁴ (Briese), the parent company, was established in 1984 and at the time of the fire was one of the largest providers of heavy-lift ships to transport project cargo. Briese and its subsidiary companies provide ship and crew management, chartering and other services. The company's ship management arm was restructured in 2018, when Briese Heavylift⁵ was formed to manage larger geared cargo ships.

The ship's multi-national crew of 21, including the master, comprised Russians, Ukrainians, and Filipinos. The master had 20 years of seagoing experience and held a Russian master's certificate of competency, issued in 2007. Most of the master's seagoing experience was on board Briese general cargo ships. He first joined *BBC Rhonetal* in March 2020 and sailed for one voyage as chief mate before re-joining the ship as master in November 2020 for another assignment.

The chief mate had 14 years of seagoing experience, including 5 as chief mate, and held a Russian master's certificate of competency. All the chief mate's experience had been gained on Briese bulk carriers and general cargo ships. The chief mate joined *BBC Rhonetal* for the first time on 27 October 2020.

The second mate had 10 years of seagoing experience and held a Russian chief mate's certificate of competency. All the second mate's experience had been on board Briese bulk carriers and general cargo ships. The second mate had also joined *BBC Rhonetal* on 27 October 2020 for the first time.

The bosun had 29 years of seagoing experience. He was also a qualified welder and the only crew member on board *BBC Rhonetal* trained to use the plasma cutting equipment. The bosun had worked on various types of ship in different companies during his career, including Briese, and joined *BBC Rhonetal* for the first time in October 2020.

The ordinary seaman (OS) had 5 years of seagoing experience. Having started his seafaring career with Briese, all of the OS's seagoing experience had been accrued aboard bulk carriers and general cargo ships. The OS had joined *BBC Rhonetal* for the first time on 10 October 2020.

Cargo securing arrangements

BBC Rhonetal typically transported project cargo, including large items of machinery and components destined for the mining sector. These generally heavy items had to be secured to avoid shifting during the sea passage.

The common method to secure the cargo was to weld steel D-shaped rings, called sea fastenings, at specific locations on the cargo decks and then tightly lash the cargo to these fastenings using chains and straps. This technique was usually used in addition to welding steel brackets or lugs

⁴ Briese Schiffahrts, International Maritime Organization (IMO) Company Number 1183357. The IMO database identifies the company as the manager for 75 ships and the operator for 39 ships (as of 30 August 2022).

⁵ Briese Heavylift, IMO Company Number 6025045, managed 50 ships on 30 August 2022 as per the IMO database.

(often referred to as sea stoppers) to the deck, and directly against items of cargo, to prevent movement across the deck while at sea (Figure 6).

Figure 6: Example of project cargo securing



Source: Online image at admmarinesurvey.co.uk

Since the fastenings and stoppers were welded to the deck, hot work techniques including cutting and gouging were required to remove them whenever the cargo was discharged. As a result of this type of cargo securing arrangement, hot work operations were much more frequent on this type of multi-purpose general cargo ship than on many other types of cargo ships.

Shipboard safety management system

The International Safety Management (ISM) Code provides an international standard for the safe operation of ships at sea.⁶ Its objective is to ensure the prevention of human injury or loss of life and the avoidance of damage to the environment and to property.

⁶ International Maritime Organization, 2018, International Management Code for the Safe Operation of ships and for Pollution Prevention (ISM Code) as amended, IMO, London.

To help achieve this objective, the ISM Code requires companies to develop, implement and maintain a safety management system (SMS) that provides policies, procedures, instructions and guidance for the safe performance of all shipboard operations and the management of identified risks to the ship, personnel and the environment.

Under the ISM Code, a company must ensure its SMS is effective by periodically confirming that all shipboard personnel have an adequate understanding of its content.

BBC Rhonetal's safety management system (SMS) included the following procedures for hot work (with associated forms and tools):

- procedure for hot work
- procedure for risk assessments
- general risk assessment form for hot work
- permit to work form with a section for hot work
- safety meeting form for general hot work tasks.

Procedure for hot work

The SMS manual on board *BBC Rhonetal* included a section dedicated to hot work. It contained a requirement that a risk assessment be completed and reviewed periodically. Before starting hot work when in port, written permission was to be obtained from the relevant port authority, and the duty officer notified. The procedure further required that a permit to work be completed for all hot work on board, including welding and flame cutting, except when such work was performed in the welding space of the engine room workshop.

