BSAFE

INCIDENT CASE STUDY

No.15 | MARCH 2022

INCIDENT CAUSED BY CHEMICAL REACTION OF FERTILISER

A 23,401 GT multi-purpose carrier was about to anchor after leaving port carrying a cargo of various types of fertiliser in bulk as well as general cargoes. During the anchoring manoeuvre white smoke was noticed emitting from cargo hold no.3. After a failed attempt to extinguish the suspected fire using the ship's fixed CO_2 system and with the risk of an explosion due to the decomposition of the fertilizer, the ship was evacuated and later declared a total loss.

FIGURE 1 CARGO HOLD NO.3 TWEEN DECK, PORT SIDE, AFT SECTION OF THE HOLD AFTER LOADING
SOURCE BUNDESSTELLE FÜR SEEUNFALLUNTERSUCHUNG (BSU)

WHAT HAPPENED

After loading a cargo consisting of various types of fertiliser in the lower holds no. 2 to 5, and various general cargoes in hold no. 1 and on the tween decks of holds no. 3 and 4 **(FIGURE 1)**, the ship was proceeding to anchorage before continuing its voyage.

During the anchoring manoeuvre the master noticed from the bridge some white smoke emerging from the aft part of hold no. 3 and soon after also from the starboard side of the hold. The master notified the chief officer (C/O) who was monitoring the anchoring operation at the forecastle. The C/O sent crew

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FIGURE 2 SMOKE EMITTING FROM THE SHIP THE DAY FOLLOWING THE INCIDENT.
SOURCE BUNDESSTELLE FÜR SEEUNFALLUNTERSUCHUNG (BSU)

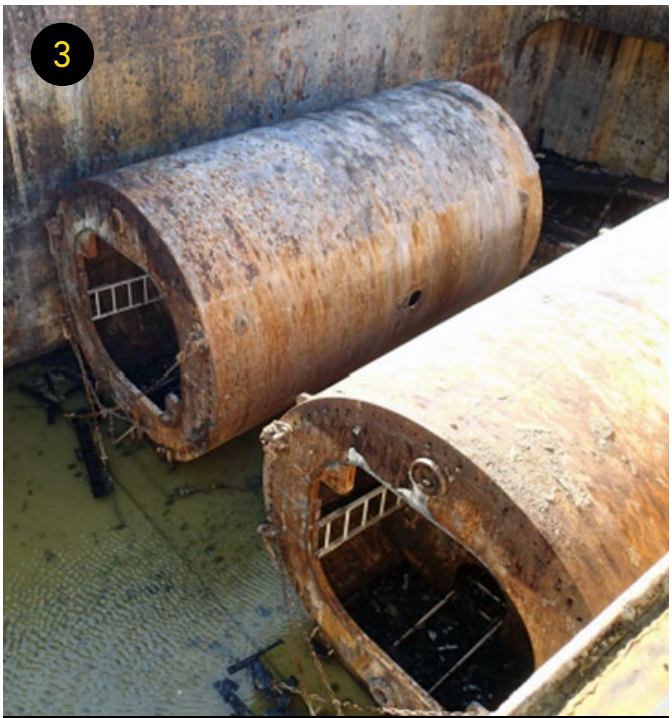

FIGURE 3 CARGO HOLD NO.3 TWEEN DECK, PORT SIDE FOLLOWING THE INCIDENT
SOURCE BUNDESSTELLE FÜR SEEUNFALLUNTERSUCHUNG (BSU)

WHAT HAPPENED (CONTINUED)

members to investigate and later joined himself. Arriving at cargo hold no. 3 it was established that the white smoke was escaping from the hold's fan cowls and that the smoke had a chemical odour and did not appear to be hot.

The crew closed the ventilation flaps and disconnected all electric power in the area . An able seaman (A/B) put on a fire protection suit including breathing apparatus and prepared to enter the hold through the booby hatch on its aft starboard side. When the booby hatch was opened dense smoke was observed and, as the A/B felt he could sense smoke inside his face mask, the attempt to enter the hold was aborted. Instead fire hoses were placed and turned on at each of the four corners of the hold to provide boundary cooling.

