Safety Clicks

Learning from others' mistakes

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Swiss Cheese Safety

By Shannon Smith

Have you ever heard that safety is like slices of Swiss cheese? Each slice represents a safety barrier between an accident and its causes. If you remove slices/ barriers or have enough gaps in them, they eventually line up so there is no barrier (a hole all the way through the stack of slices) and an accident will likely happen as a result.

All of TDI's procedures, practices and protocols are created to put as many safety barriers as possible between you and an accident. **The whole point of the safety system,** the JSAs, the permits, the HAZIDs, the toolbox meetings and all safety training is **to get you to STOP and THINK before you ACT.** Part of the THINK step is to recognize hazards and make sure there are safety barriers between you and the hazards.

In the story below, you will see how many lapses is safety combined to result in a fire on board the *Celtic Carrier*. The *Celtic Carrier's* crew was unable to control the fire on its own and two fire fighting teams from another vessel were required to extinguish the fire completely. Most of the accommodation spaces were damaged by heat, smoke and water.

The information and details provided in the following story are a greatly summarized version of an investigation by the Marine Accident Investigations Branch (MAIB) of UK Merchant Shipping.

Fire aboard the Celtic Carrier

The vessel was dockside in Gibraltar for repairs. The second AB (AB2) had several alcoholic drinks ashore before boarding the vessel for dinner at 1700. With repairs completed, the vessel prepared to resume its journey. At 1830, the AB2 helped cast off the lines, watched tv and went to his cabin about 2300. He moved the glass ashtray from the table to the built in sofa on his right so he could reach it from his bed. He continued to drink beer and smoke cigarettes in bed until he fell asleep.

About 0315 he woke to pain on his right hand and leg. He saw flames and thick black smoke coming from the sofa. He threw a blanket over the fire and , still in his underwear, ran into the hallway, past a fire extinguisher and up to the bridge to shouting to the second officer that there was a fire in his cabin. He left the cabin door open behind him.

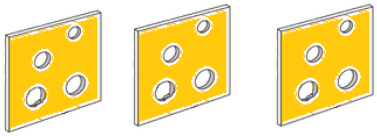
The second officer went down the stairs and saw the smoke in the hallway. He returned to the bridge, told the AB2 to go to the muster station, sounded the fire alarm and stopped the main engine. Three minutes later, no one else showed up on the bridge so the second officer went to the muster station.

Crew Response

The motorman woke to the fire alarm and saw smoke in his cabin. He put a rag over his face, opened the cabin door, held his breath and ran up the stairs to the muster area in his bare feet. The motorman was designated as part of the fire team and had completed advanced fire training, but had not put on any of the fire fighting equipment and refused to do so. Although every crewman was STCW trained in fire

Fire Statistics

Of the 17 similar marine investigation reports of fires on vessels, six of them were caused by people smoking in bed. Eight of the fires were caused by cigarettes being tossed into bins without being fully extinguished.



TOP Safety Card Hits

(Fleetwide last month)

Maintenance/ Inspections	**14**
Safety Attitude	**10**
Tools & Equipment	**8**

Fire Aboard the Celtic Carrier

fighting, no other crewman was willing to take his place, leaving the second officer to fill that position, despite the fact that the fire suit was too small for him. (Could not wear the pants or button the jacket)

The first AB (AB1) woke to what he thought was a small explosion and the noise of electrical breakers tripping open. He smelled burning plastic, then heard the fire alarm. When he opened his cabin door, the hallway was dark and full of smoke. He closed the door and, wearing only his pajama bottoms, crawled out of the porthole and over the vessel's side until he reached the muster deck..

The cook and chief engineer (C/E) both woke to the fire alarm, got dressed, covered their faces in rags and made their way to the muster station. The CO woke to the smell of smoke, opened his cabin door, saw dense smoke in the hallway. Then the alarm sounded and he joined the crew at the muster area. The master woke to the alarm and went to the bridge, which was unmanned. A crew member came to the bridge and told him there was a fire in the accommodation.

Fighting the Fire

The crew ran out three hoses, which were initially directed to cool the exterior (ship's side) of the burning cabins. The C/E and motorman entered the engine control room through the emergency hatch. They stopped the accommodation ventilation fans, turned off electrical power to the accommodation and started the fire pump and emergency generator.

The crew closed the accommodation ventilation fire dampers and collected the SCBAs. The fire in the AB2's room grew rapidly from several flammables improperly stored in the room and flames and smoke were seen coming out of the cabin's porthole. (water bottles filled with paint thinner were stored next to newspapers, lighter fluid, two lighters, flammable aerosol air fresheners and an ashtray)

The AB1 and the second officer donned SCBAs and entered the accommodation through the galley into the hallway. The lead man wore a lifeline and the men carried the hose between them. They sprayed down the bulkheads and deckheads in the area for about 10 minutes, when they became concerned about their air supply. They withdrew and their air supply ran out just as they reached the top of the emergency escape ladder.