The hot work procedure stated that the ship must ensure a proper fire watch and fire precautions in addition to agreed procedures with shore workers or contractors. The procedure also directed crew to further guidance in the Code of Safe Working Practices for Merchant Seafarers (COSWP)⁷, available on all Briese ships, including *BBC Rhonetal*.

This COSWP identified hot work as a task which should normally be the subject of a permit to work, and recommended that:

- a risk assessment be completed prior to hot work and include a survey of all adjacent spaces and a check of the work area for combustible solids, liquids or gases that could be ignited by heat or sparks from the work
- when work was being done close to bulkheads, decks or deckheads, the far side of the divisions should be checked for materials and substances that could ignite
- hot work be properly supervised and suitable fire extinguishers kept ready for use, including in areas that may be affected but which are not visible to the seafarer doing the work
- fire sentries be posted in adjacent compartments and frequent fire checks be made for at least 2 hours after the hot work has finished (as a precaution against delayed fires).

Procedure for risk assessment

BBC Rhonetal's SMS included a procedure covering the conduct and management of risk assessments. The SMS included general risk assessments that were reviewed and updated by Briese on an annual basis with the master and officers responsible for the periodic review of these assessments.

Ship's staff were required to notify the company of any additional hazards and risk controls identified as part of their onboard reviews for inclusion in the assessments. The procedure noted

⁷ The COSWP is published by the United Kingdom's Maritime and Coastguard Agency (MCA) as the best practice guidance for improving work, health and safety on board ships.

that the risk assessment process was to be initialised before implementing new processes or non-routine tasks, and while reviewing existing processes.

It also explained that the occurrence of hazardous events on board might indicate weaknesses in the way risks have been assessed or mitigated. It required that any risk assessment be reviewed before implementation, and then periodically, to ensure risk controls remained effective and adequate.

Risk assessment for hot work

The general risk assessment form for hot work stated that, based on the outcome of the assessment, appropriate control measures were to be put in place while taking into account any relevant guidance contained in company fleet circulars.

The hot work risk assessment form contained a pre-filled risk matrix with several hazard scenarios, corresponding risk, control measures and resulting residual risk.

Among those identified scenarios, the risk matrix documented the hazard of molten metal from hot work on deck falling between gaps in the tween deck into the hold below. The assessment identified that this could result in major consequences, such as a fire on the cargo or in the hold and damage to cargo and other equipment.

The risk assessment identified several measures to mitigate the risk of fire. The measures included the issue of a hot work permit, the need for a safety meeting (toolbox meeting) prior to the commencement of hot work and the use of fire mats, fire blankets and other precautions in accordance with company circulars issued in response to past fires on board Briese ships (see the section titled *Similar occurrences*).

The risk assessment also identified additional measures related to fire response training and use of correct firefighting equipment. The outcome of the combined controls was indicated on the risk assessment tool as being effective in reducing the risk of fire from 'major' to 'moderate'.

On *BBC Rhoneta's* arrival in Port Hedland, the risk assessment and its pre-filled hazards, risks and control measures were reviewed, in preparation for the cutting of sea fastenings. The risk assessment form allowed for the capturing and recording additional hazards, risks or controls identified through a review immediately before work. No additional risks or precautions specific to the location of the intended hot work and the relative position of flammable cargo in the lower hold were recorded on the risk assessment form.

Permit to work system

The permit to work form consisted of a checklist for different types of special work tasks subject to the permit to work system, including hot work. The hot work section contained a list of checks and precautions required for the issue of the permit, including a prompt to check that surrounding areas were clear of dangerous materials and protected from sparks and weld splatter (Figure 7).

