IMCA Safety Flash 06/17

March 2017

Focus: Fire Safety

Here are four recent incidents all involving fire or the risk of fire. The first involves an actual galley fire which was extinguished by automatic equipment. Lack of knowledge, inadequate maintenance and work standards and lack of skill and poor practice were amongst the root causes identified.

The next two incidents deal with near misses where equipment failure caused smoke or a small fire. In both cases the presence of smoke triggered automatic smoke detection systems, causing a General Alarm. The prompt and professional response of the vessel crew ensured that neither incident got out of control. The second of these incidents was caused by fuel impacting on hot metal.

The final near miss, in which during a drill the vessel bridge was found to have no control of the emergency fire pump, could have led to a serious issue in the event of a real fire.

Members may wish to reiterate the importance of taking fire drills seriously. Another interesting question emerging from one of these incidents is, how do we manage a *real* emergency that starts during a drill?

1 Fire in the Deep Fat Fryer

A member has reported an incident in which there was a fire in a deep fat fryer. The galley crew were finished in the galley and went for a break at 12:55. At 13:02 the fire alarm sounded, indicating a fire in the galley. Crew mustered and power was switched off to the galley. Fire teams were prepared. On entry into the galley it was discovered that the deep fat fryer was the cause of the fire, and that the automatic fire prevention system over the deep fat fryer had extinguished the blaze. There were no injuries. Some smoke got into the accommodation spaces but was ventilated out.

Our member's investigation noted the following:

- The galley crew said that the deep fat fryer was turned off 10 minutes before they left the galley;
- The deep fat fryer had a thermostat with maximum 210°C, and thermal fuses which should have cut out, with an alarm sounding, at 246°C and 275°C. These two thermal fuses had not cut out;

- No fault was found with the thermostat after the fire. It could not be said with certainty that the thermostat was without fault – an intermittent fault could have been present;
- The oil used in the deep fat fryer had a flash point of ~250°C, but the user manual for the device requires that the oil used should have a flash point higher than 350°C;
- The most likely cause of the fire was the high oil temperature;
- The deep fat fryer was left in an unsafe condition:
  - The two baskets were not removed
  - The lid was not in use
  - The heating element was not clean, and the thermostat is under the heating element. Therefore, the thermostat could have been reading an incorrect temperature;
- Two days before the incident, the deep fat fryer had been inspected and repaired by the engineers, but no work order or record was made of the corrective work or repair.

Our member's investigation recorded the following **direct causes**:

- Incorrect use of equipment/machinery:
  - The flash point of the oil used was too low
  - The deep fat fryer was left in an unsafe condition;
- Inadequate tools and equipment: the thermostat may have had an intermittent fault;
- Our member's investigation recorded the following **root causes**:
  - Lack of knowledge and lack of experience of what kind of oil should have been used in the deep fat fryer
  - Inadequate maintenance standards – no proper records were kept after repair work was conducted on the fryer
  - Lack of skill/poor practice: the galley crew ought not have left the fryer in that condition
  - Inadequate work standards: procedures were not adequate for the correct use and cleaning of the fryer.

The deep fat fryer was taken out of use and an investigation begun. The actions taken included:

- Ensure oil with the correct flash point is used in all such fryers on all company vessels;
- Ensure that all repair work is properly documented in company planned maintenance system;
- Make sure focus/attention is given to ensuring galley equipment is left in safe and appropriate condition after use, and that there are proper procedures for cleaning the fryer.

Members may wish to refer to the following incident:

- IMCA SF 07/11 Incident 2 *Galley fryer fire*

2 Near Miss: Fire Hazard arising from Failed Fuel Pipe Connection

A member has reported a near miss incident involving a failed fuel pipe connection. The incident occurred while the vessel was full ahead in transit. Smoke was observed near the port main engine. Shortly thereafter, the smoke detection system activated, indicating smoke in the engine room, and the General Alarm sounded. All personnel mustered at their "At Sea" emergency muster stations and fire parties were prepared. The port engine was brought to a controlled stop and its fuel supply was isolated.

The engineers identified that a fuel pipe connection had failed, and reported to the bridge that although there was slight smoke present in the engine room, there was no fire and the situation was under control.

Repairs were made, the engine run up and tested satisfactorily, and the transit continued.

Top view of the failed pipe in place

Location of failure at the fuel pipe coupling

Our member's investigation noted the following:

- The cause of the incident was a failed high pressure fuel pipe coupling between the fuel injector and delivery pipe. This caused fuel to run onto hot engine components which created smoke.
  - The leak originated from the fuel coupling which contained an O-ring seal inside. Upon inspection the O-ring was not brittle or damaged
  - The pipe was inspected and showed no signs of visible damage. Further analysis would take place;
- What went well:
  - "Know your ship" – the on-watch engineer had good awareness and knowledge of the engine room and was able to swiftly and correctly identify the failed component and source of potential fire
  - There was swift and safe co-ordination between engine room and bridge to safely stop the port engine and isolate the fuel supply
  - The crew muster was swift and effective
  - Repair and return to operation was conducted in less than two hours after initial emergency
  - Using OEM parts, and not suspect/reconditioned parts, allowed the vessel to implement repairs quickly and effectively;
- What could have gone better:
  - The on-watch engineer, rather than **immediately** contacting the bridge and starting shut-down of the port engine, called the second engineer
  - Trends of failures – the vessel had noticed a trend developing with the failure of fuel supply piping – this was the third failure within four months.

