

THE FOLLOWING COMMENTARY IS PART OF THE CASE STUDY MATERIAL AND HAS BEEN PREPARED TO CONSIDER SOME OF THE KEY ISSUES. THIS WILL SUPPORT REFLECTIVE LEARNING AND ENABLE DISCUSSION OF SOME OF THE CONTRIBUTORY FACTORS AND LESSONS LEARNED WITH PARTICULAR REFERENCE TO BEST PRACTICES.

INCIDENT CAUSED BY CHEMICAL REACTION OF FERTILISER

THE INCIDENT INVESTIGATION CARRIED OUT BY THE LOCAL AUTHORITIES IDENTIFIED A NUMBER OF FACTORS WHICH COULD EITHER HAVE CAUSED OR TRIGGERED THE INCIDENT, OR HINDERED THE CREW'S ATTEMPT TO CONTROL THE SITUATION. THE CONTRIBUTING FACTORS AND LESSONS LEARNED ARE DISCUSSED BELOW.

STOWAGE PLAN

The investigation found that the stowage plan provided which required fertiliser to be stowed in the lower holds with various general cargo on the above tween decks, was not compliant with the stowage requirements of the International Maritime Solid Bulk Cargoes (IMSBC) code. The applicable schedule of the IMSBC code covering ammonium nitrate based fertiliser (non-hazardous) which was loaded in lower hold no. 3 requires that: "The hatches of the cargo spaces, whenever this material is on board, shall be kept free to be capable of being opened in case of an emergency". This was not possible due to the loading of general cargo on the above tween deck. Furthermore, the design of the tween deck with pontoon hatches would also make any opening of the hatches during the voyage difficult.

When approving a stowage plan it is important that all available information and requirements are taken into account. As ammonium nitrate based fertiliser (non-hazardous) is classified as an IMSBC Group C cargo, which normally does not possess any chemical hazards nor the risk of liquefaction, this may have provided the master with a false sense of security and meant he was unaware of the specific requirements stated by the IMSBC code for the carriage of ammonium nitrate based fertiliser (non-hazardous).

Irrespective of ship type, it is important that before a stowage plan is handed over to the master for his final approval, it has been reviewed by his company office and any discrepancies identified have been duly discussed with the shipper and rectified. The master shall use his overriding authority if he has any concerns about the stowage plan and be supported by his back office so a safe solution can be implemented.

LOADING OF THE CARGO

While the cargo of fertiliser was loaded into holds no. 2 and 3, the ship was also receiving bunkers. Furthermore, hot work was carried out on the tween deck of cargo hold no. 3. Both actions are in breach of the IMSBC code which prohibits both bunkering and hot work in the vicinity of the cargo hold when loading ammonium nitrate based fertiliser (non-hazardous) cargo.

It is important that the crew is fully familiarised with the cargo that is to be carried and any associated safety risks. The provisions of statutory regulations should always be adhered to and this may require specific crew training prior to the carriage of the cargo.

DETECTION OF THE DECOMPOSITION

It was felt in the incident investigation that stowing general cargo on the pontoon hatch covers and laying out sheeting over the fertiliser cargo prevented an earlier detection of the incident. Furthermore, that the smoke detection system in cargo holds 2 and 3 was disconnected, and thereby did not provide the crew with an early warning of the self-sustaining exothermal decomposition.

DOUBLE FATALITY RESULTING FROM ENCLOSED SPACE ENTRY

DETECTION OF THE DECOMPOSITION (continued)

A ship's smoke detection system is a vital safety feature to provide the crew with a timely warning about a fire potentially developing and enable the crew to implement prompt remedial measures. The system should only be disconnected for short periods of time, e.g. during hot work, and only on the basis of a thorough risk assessment permit to work and when the work area is properly supervised.