Figure 7: Hot work checklist section from the permit to work form

<input checked="" type="checkbox"/> HOT WORK		
- Area clear of dangerous material and "gas free"?		<input checked="" type="checkbox"/>
- Surroundings clear of dangerous materials and protected against sparks or weld spatter?		<input checked="" type="checkbox"/>
- Ventilation adequate?		<input checked="" type="checkbox"/>
- Electric isolated (if applicable)?		<input checked="" type="checkbox"/>
- Pipelines isolated / gas free / safe?		<input checked="" type="checkbox"/>
- Tools, equipment and PPE in good order?		<input checked="" type="checkbox"/>
- Emergency procedures established and understood by all personnel?		<input checked="" type="checkbox"/>
- Fire appliances in place and good order?		<input checked="" type="checkbox"/>
- Fire watch in place? Name of PIC/2nd Officer: [REDACTED]		<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Toolbox meeting carried out with all involved parties, Fire safety precautions agreed-see below*		<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Existing Risk Assessment consulted		<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Hot work permit from shore received and granted if required		<input checked="" type="checkbox"/>

Source: BBC Rhonetal

A work permit for the cutting of sea fastenings was prepared during the safety meeting and was to remain in effect from 0500 for the next 24 hours. The permit was still valid when the hot work in hold number two began, about 19 hours after it was issued.

All the checklist items were marked as complete on an electronic version of the permit. It was then printed to allow crew members to sign that they understood and were able to fulfill the requirements of the permit. The bosun signed off as the person in charge of the work and the second mate signed off as the person in charge of fire watch.

Safety meeting

It was general procedure to use a company training record form to record safety meetings. Different versions of the form had been previously prepared on a computer as templates for regular use. These contained safety information and guidance specific to various shipboard tasks.

The version used to record the safety meeting held on 24 March had been pre-completed as a template for safety meetings prior to general hot work. It included a bullet point list identifying general precautions related to hot work, pertaining primarily to matters such as toxic fumes and personal health. The form did not contain any reference to the risk of fires.

Another version of the training record form, which contained information more specific to the removal of sea fastenings, was also available as a template. However, it was not the version used to record the safety meeting.

Similar occurrences

The fire on *BBC Rhonetal* was the tenth fire incident attributed to hot work on a Briese ship since 2007. Four of these fires occurred in Australian ports, three of which were investigated by the ATSB (summarised below). On each occasion, cargo was ignited or damaged by sparks and molten material generated from hot work.

BBC Islander

On 14 August 2007, a fire broke out on board the general cargo ship *BBC Islander* while anchored off Dampier, Western Australia. The ship's crew were cutting sea stoppers on a cargo hold hatch cover with an oxy-acetylene torch when a hole was inadvertently cut in the hatch cover resulting in sparks and molten metal falling into the hold below and igniting cargo.

The crew's attempts to extinguish the fire by flooding the cargo hold with carbon dioxide proved unsuccessful, so the ship was berthed on 16 August, where shore fire services attended. It took 2 days to extinguish the fire and only after the hold was flooded with water, resulting in severe damage to the cargo and the ship.

The ATSB investigation, report [MO-2007-245](#), found that the ship's SMS procedures had not provided sufficient guidance to ensure the crew appropriately assessed the risks associated with

removing sea stoppers from hatch covers. As a result, proper precautions were not taken by the crew and a fire watch was not established inside the cargo hold before the hot work started.

BBC Baltic

On 26 January 2012, a fire broke out in the number one cargo hold of the general cargo ship *BBC Baltic* while discharging cargo in Port Hedland. Contractors from a local engineering company were using oxy-acetylene equipment to remove sea stoppers in the ship's hold when sparks from the hot work set alight a tarpaulin covering an item of cargo adjacent to the work site.

The workers swiftly evacuated the area leaving the oxy-acetylene equipment on the tween deck, which then caught fire resulting in a large fire ball. The fire was extinguished about an hour later by the ship's crew using fire hoses, with the assistance of two harbour tugs and the local fire brigade.

The ATSB investigation, report [MO-2012-002](#), found that the ship's crew had not properly considered and mitigated the risk of fire before the hot work started. Precautions listed in the ship's hot work permit had not been taken and a toolbox meeting before the hot work was not held.

As a result of the inadequate risk assessment, there was no fire watch in place, none of the ship's crew were at the hot work site and there was no clear understanding of the action to take in case of a fire.

In response to that fire, Briese advised that it had reviewed shipboard procedures for hot work with resulting improvements focused on the hot work permit system to ensure better coordination with shore workers through a tool box meeting to identify risks, controls and responsibilities.