Our member took the following actions:

- Investigate similar systems to ensure no other latent failures or defects that may result in recurrence;
- Ensure main engine fuel pump overhaul to include fuel pipe pressure testing and seal renewals.

Members may wish to refer to:

- IMCA SF 10/14 which consists solely of fires in engine room spaces;
- IMCA SF 08/15 Incident 4 *Fatalities: Engine Room Fire Caused by Fuel Spray Ignition* [having the exact same immediate cause of fuel supply lines leaking onto hot metal].

3 Near Miss: Fire Hazard from Engine Room Equipment Failure

A member has reported a near miss incident relating to a fire hazard in a separator room. During routine planned maintenance and testing of a main engine lube oil purifier during a port call, smoke was noted emerging from beneath the guard of the purifier pre-heater.

***Above** – safety cut-off removed for investigation. The failed Reset button is highlighted.*

The vessel's smoke detection system activated, indicating smoke in the separator room. A General Alarm was sounded and a broadcast made to inform the crew that a potential emergency was developing and "In Port" fire procedures were activated.

The heater was immediately isolated both electrically and mechanically. Bridge was informed that although smoke was present there was no fire and the situation was under control. The heater was monitored to ensure that it cooled appropriately and presented no further danger.

Our member noted the following:

- There was some initial confusion at the time of the alarm, for two reasons:
  - The vessel was preparing to conduct an "At Sea" emergency drill, which required personnel to muster on board, rather than ashore, and personnel assumed the drill had been brought forward
  - Communications were hampered by a fault with the vessel PA system. The Master had to rely on portable UHF communications to clarify the exact situation.

What caused the incident?

- The **immediate cause** was the overheating of the lube oil pre-heater, which in turn overheated the paint on the heater casing, causing smoke;
- The engineer carrying out the work noted his concerns with the operation of the heater. He shut down the system by activating the heater stop button, and had the intent to report a possible fault;
- Events overtook his intentions: the smoke activated the smoke detection system and raised the General Alarm;
- The **root cause** was discovered to be a failed switch in the safety cut-off mechanism, which was found to have failed in the "Reset" position; this meant that, even if the heater had tripped, it would have immediately reset itself thereby keeping the heater on.

Positive points noted:

- Concerns were identified and support was sought in a timely way;
- When they heard the alarm, the duty engineer and chief engineer immediately activated both mechanical and electrical isolations, complete killing the system;
- The vessel was brought to Emergency Stations relatively quickly, despite communications problems;
- Investigation correctly identified the failed component and chain of events that led to the hazard;
- The vessel notified shore management in a timely way and provided full supporting information about the incident.

Negative points noted:

- Emergency communications – vessel management had notified shore management of the recurring defect with the PA system, but repairs had been deferred and then cancelled;
- What happens when a real emergency occurs during a drill or exercise? There was no policy or guidance in place to deal with this possibility.

Particular actions taken:

- Investigation of similar systems to ensure no other latent failures or defects that may result in recurrence;
- Immediately pursue and action any outstanding defects related to communications and/or emergency response systems;
- Implement and publish a procedure for emergencies occurring during drills and exercises.

Members may wish to refer to the following incident:

- IMCA SF 14/11 Incident 5 *Diver Helmet Hat Light* [a dive helmet hat light which overheated to the point that the outer casing caught fire]

4 Near Miss: Emergency Fire Pump could not be Started from the Bridge

A member has reported a near miss incident in which it was discovered that an emergency fire pump could not be started from the bridge. The discovery was made during a fire drill exercise on a vessel. The Master immediately informed the chief engineer. The chief engineer took action and noticed that the Emergency Fire pump main switch in the engine room was switched to local control. He switched it from local control to bridge remote and informed the bridge to start again; on this attempt it was started successfully and came on line.

Our member's investigation noted the following:

- **What went wrong?** The vessel's Emergency Fire pump main control switch in the engine control room was switched to "local control" instead of "remote/bridge control". This meant that the Emergency Fire pump could not have been started from the bridge;
- **Stop work authority** (safety observation) was not properly used. The chief engineer confirmed that when he had joined the vessel he had found the main switch on local control but did nothing to correct it;
- Existing company **procedures were not followed** by the Master or the chief engineer, for monthly and weekly checks of this equipment. "*Run the Emergency Fire pump on weekly basis and ensure that it is capable of supplying water under pressure to two charged fire hoses*". This item was marked as completed;
- There was a **failure of communication**: The fire drill scenario was particularly highlighted to the chief engineer, including the fact that during fire drill it would be required to start the Emergency Fire pump from the bridge. It was obviously understood but order and procedures were not followed.

Action:

- Chief engineer to ensure that the main switch in the engine room is always stationed on "Bridge Remote Control". A sign or notice to this effect to be posted in the engine room to remind engineers to always leave the switch on bridge remote control.

Lessons learnt:

- Ask questions, be willing to exercise the stop work authority; don't assume it's all just business as usual;
- Drills and exercises exist for a reason – treat them seriously and guard against complacency;
- Ensure that critical equipment checklists and tests are thoroughly carried out for real, not just ticked off;
- Handovers at crew change and shift should be comprehensive and thorough, with a written record, and should cover all vital areas of concern.

Members may wish to refer to the following incident (search words: *pump, switch*)

- IMCA SF 04/14 Incident 2 *Near Miss: Failure to Reconnect Fire Suppression Systems*