IMCA Safety Flashes summarise key safety matters and incidents, allowing lessons to be more easily learnt for the benefit of all. The effectiveness of the IMCA Safety Flash system depends on members sharing information and so avoiding repeat incidents. Please consider adding **safetyreports@imca-int.com** to your internal distribution list for safety alerts or manually submitting information on incidents you consider may be relevant. All information is anonymised or sanitised, as appropriate.

1 Fire in engine room

Applicable Life Saving Rule(s)

Bypassing Safety Controls

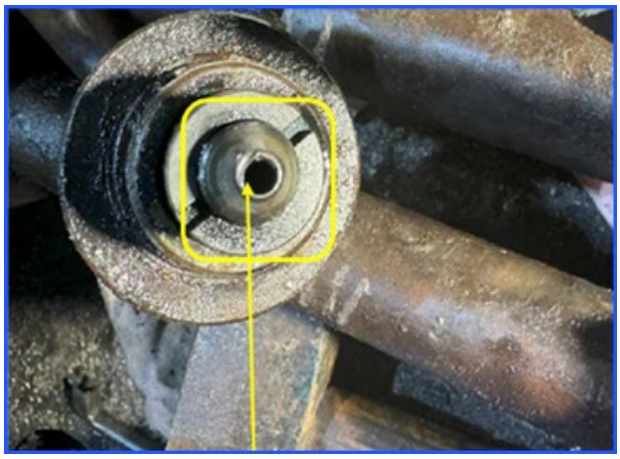
Line of Fire

What happened

A fire occurred in the engine room of a vessel during operations. The fire was first detected by a duty crew member, and the watch team immediately attempted to extinguish it using portable fire extinguishers. Unfortunately, these efforts were not successful, and the fire rapidly escalated.

The fire initially impacted the starboard main engine and surrounding areas, with temperatures rising beyond 660°C. This extreme heat caused significant damage, ultimately leading to the destruction of the engine room and adjoining areas, including accommodation spaces.

However, the emergency response and firefighting efforts from the fleet and local authorities were swift, helping to prevent further escalation and ensuring the safety of the crew and passengers and protection of the environment.



High Pressure Fuel Pipe Sealing Found With Scuffing marks

Pressure Fuel Pump Outlet Port Found With Sign Of Fuel Leakage

Why did it happen?

Investigation identified that:

- The most likely cause as a fuel leak from a high-pressure pipe which had been misaligned during re-assembly;
- Blocked leak detection tubing failed to alert the crew to the fuel leak in a timely manner;
- Additionally, blocked drain lines from the hot box prevented proper fuel drainage, leading to fuel accumulation;
- The accumulated fuel ignited upon contact with the engine's hot surfaces.

Why did the fire spread?

The fire spread for several reasons including:

- The fire water mist system valve being closed, preventing effective suppression;
- Crew attempted to close the fuel supply quick closing valves remotely but failed due to heavy smoke in the area;
- The delayed shutdown of engine room ventilation, along with incomplete closure of fire dampers and doors, allowed the fire to spread rapidly due to increased oxygen supply.

What can we learn

This incident highlights several critical areas for improvement in fire prevention and emergency response:

- Proper Re-Assembly and Maintenance
  - Alignment of Components: Misalignment during re-assembly can lead to serious failures, such as fuel leaks. OEM manual procedures and checks must be followed to ensure that all components, especially high-pressure fuel systems, are correctly installed and secured.
  - Regular Drain Line and Leak Detection Inspections: Drain lines and leak detection systems should be regularly inspected and cleared of any debris that might obstruct proper operation. Blockages in these systems can lead to undetected hazards.
- Emergency Preparedness and Training
  - Drills and Simulations: Frequent fire drills and simulations focusing on proper equipment handling, securing ventilation, and closing safety barriers (such as hatches and doors) are key to ensuring crew readiness.
  - Cross-Check of Procedures: Regular cross-checking and audits of safety procedures can help identify areas where emergency response might fall short, providing an opportunity for corrective action before an incident occurs.

Members may wish to refer to:

- Fuel spray fire
- USCG: fatalities in engine room fire caused by fuel spray ignition
- Fire at sea – some timely reminders (Safety4Sea)

2 Near Miss: Smoke and fire on Main Engine Exhaust

What happened

During sea trials following a docking period, smoke and fire were observed coming from the turbocharger flange to the exhaust manifold of one of the engines.

What went wrong

It was found that the gasket on the turbocharger flange was damaged.