BBC Xingang

On 11 December 2017, a fire occurred aboard, *BBC Xingang*, while alongside in Newcastle, New South Wales. The incident occurred during the removal of sea stoppers from the tween deck by workers from a local engineering company using oxy-acetylene equipment. Sparks and molten metal generated by the hot work burned through protective fire mats covering gaps in the tween deck and onto unprotected cargo in the lower hold, resulting in the fire.

The fire watch was alerted to the fire over the radio by one of the contract workers who had seen smoke rising from the hold. The fire watch rushed to the location of the fire and quickly extinguished it using a water hose.

The ATSB investigation, report [MO-2017-011](#), found that the flammable material covering the cargo in the hold below had not been identified as a fire risk and had not been adequately protected prior to the work commencing. Further, the fire watch had not been directed to closely monitor immediately below the work site and was not in position to quickly react when the cargo caught on fire.

As a result of the fire aboard *BBC Xingang*, Briese provided the ship with replacement fire blankets and convened a safety meeting on board the ship to review the circumstances of the incident. BBC Chartering & Logistics, the ship's operator, advised the ATSB that gaps and holes in the tween decks would in future be fully covered by fire resistant tape prior to hot work, in addition to other measures such as using fire blankets, to protect areas below hot work.

The other six fires

In addition to this occurrence and the three previous fires above investigated by the ATSB, there have been six other similar fires involving Briese ships since 2007. The cause of each of the fires was attributed to welding, cutting or gouging work related to the cargo securing arrangements. These six fires involved the following ships.

- *BBC Barbarossa*, 2007

- *BBC Everest*, Campana (Argentina), 2013
- *BBC Fuji*, Baltimore (USA), 2014
- *BBC Bangkok*, Rostock (Germany), 2014
- *BBC Seine*, Onslow (Australia), 2014
- *Jan*, Tanjung (Malaysia), 2017

While the severity of each fire varied, such incidents have commonly resulted in significant economic impact. For example, Briese reported that the 2007 fire on *BBC Barbarossa* resulted in almost EUR 8,000,000 worth of claims relating to firefighting efforts, waste disposal and cargo damage. More significantly, as reported by Hong Kong's Administration, this type of fire incident has previously resulted in fatalities.⁸

Company response to previous fires

In response to these previous fires, Briese issued numerous fleetwide communications, including fleet circulars and safety bulletins. The communications often described the fires and identified their causes as a failure of crew or contractors to observe basic shipboard procedures and controls for hot work.

The company used these communications to reinforce the SMS requirements for conducting hot work on deck, such as adhering to the risk assessment and work permit procedures, conducting proper inspections prior to work and, maintaining a fire watch at all times. For example, a fleet circular issued on 28 July 2010 recommended the use of fire-retardant blankets for stopping sparks from falling through gaps in the tween deck and for covering fire prone cargo.

⁸ Merchant Shipping Information Note 5/2015, Marine Department of the Hong Kong Special Administration Regime (SAR), describes the fatality of a seafarer who was trapped in the lower hold of a Hong Kong-registered ship after a fire broke out in the hold due to inadequately managed hot work to remove sea fastenings from the deck above.

Safety analysis

The fire

On 25 March 2021, while discharging cargo in Port Hedland, a fire broke out in *BBC Rhoneta's* number two hold. Immediate efforts by the ship's crew to control the fire with fire hoses were not successful so the cargo hold was closed and flooded with carbon dioxide using the ship's fixed fire-extinguishing system.

The fire was extinguished several days later with the assistance of shore emergency services. The fire caused significant damage to some cargo in the hold, but damage to the ship was restricted to localised paint damage. No one was seriously injured.

Origin

Shortly before smoke was observed rising from the lower hold, the bosun had been cutting fastenings with a plasma torch in an area on the tween deck which was located above a vibrating screen assembly stowed in the lower hold. The screen was later identified by firefighters from the Western Australia Department of Fire and Emergency Services as the origin of the fire.

The fire started when sparks and globules of molten metal generated by the plasma cutting fell through gaps in the tween deck and down onto the screen below. The hot material swiftly melted through the protective plastic covering on the screen and then onto its combustible internal components, which ignited shortly afterwards.

Fire watch

The shipboard safety management system (SMS) provided guidance for performing hot work safely. It required fire watches to be in place at all times during the work, including in adjacent compartments where appropriate, and fire rounds to be made for at least 2 hours following the conclusion of hot work.