SCBA tanks were replaced and the AB1 attempted to enter the accommodation again, but had to return to the muster station due to intense heat. Crew continued to cool boundaries of the fire area. The Chief Officer and second officer instructed the crew to rig a stage over the ship's side forward of the AB2's room. AB1– now wearing a variety of safety clothing that had been found—climbed down the stage and swung the fire hose nozzle through the porthole opening into the AB2's room. The master remained on the bridge and received updates from the crew.

By this time smoke and flames could be seen pouring from the AB1's cabin's porthole opening– 2 rooms away from where the fire started. The motorman's room in the middle had the door and porthole glass closed, so the crew moved the staging forward and swing the hose nozzle into porthole opening of the AB1's cabin.

At 0600, the C/E, who had been regularly checking the engine room via the escape hatch, became concerned about the amount of water draining into the engine room. The decision was made to stop the fire pump and wait until daylight before attempting to inspect the accommodation. However, the crew noticed the steering gear was no longer working due to a power failure.

Post Fire Inspection

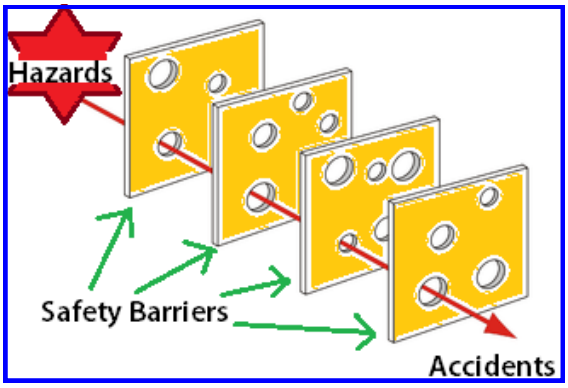
At 0800 only vapor was seen coming out of the AB1 and AB2's cabins. Accommodation fire dampers were opened and ventilation fans restarted. The second officer and AB1 put on SCBA gear, checked air pressures and entered the accommodation to inspect the damage. They did not bring a fire hose or any fire

Fire Aboard the Celtic Carrier

extinguishers with them.

AB1's cabin had suffered fire damage to the upper third of the room and was still hot. AB2's cabin was still emitting considerable heat, so the door was not opened. The Motorman's room (between the two) appeared to have no major fire damage and most of the furniture was still intact.

At 0904 the master informed the owner about the fire and that it was extinguished. The owner arranged a tug to pull it into port.



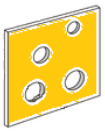
Re-ignition

Less than an hour later, the fire in the motorman's cabin reignited. Ventilation fans were stopped and the fire flaps closed again. The crew was unable to break the porthole glass to get the nozzle of the fire hose into the cabin and the fire quickly grew out of control.

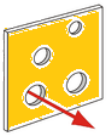
At 1005 the master had to call the owner back to say the fire had reignited and the situation was serious. The master contacted the nearest emergency response center to advise of the situation. The response center put out a call for assistance and notified the Celtic Carrier that several vessels were responding. The crew began to prepare the life raft, immersion suits, SART and flares in case they needed to abandon ship.

A vessel from the Spanish navy arrived and dispatched two 6 man fire teams to the Celtic Carrier's accommodation and another vessel broke the motorman's cabin porthole glass and directed fire-fighting foam into this and the surrounding cabins. By 1226 the fire was under control and later extinguished.

The Investigation There are far too many safety "holes" to list in detail, but here are the highlights.



Safety Barrier (slices)	Safety Gaps (holes)
SMS called for Master to designate smoking areas and specifically prohibited smoking in bed	No designation implied permission for smoking in rooms
HazCom program (not effective or understood)	Multiple flammables stored in AB2s cabin
Muster list designated fire team. All crew had completed vessel orientation and signed the fire training manual.	Fire team member unwilling to fight fire. No backup personnel assigned in case of unwillingness or incapacitation.
Fire drills conducted at regular intervals. 3rd party fire training last completed 5 years before this fire.	Fire drills were falsified or tabletop only. Reason given was insufficient time due to ship's work schedule.
Signed master's checklist covered all aspects of the ship, including drills and condition of fire doors. Weekly and monthly checklists for inspections of fire doors had been completed. Completed and cosigned by DPA.	Both fire door hinges to the steering gear compartment were rusted and seized in open position. Multiple paper checklists and inspections indicated all fire doors working satisfactorily.
ABs were scheduled for bridge watch and fire rounds around the clock.	ABs were used for cargo loading and unloading from 8am to 5 pm daily (during their scheduled rest hours) so were allowed to rest during their scheduled bridge watch. Master falsified bridge logs to indicate watches and fire rounds were completed.



Company managers' micro-management and authoritarian approach to ship operations did not recognize the need to fully involve crews in the application of the SMS to ensure success. Instead it **"had the effect of reducing the interest and engagement of the crew, made the SMS harder to implement… and probably contributed to the falsification of shipboard records."**