- The gasket in question was the wrong one for the job: it from the exhaust pipe and was designed as a “high temperature” gasket (<300°C), whereas it should have been a gasket with a specification of >500°C.
- The correct turbocharger flange gasket was not available on board during the overhaul. The correct parts had not been properly identified;
- The engine had just undergone an overhaul, during which all engine components were cleaned. However, there was a concern that residual material from the combustion chamber may have remained and reached the turbocharger area.

What was the cause

An incorrect gasket was installed that did not meet the required specifications. The required gasket needed to have a temperature resistance above 500°C, whereas the installed gasket had a specification below 300°C.

Lessons and actions

- Check carefully that equipment and spares used, particularly in safety critical equipment, meet the specified requirements;
- There is a difference in appearance between gaskets designed for temperatures above 500°C and those designed for temperatures below 500°C. Those designed for temperatures above 500°C will feature a visible wire mesh in the middle of their structure.

Members may wish to refer to:

- Fires and fire risks on vessels
- Fire in incinerator exhaust gas manifold

3 Urgent inspection of pressurised carbon dioxide fire fighting systems

What happened?

Applicable Life Saving Rule(s)

Bypassing Safety Controls

Coins were found inserted into CO_2 fire fighting cylinders. During a 10-year third party specialist inspection of a vessel CO_2 fire suppression system, coins of Chinese manufacture were found inserted in 21 out of 24 main 45 kg CO_2 cylinders. These coins were found blanketing high-pressure hoses, potentially compromising the effectiveness of the CO_2 fire suppression system. The presence of foreign objects in such critical safety systems poses a severe risk to crew and vessel safety.

What should be done

- Conduct an immediate inspection of the hose connections of the vessel's CO_2 fire suppression system. Any anomalies or concerns discovered during inspections can then be rectified immediately.

4 MSF: Safety pins left in fire suppression system – high potential near miss

The Marine Safety Forum has published Safety Alert 24-07 relating to an incident where a Flag State inspection found that all of the CO_2 bottles for the engine room fire suppression system still had their safety pins in place.

What happened

The incident occurred following a major refit / dry docking. The vessel departed port and sailed to its area of operation to complete the works and prepare for being commercially available. On arrival, the Flag State carried out an inspection of the vessel and found that all of the CO2 bottles for the engine room fire suppression system still had their safety pins in place. This means that if there had been an engine room fire, the crew would have been unable to set off the suppression system remotely and any deployment of the system would have been seriously hampered and hindered.

What went wrong

The safety pins had been put in at the start of the dry dock, as was usual. At the end of the dry dock when the vessel was floated, the fire suppression system was tested by a third party. The safety pins were still in place and the third party left them in situ during testing. After the tests, the third party testing company stated that the system had been put back into service. However, the pins were not removed and were subsequently missed on any pre-sailing or coming out of dry dock checks.

On investigation it was found that the testing work on the system had been carried out without a Permit to Work in place. Had a Permit to Work been in place, the failure to remove the pins would have been picked up during the inspection to recommission the system and close the Permit.

Actions

- Appropriate personnel should be fully familiar with the procedures for operating vessel CO_2 fire suppression systems;
- Work on safety critical equipment, including that done by a third party, should be covered under a Permit to Work and should be verified by a deck officer;
- Carry out a check to ensure that safety pins are removed from CO_2 fire suppression systems and indeed any other safety critical equipment after dry docking – ensure such equipment is ready for immediate use.

Members may wish to refer to:

- Fire alarm activation in engine room
- Near-miss: Failure to reconnect fire suppression systems *[after dry dock]*

5 Inappropriate automatic activation of fixed fire-fighting system

What happened

Applicable Life Saving Rule(s)

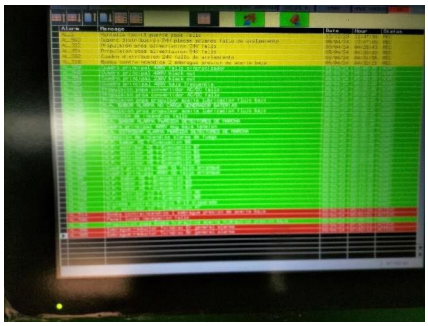
Energy Isolation

The fixed firefighting system in the engine room on a harbour tug automatically activated and all the gas in the tanks emptied. This occurred after two consecutive blackouts on the tug within 24 hours. No-one was harmed.