However, the recall and reassignment of the ordinary seaman (OS) on fire watch to other duties meant that there was no fire watch in the lower hold while the bosun continued hot work activity above. At the time the OS was recalled, there was no sign of fire or smoke in the lower hold. This indicates that the fire almost certainly developed after the OS was recalled and left his post.

Had a continuous fire watch been maintained, it is likely that the sparks and molten metal falling from above would have been immediately identified and smothered by the OS before they ignited the combustible cargo. In the unlikely event that they did catch fire, the OS would have been stationed to promptly raise the alarm and attempt extinguishing the fire with the firefighting equipment at hand.

Fire risk assessment

Hot work practices on board indicated some general awareness of the fire risk associated with removing sea fastenings. This was evidenced by the completion of a hot work permit, availability and deployment of firefighting and fire prevention equipment and assigning a fire watch.

However, no efforts were made to assess or address specific fire risks associated with the flammability of vibrating screens in the lower hold. As a result, the cargo was not protected with specific, effective measures such as fire-retardant coverings and a continuous fire watch.

Safety management system implementation

During the 15 years preceding the fire on *BBC Rhoneta*, there had been nine similar fires on Briesse ships. The ATSB investigated three of those fires and found that in each occurrence,

fundamental risk controls such as maintaining a continuous fire watch and protecting combustible cargo from the hot work with suitable fire-retardant coverings were not followed.

In response to the previous fires, the company had undertaken action to improve relevant SMS processes and disseminate various fleet circulars highlighting the inherent dangers of hot work and the associated risk controls. As such, *BBC Rhonetal's* SMS, consisting of dedicated procedures for hot work and associated tools such as work permit and risk assessment forms, in addition to relevant fleetwide circulars, should have provided sufficient guidance for the safe removal of sea fastenings.

However, factors that contributed to those earlier fires, such as inadequate risk assessment, not maintaining a continuous fire watch and not protecting combustible cargo with fire retardant coverings, also contributed to the fire on *BBC Rhonetal*.

The evidence shows that this fire resulted because the SMS procedure and guidance were not properly followed. A proper inspection for fire risks at the work site and surrounding areas was not undertaken. The risk assessment procedure was not followed to ensure specific risks associated with the task were identified, documented and mitigated and a continuous fire watch was not maintained for the duration of the hot work. While a safety meeting was held for the planned hot work, it was not effectively executed so as to prepare the crew for carrying out the task safely.

Non-adherence to basic safety precautions and hot work procedures have been a common factor in fires on board Briese ships. The number and frequency of these incidents in recent years, together with the circumstances of this fire, shows that the company had not effectively implemented its SMS procedures across its fleet.

Findings

ATSB investigation report findings focus on safety factors (that is, events and conditions that increase risk). Safety factors include ‘contributing factors’ and ‘other factors that increased risk’ (that is, factors that did not meet the definition of a contributing factor for this occurrence but were still considered important to include in the report for the purpose of increasing awareness and enhancing safety). In addition, ‘other findings’ may be included to provide important information about topics other than safety factors.

Safety issues are highlighted in bold to emphasise their importance. A safety issue is a safety factor that (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operating environment at a specific point in time.

These findings should not be read as apportioning blame or liability to any particular organisation or individual.

From the evidence available, the following findings are made with respect to the fire within cargo hold number two on board *BBC Rhonetal*, Port Hedland, Western Australia on 25 March 2021.

Contributing factors

- Sparks and molten metal generated from the removal of sea fastenings from the tween deck using a plasma cutting torch fell through gaps in the deck and ignited combustible cargo stowed in the cargo hold below.
- Hot work continued on the tween deck after the fire watch had been asked to leave the lower hold to perform other duties. As a result, no one was in a position to immediately identify and respond to the fire that developed in the lower hold.

Other factors that increased risk

- Items of cargo stowed in the lower hold below the work site were not adequately assessed as a fire risk and protected before starting the hot work.
- ***BBC Rhonetal's* managers had not effectively implemented the shipboard safety management system procedures in place to prevent the fire. This was the tenth such fire on a company ship in the past 14 years, and the fourth investigated by the ATSB, identifying similar contributing factors. [Safety issue]**

Safety issues and actions

Central to the ATSB’s investigation of transport safety matters is the early identification of safety issues. The ATSB expects relevant organisations will address all safety issues an investigation identifies.

