

CHEMICAL BURNS INCIDENT

THE THIRD OFFICER (3/O) OF A CHEMICAL TANKER WAS SPLASHED WITH CAUSTIC SODA WHILE PREPARING THE SHIP'S CARGO TANKS READY FOR LOADING A CARGO OF CAUSTIC SODA (FIGURE 1). TO PREPARE THE CARGO TANKS FOR LOADING RESIDUES FROM A CARGO SAMPLE OF CAUSTIC SODA HAD TO BE REMOVED FROM THE TANKS FOR WHICH A MOBILE PNEUMATIC DRIVEN PUMP WAS USED. WHILE THE CAUSTIC SODA WAS BEING PUMPED OUT, THE HOSE PARTED FROM THE PRESSURE SIDE OF THE PUMP CAUSING THE 3/O TO BE SPATTERED WITH THE CORROSIVE SOLUTION WITH A SMALL QUANTITY ENTERING HIS EYES.



FIGURE 1 GENERAL ARRANGEMENT PLAN SHOWING THE LOCATION OF TANK NO.1 PORT IN RED.
SOURCE: FEDERAL BUREAU OF MARITIME CASUALTY INVESTIGATION (BSU)

WHAT HAPPENED

A 12,162 GT chemical tanker was anchored at a roadstead in the lower reaches of a river and was in ballast condition. The crew were preparing its tanks for loading a cargo of 50% sodium hydroxide solution (caustic soda) in ten of the ship's twelve cargo tanks, having previously carried RBD (refined, bleached, deodorised) palm stearin in six of the tanks, including tank no.1 port, and crude palm oil, coconut oil and biodiesel in the other tanks.

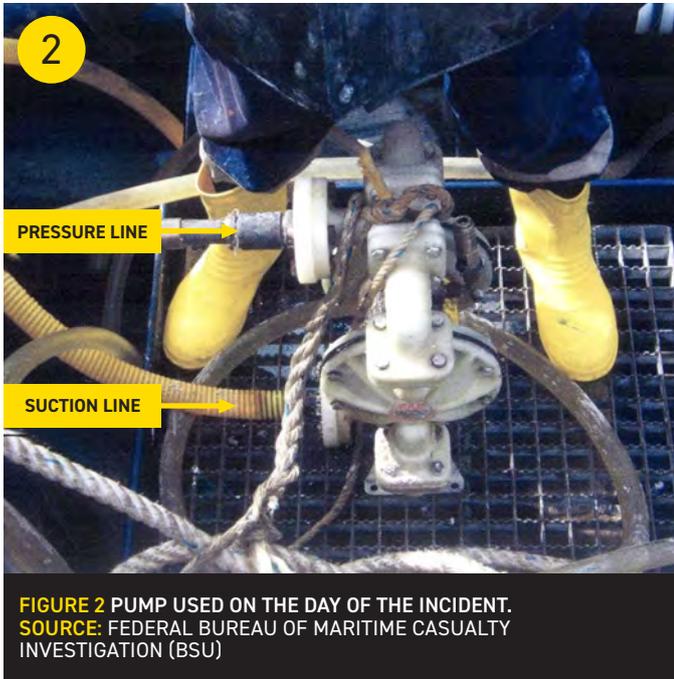


FIGURE 2 PUMP USED ON THE DAY OF THE INCIDENT.
SOURCE: FEDERAL BUREAU OF MARITIME CASUALTY INVESTIGATION (BSU)

WHAT HAPPENED (CONTINUED)

The tanker had only been operating for four months and the same crew had been on board throughout this period.

In the days preceding the incident, the crew had made various attempts to prepare the ship's tanks for the new cargo by cleaning the residues of the previous cargoes. However, each time the tank inspector, who was attending on behalf of the chemical company supplying the caustic soda, rejected the tanks following inspection due to the presence of cargo residues. The first tank pre-inspection had been carried out on the night of 24 July. However, it was not until the morning of 29 July, following a successful tank inspection, that a cargo sample of caustic soda could be loaded and circulated through the other tanks in which the cargo was to be loaded. After completing a circulation a specimen of the cargo sample was taken to check its level of contamination and water content. The specimen came back as being contaminated and the tanks were again rejected by the tank inspector.

Early on 30 July the ship relocated back to the roadstead and on 1 August the crew prepared to clean the cargo tanks one more time. This required two crew members to enter tank no. 1 port and remove the residues of the caustic soda that had been used as a cargo sample using a mobile pump. A polypropylene pneumatic driven pump with a pumping capacity of 520 l/min at a maximum working pressure of 8 bar (**Figure 2**) was prepared. Meanwhile a tank cleaning team consisting of the 3/O and an ordinary seaman (O/S) donned Personal Protective Equipment (PPE) consisting of a cotton overall, a rubberised jacket, safety boots, protective gloves, goggles and a safety helmet (**Figure 3**) and prepared to enter the tank.