What went wrong

- It was discovered that the firefighting system was activated by a sudden rise in battery voltage following the malfunction of the solenoid valve on the pilot cylinder, after the blackout;

- Our member considered that the low voltage (24v) electrical system in the tug may not have sufficient power to supply the critical equipment it was being used for;
- There was a lack of indication on the bridge or in the engine room regarding the operation of the electrical system; it was not possible to discern whether it was in emergency mode or normal operational mode.



Alarm notification screen

Tank rack

Firefighting dashboard (lefthand button with lid, activation button)

Lessons to learn

- Check the functionality of vessels' general emergency response systems:
  - Review the ships' electrical system, especially systems affecting critical equipment – is there sufficient current supplied to operate the system in all cases?
  - Review blackout and emergency drill protocol in case of loss of power;

Members may wish to refer to:

- Inadvertent activation of condensed aerosol fire extinguishing system leads to a fatality
- Wrong key for the CO2 room
- MAIB: Blockage of fixed CO2 fire extinguishing system pilot hoses

Members may wish to review the incident of the cargo vessel *Dali* hitting and destroying the bridge in Baltimore. A Vessel blackout may have been one of the causal factors. IMCA hopes to make a safety flash on this incident available when a full report with findings is published.

6 NTSB: Fire on vessel – escaped exhaust gases

The National Transportation Safety Board of the United States (NTSB) published "Safer Seas Digest 2023", which includes a number of incidents which may be of interest to IMCA members. This is one of them.

What happened

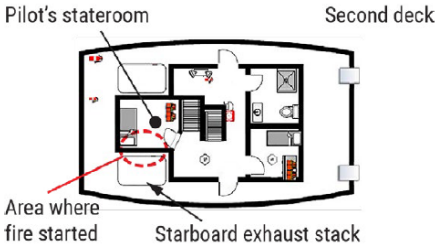
A fire broke out in a stateroom on board a small towing vessel on the Gulf Intracoastal Waterway. The fire was extinguished and the crew were evacuated safely. There were no injuries, and no pollution was reported, but the vessel was destroyed.

An off-watch pilot was awakened by a smoke alarm and the smell of smoke in his stateroom. About the same time, the captain, who was on watch in the wheelhouse, heard a smoke detector beep (but didn't smell smoke) in the wheelhouse, and the other sleeping deckhand woke up to "a burnt smell."

A fire had started behind panels in the pilot's stateroom, which was located between the vessel's two stacks, each containing engine exhaust mufflers and piping. Cracks in the welds on the upper section of the starboard muffler located inside the starboard stack—which may have been caused by a latent issue, such as a defect in the muffler during construction or the exhaust system design's allowance for thermal expansion and contraction of exhaust piping above the muffler outlet—allowed the hot exhaust gases from the operating starboard engine to escape into the stack area and increase the temperature of the space and its bulkheads.

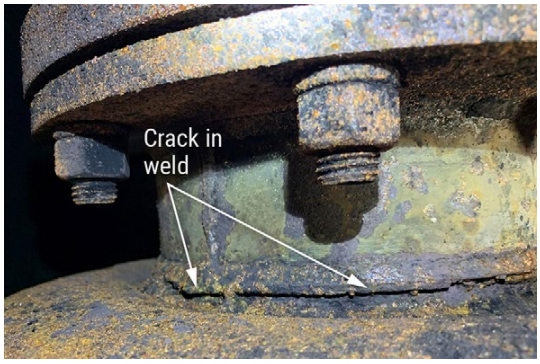
What was the (probable) cause

The NTSB's investigation suggested that **undetected cracks** in the starboard muffler allowed exhaust gases from an operating engine to escape and ignite wooden structures affixed to the common bulkhead of an accommodation space. Contributing to the extent of the fire damage was the substantial use of combustible materials in the joinery, outfitting, and furnishings in the accommodation spaces.



Layout of part of the vessel. The dashed oval identifies where fire started.

Burnt out stateroom



Crack in weld below the upper (outlet) flange of the starboard muffler

Lessons learned

- Remember that engine and other machinery exhaust systems generate tremendous amounts of heat. These systems often run through tight spaces that are difficult to access and inspect and are often located near materials or equipment that obstruct entry and direct observation;
- Consider inspection of welding and other potential weak points in such areas.

Members may wish to refer to:

- Near-miss: Fire hazard from leaking fuel supply line
- Near-miss: Corrosion caused crane boom failure during heavy lifting