Depending on the level of risk of a safety issue, the extent of corrective action taken by the relevant organisation(s), or the desirability of directing a broad safety message to the marine industry, the ATSB may issue a formal safety recommendation or safety advisory notice as part of the final report.

All of the directly involved parties were provided with a draft report and invited to provide submissions. As part of that process, each organisation was asked to communicate what safety actions, if any, they had carried out or were planning to carry out in relation to each safety issue relevant to their organisation.

The initial public version of these safety issues and actions are provided separately on the ATSB website, to facilitate monitoring by interested parties. Where relevant, the safety issues and actions will be updated on the ATSB website as further information about safety action comes to hand.

Safety Management System implementation

Safety issue description

BBC Rhoneta’s managers had not effectively implemented the shipboard safety management system procedures in place to prevent the fire. This was the tenth such fire on a company ship in the past 14 years, and the fourth investigated by the ATSB, identifying similar contributing factors.

Issue number:	MO-2021-002-SI-01
Issue owner:	Briese Heavylift and Briese Schiffahrts
Transport function:	Marine: Shipboard operations
Current issue status:	Open – Safety action pending.
Issue status justification:	To be advised

Proactive safety action taken by Briese Heavylift

Action number:	MO-2021-002-PSA-01
Action organisation:	Briese Heavylift
Action status:	Monitor

On 16 August 2022, Briese Heavylift advised the ATSB that it intends to amend the shipboard procedures for hot work to better describe the role of the fire watch, emphasising its importance in fire prevention. Fire watch requirements are to be integrated into the hot work permit procedure and backpacks containing equipment that includes a portable foam extinguisher, ‘thunderer’ whistle, infrared camera and a high visibility vest will be provided for the fire watch.

Briese Heavylift also intends to educate shipboard crew on the amended procedures and the additional equipment, through a training video. This education is to be reiterated during ship inspections by shore-based staff.

ATSB comment

The ATSB acknowledges the safety actions proposed by Briese Heavylift, particularly the training and educational initiatives, which have the potential to adequately address this safety issue.

However, as there is no timeline for implementing these proposed actions, the ATSB remains concerned about the indefinite nature of the advised action. Further, this safety issue is applicable to ships managed by Briese Schiffahrts, the parent company, as well as those managed by its subsidiary companies. Therefore, addressing this safety issue will involve taking safety action across their fleets and, accordingly, the ATSB issues the following safety recommendations.

Safety recommendation to Briese Heavylift

The ATSB makes a formal safety recommendation, either during or at the end of an investigation, based on the level of risk associated with a safety issue and the extent of corrective action already undertaken. Rather than being prescriptive about the form of corrective action to be taken, the recommendation focuses on the safety issue of concern. It is a matter for the responsible organisation to assess the costs and benefits of any particular method of addressing a safety issue.

Recommendation number:	MO-2021-002-SR-01
Responsible organisation:	Briese Heavylift
Recommendation status:	Released

The Australian Transport Safety Bureau recommends that Briese Heavylift takes safety action to ensure safety management system procedures for hot work on board ships that it manages are effectively implemented.

Safety recommendation to Briese Schiffahrts

The ATSB makes a formal safety recommendation, either during or at the end of an investigation, based on the level of risk associated with a safety issue and the extent of corrective action already undertaken. Rather than being prescriptive about the form of corrective action to be taken, the recommendation focuses on the safety issue of concern. It is a matter for the responsible organisation to assess the costs and benefits of any particular method of addressing a safety issue.

Recommendation number:	MO-2021-002-SR-02
Responsible organisation:	Briese Schiffahrts
Recommendation status:	Released

The Australian Transport Safety Bureau recommends that Briese Schiffahrts takes safety action to ensure safety management system procedures for hot work on board ships that it manages, and ones managed by its subsidiary companies, are effectively implemented.