The crew identified the cargo in hold no. 3 to be ammonium nitrate based fertiliser in the lower hold and machinery parts and metals packed in wooden crates on the tween deck. After consulting the company's designated person it was decided to release the hold's fixed CO_2 system. Immediately after all the CO_2 had been released the smoke visible reduced to a minimum. Openings on the hold's hatch cover where smoke was still visible were sealed by the crew who believed the situation was now stable.

It was only about two and a half hours after releasing the CO_2 system that the ship first contacted the local shoreside authorities by notifying the local pilot station about the situation. This information was then passed on to the local Vessel Traffic Service (VTS) who issued a prohibition of entry notice until the situation on

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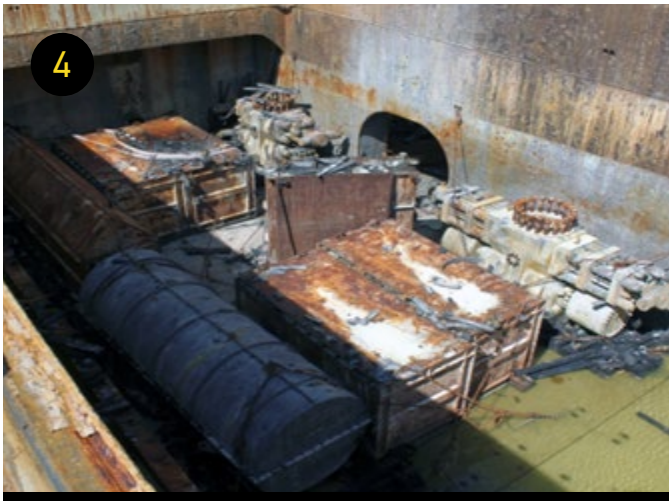

FIGURE 4 CARGO HOLD NO.3 TWEEN DECK, STARBOARD SIDE FOLLOWING THE INCIDENT
SOURCE BUNDESSTELLE FÜR SEEUNFALLUNTERSUCHUNG (BSU)

WHAT HAPPENED (CONTINUED)

board was assessed. The local Central Command for Maritime Emergencies (CCME) assumed overall command of the operation and a team of firefighters were dispatched to the ship by helicopter to investigate.

The firefighting team established that the ammonium nitrate based fertiliser on board was likely to be decomposing. In an attempt to halt the chemical decomposition process, it was decided to try and flood hold no. 3 by opening its hatch cover and then discharging water into it using a water canon from a firefighting ship that had arrived at the scene. For this only a minimum of the ship's crew were to remain onboard, with the rest getting evacuated. While preparing for the evacuation, a massive outbreak of yellow smoke emerged from cargo hold no.3. This raised concerns about the potential risk of an imminent explosion on board and it was decided to evacuate the ship completely. The crew evacuated the ship by deploying its free-fall lifeboat, while the firefighting team boarded a working boat from the nearby firefighting ship.

Three firefighting ships in total had been ordered to the scene and tasked with cooling and supressing the cloud of smoke coming from the damaged ship. Over the next couple of days the three ships managed to flood hold no. 3 and successfully stop the suspected exothermal self-sustaining decomposition of the ammonium nitrate based fertiliser in the hold **(FIGURE 2)**.

The damaged ship was later towed away for unloading and declared a constructive total **(FIGURES 3 & 4)**. The incident did not result in any fatalities or serious injuries. However, as a precaution the crew and firefighting team were taken to hospital for observation after being exposed to the smoke and fumes.

CONTACT

For more information on this incident email losspreven tion@tindallriley.com

THIS CASE STUDY IS DRAWN FROM THE INVESTIGATION REPORT 10-201 PUBLISHED BY THE TRANSPORT ACCIDENT INVESTIGATION COMMISSION, NEW ZEALAND AT: https://www.taic.org.nz/sites/default/files/inquiry/documents/10-201%20final%20version.pdf

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