FIGURE 3 PERSONAL PROTECTIVE EQUIPMENT WORN BY THE 3/O AT THE TIME OF THE INCIDENT.
SOURCE: FEDERAL BUREAU OF MARITIME CASUALTY INVESTIGATION (BSU)

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FIGURE 4 CARGO TANK NO. 1 PORT HATCH COAMING.
SOURCE: FEDERAL BUREAU OF MARITIME CASUALTY INVESTIGATION (BSU)

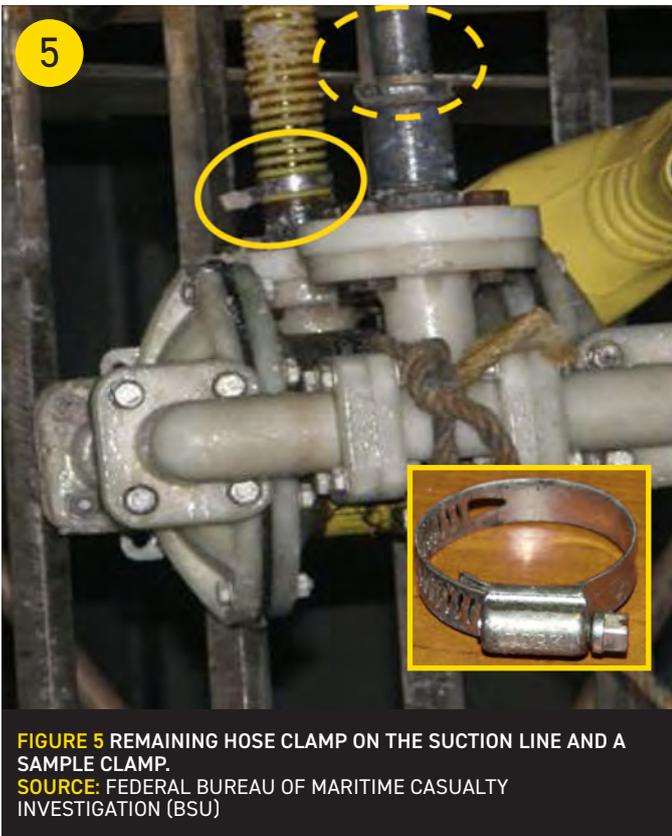


FIGURE 5 REMAINING HOSE CLAMP ON THE SUCTION LINE AND A SAMPLE CLAMP.
SOURCE: FEDERAL BUREAU OF MARITIME CASUALTY INVESTIGATION (BSU)

WHAT HAPPENED (CONTINUED)

At about 1430 local time, the tank cleaning team entered cargo tank no. 1 port on its port side (**Figure 4**). The bosun was located at the coaming of the entry hatch to the cargo tank and the master was located at the forward part of the vessel near the tank entrance.

While the caustic soda was being pumped out from inside the tank, the hose clamp securing the pressure hose to the pump parted and caustic soda was released into the cargo tank (**Figure 5**). This resulted in the 3/O being spattered with caustic soda, with a small quantity entering his eyes. Alerted by the 3/O's screams, the O/S requested assistance using his portable radio. The 3/O was safely escorted out of the cargo tank and onto the deck where the master and the bosun took him to his cabin where they conducted first aid by rinsing his eyes with water, while shore assistance was requested.

The Rescue Coordination Centre was alerted at 1443 and the rescue lifeboat of the local Volunteer Fire Brigade was deployed at 1500 reaching the ship at 1509. At 1523, the injured 3/O was taken to a nearby town by the rescue lifeboat and then flown to hospital by helicopter.

The injured 3/O was treated at the hospital for chemical burns and was released after ten days. It is unknown whether the injuries sustained have caused any permanent disabilities.

Following further cleaning and testing on the evening of the incident and on 2 August, the tanks again failed the inspection and the chemical company permanently refused to load the cargo. At 1800 on 2 August, the ship departed without any cargo.

Following the incident the tanker's main deck area was noted as being contaminated with a large amount of the previous cargo of palm oil.

LESSONS LEARNED ON NEXT PAGE

LESSONS LEARNED

THE FOLLOWING LESSONS LEARNED HAVE BEEN IDENTIFIED. THESE ARE BASED ON THE INFORMATION AVAILABLE IN THE INVESTIGATION REPORT AND ARE NOT INTENDED TO APPORTION BLAME ON THE INDIVIDUALS OR COMPANY INVOLVED:

- The goggles worn by the 3/O at the time of the incident were open at the sides, allowing the caustic soda to enter his eyes more or less freely, while the cotton overalls were also not of a suitable standard for handling caustic soda. The use of tight-fitting goggles or a face shield (or both), as well as clothing made of chemical-resistant material, would have provided a more effective level of protection in accordance with the requirements of The International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk (IBC Code).
- A tank cleaning plan based on a thorough risk assessment was not available following the incident and the investigation concluded that these documents had not been prepared. These would have identified the risks associated with removing the caustic soda using a mobile pump and the requirement for proper PPE to be worn, and should have prevented the incident.
- Although the master and bosun were present as the cleaning team entered the cargo tank, neither of them took any actions with regard to the inadequate PPE being worn by the 3/O and O/S. An effective Stop Work Authority programme would have prevented the incident.
- The investigation concluded that the safety management implementation on board did not meet international standards as established safe systems of work were not being followed e.g. not preparing a tank cleaning plan and personnel not wearing adequate levels of PPE for the tasks.
- The crew demonstrated a lack of training and capability both in preparing the tanks for the cargo and safely handling the cargo. A sufficient level of safety awareness relating to handling caustic soda would have prompted the use of appropriate PPE, while the positioning of suitable first aid equipment close to the tank would have enabled the timely treatment of the injuries.
- The investigation was unable to establish the actual cause of the hose clamp parting from the mobile pump as the investigators were unable to locate the clamp following the incident. Therefore it remains uncertain whether a case of material fatigue caused the clamp to part. Nonetheless, all equipment should always be inspected prior to use to ensure it is fit for purpose.

CONTACT

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

THIS CASE STUDY IS DRAWN FROM THE INVESTIGATION REPORT 301/09 PUBLISHED BY THE FEDERAL BUREAU OF MARITIME CASUALTY INVESTIGATION (BSU) AT: https://www.bsu-bund.de/SharedDocs/pdf/EN/Investigation_Report/2012/Investigation_Report_301_9.html

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.