General details

Occurrence details

Date and time:	25 March 2021 – 0309 WST	
Occurrence class:	Serious Incident	
Occurrence categories:	Fire	
Location:	Berth No.2, Port Hedland, Western Australia	
	Latitude: 20°18.9' S	Longitude: 118°34.3' E

Ship details

Name:	<i>BBC Rhoneta</i>	
IMO number:	9614701	
Call sign:	V2HH3	
Flag:	Antigua and Barbuda	
Classification society:	DNV GL	
Departure:	Tianjin, China	
Destination:	Port Hedland, Australia	
Ship type:	General Cargo	
Builder:	Taizhou Sanfu Ship Engineering	
Year built:	2013	
Owner(s):	Briese Schiffahrts	
Manager:	Briese Heavylift	
Gross tonnage:	14,941	
Deadweight (summer):	17,500 t	
Summer draught:	8.60 m	
Length overall:	161.50 m	
Moulded breadth:	25.20 m	
Main engine(s):	Hyundai MAN B&W 6550MC-C	
Total power:	9960 kW	
Speed:	17.2 knots	
Injuries:	Crew – nil	Passengers – nil
Damage:	Significant fire damage to some cargo and minor fire damage to the ship's cargo hold	

Glossary

AMSA	Australian Maritime Safety Authority
AWST	Australian Western Standard Time
BBC	Briese Bischoff Company
CCTV	Closed-circuit television
CO ₂	Carbon dioxide
COSWP	United Kingdom Code of Safe Working Practices for Merchant Seafarers
DFES	Western Australia Department of Fire and Emergency Services
DNV GL	Det Norske Veritas, Germanischer Lloyd
EUR	Euro (European Monetary Unit)
IMO	International Maritime Organisation
ISM Code	International Safety Management Code
MCA	United Kingdom Maritime and Coastguard Agency
MSIN	Merchant Shipping Information Note (Hong Kong)
OS	Ordinary Seaman
PPA	Pilbara Ports Authority
SAR	Hong Kong Special Administrative Region
SMS	Safety Management System
SWL	Safe Working Load
UTC	Coordinated Universal Time
VHF	Very High Frequency
VTS	Vessel Traffic Services
WA	Western Australia

Sources and submissions

Sources of information

The sources of information during the investigation included the:

- directly involved officers and crew of *BBC Rhonetal*
- Brieze Schiffahrts
- Brieze Heavylift
- BBC Chartering and Logistics
- Western Australia Department of Fire and Emergency Services
- Australian Maritime Safety Authority
- Pilbara Ports Authority
- Flag administration of Antigua and Barbuda.

References

International Maritime Organization (IMO) 1995, International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code) as amended, IMO, London.

Maritime and Coastguard Agency (MCA), Code of Safe Working Practices for Merchant Seafarers, 2015.

Submissions

Under section 26 of the *Transport Safety Investigation Act 2003*, the ATSB may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. That section allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to the following directly involved parties:

- directly involved officers and crew of *BBC Rhonetal*
- Brieze Schiffahrts
- Brieze Heavylift
- BBC Chartering and Logistics
- Western Australia Department of Fire and Emergency Services
- Australian Maritime Safety Authority (AMSA)
- Pilbara Ports Authority
- The Department of Marine Services and Merchant Shipping for the ship's flag State (Antigua and Barbuda) administration.

Submission were received from:

- Brieze Schiffahrts and Brieze Heavylift
- AMSA

The submissions were reviewed and, where considered appropriate, the text of the report was amended accordingly.

Australian Transport Safety Bureau

About the ATSB

The ATSB is an independent Commonwealth Government statutory agency. It is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers.

The ATSB's purpose is to improve the safety of, and public confidence in, aviation, rail and marine transport through:

- independent investigation of transport accidents and other safety occurrences
- safety data recording, analysis and research
- 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, as well as participating in overseas investigations involving Australian-registered aircraft and ships. It prioritises investigations that have the potential to deliver the greatest public benefit through improvements to transport safety.

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

Purpose of safety investigations

The objective of a safety investigation is to enhance transport safety. This is done through:

- identifying safety issues and facilitating safety action to address those issues
- providing information about occurrences and their associated safety factors to facilitate learning within the transport industry.

It is not a function of the ATSB to apportion blame or provide a means for determining 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. The ATSB does not investigate for the purpose of taking administrative, regulatory or criminal action.

Terminology

An explanation of terminology used in ATSB investigation reports is available on the ATSB website. This includes terms such as occurrence, contributing factor, other factor that increased risk, and safety issue.