FIGHTING THE DECOMPOSITION

As it was not possible to enter the cargo hold, it was decided to release the ship's fixed CO₂ system into hold no.3. While this may have been sufficient to extinguish a fire which had started in the general cargo carried on the tween deck, it was not adequate for ammonium nitrate based fertiliser (non-hazardous). The IMSBC code states the following emergency actions in the event of a fire with a cargo of ammonium nitrate based fertiliser (non-hazardous):

"Fire in a cargo space containing this material: Open hatches to provide maximum ventilation. Ship's fixed gas fire-extinguishing installation will be inadequate. Use copious quantities of water and isolate the source of heat, if any. Flooding of the cargo space may be considered but due consideration should be given to stability."

The incident investigation felt that with the information available from the manufacturer and the IMSBC code, it would have been possible for the crew to deduce the actual cause of the emerging smoke and thereby apply the correct suppression strategy. However, as decomposition is not an actual fire, the wording of the IMSBC code may appear misleading. Therefore, it is important the crew is trained and understand the difference and the necessary precautions that need to be taken when carrying cargo where decomposition may occur. Timely flooding of the cargo hold with due consideration given to the ship's stability has been shown to be an effective method to stop decomposition.

RUST PENETRATIONS OF THE BULKHEAD

The incident investigation identified rust penetrations on the bulkhead between cargo holds no.2 and 3. An impaired bulkhead between two cargo holds may prevent the effective flooding of the hold in case of decomposition and may also further compromise the stability of the ship if more compartments are flooded by water. Furthermore, with cargo fires where the release of the ship's fixed CO₂ system is the recommended firefighting method, the cargo hold needs to be sealed for this to be most effective. Therefore, to ensure both fire safety and the watertight integrity of the ship, a robust inspection and maintenance regime should be introduced as part of the ship's Planned Maintenance System (PMS).

USE OF APPROPRIATE EQUIPMENT

The lights installed in the cargo hold were Class T4, which means the temperature should not exceed 135°C. However, measurements conducted during the incident investigation showed temperatures exceeding 200°C. Therefore, it could not be ruled out that the light installed in lower hold no. 3, if it was of a similar type and switched on, may have caused the temperature to exceed 130°C where, according to the manufacturer's Material Safety Data Sheet, dangerous decomposition gases may be released.

The use of appropriate equipment is essential and this includes a duty to properly maintain the equipment in order to ensure the safe operation of the ship.

DOUBLE FATALITY RESULTING FROM ENCLOSED SPACE ENTRY

CHANGE OF CARGO'S CHARACTERISTICS

Contrary to the information provided by the manufacturer, the investigation established that the fertiliser loaded in hold no. 3 was capable of self-sustainable decomposition. The manufacturer explained this by the fact that the fertiliser can change its properties over time. At the time of the incident the fertiliser had been produced over nine months ago. Therefore based on its storage time it may be prudent to test ammonium nitrate based fertiliser (non-hazardous) before shipment to ensure its properties remain non-dangerous.

For more information on this incident, email: lossprevention@tindallriley.com

THE SOURCE OF THIS CASE STUDY IS DRAWN FROM THE INVESTIGATION REPORT 10-201 PUBLISHED BY BUNDESSTELLE FÜR SEEUNFALLUNTERSUCHUNG (BSU):
https://www.bsu-bund.de/SharedDocs/pdf/EN/Investigation_Report/2016/Interim_Investigation_Report_198_15.pdf?__blob=publicationFile&v=1

THE PURPOSE OF THIS CASE STUDY IS TO SUPPORT AND ENCOURAGE REFLECTIVE LEARNING. THE DETAILS OF THE CASE STUDY MAY BE BASED ON, BUT NOT NECESSARILY IDENTICAL TO, FACTS RELATING TO AN ACTUAL INCIDENT. ANY LESSONS LEARNED OR COMMENTS ARE NOT INTENDED TO APPORTION BLAME ON THE INDIVIDUALS OR COMPANY INVOLVED. ANY SUGGESTED PRACTICES MAY NOT NECESSARILY BE THE ONLY WAY OF ADDRESSING THE LESSONS LEARNED, AND SHOULD ALWAYS BE SUBJECT TO THE REQUIREMENTS OF ANY APPLICABLE INTERNATIONAL OR NATIONAL REGULATIONS, AS WELL AS A COMPANY'S OWN PROCEDURES AND POLICIES.