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 NTSB: The sinking of the *El Faro* – an illustrated digest

What happened

The National Transportation Safety Board of the United States (NTSB) has published an illustrated digest of its own Marine Accident Report NTSB/MAR-17/01 into the loss of the cargo vessel *El Faro*. The *El Faro* sank with the loss with all hands in a hurricane in 2015. The digest contains a description of the accident and safety issues, and summarizes some of the safety recommendations intended to prevent such an accident from happening again.

It is an informative and worthwhile short read for all persons involved in ships and in the maritime and offshore world. One of the causal factors in the loss of the vessel (loss of lubrication oil to the main engine) is dealt with in IMCA Safety Flash 12-18 and here on the IMCA web page.

What went wrong

The NTSB outlined the following safety issues:

- The master's actions - from early in the voyage, the captain made decisions that put his vessel and crew at risk;
- The use of old or not up-to-date weather information;
- A late decision to muster the crew. This was left late – too late;
- Ineffective bridge resource management – the bridge crew deferred to the captain's authority and experience, rather than acting more assertively. When the crew did voice concerns, the captain chose not to listen;
- Inadequate company oversight;
- Failures in the company's safety management system;
- Flooding in cargo holds;
- Loss of propulsion;
- Downflooding through ventilation closures.

Lessons learned

The NTSB's general recommendations included:

- Better and wider dissemination of information relating to weather at sea;
- Engines and other critical machinery that work at greater angles of inclination (i.e., despite more listing);
- Enclosed, not open, lifeboats, that can be launched at still greater angles of inclination;
- Protected seawater supply piping in cargo holds;

- Remote open/close indicators for watertight doors and hatches;
- Guidance that actions intended to correct a list can be dangerous if cargo is adrift;
- Class-approved damage control plans/booklets onboard all vessels, regardless of build date;
- Review of the inspection program and improved oversight for vessel inspections;
- Lifesaving appliances updated at least every 20 years;
- Personal locator beacons for crewmembers;
- Improvements to Voyage Data Recorders (VDRs);
- Improved Bridge Resource Management (non-technical skills) training – and improved meteorology training – for deck officers.

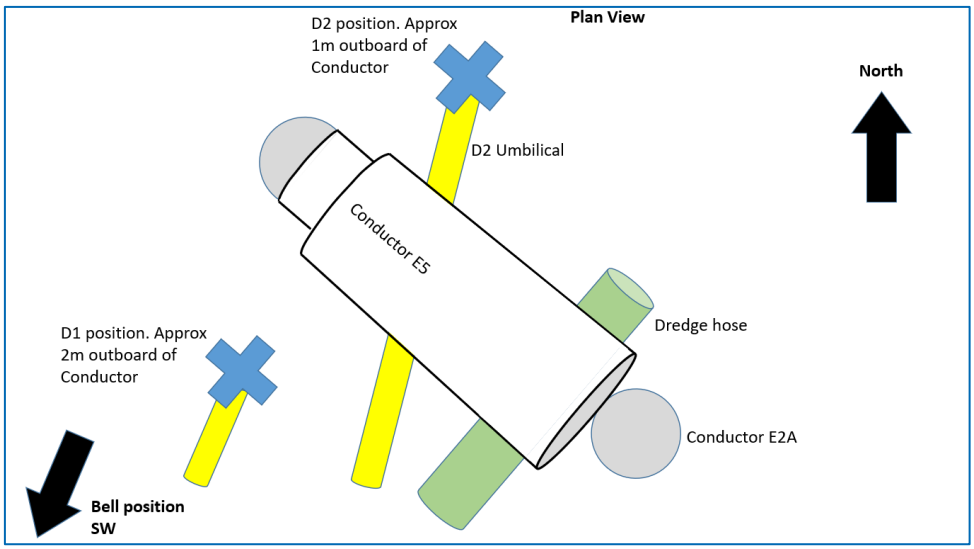
About 3 minutes after *El Faro's* VDR stopped recording, a reconnaissance aircraft estimated a 10-second average surface wind speed of 117 knots about 21 nautical miles south of *El Faro's* last known position. At 0800, Hurricane Joaquin's centre was estimated to be about 22 nautical miles south-southeast of *El Faro's* last known position, according to an NHC post-storm assessment.

2 Unexpected movement of conductor during diver dredging operations

What happened

Divers were conducting dredging operations in preparation for an external cut of a conductor (E5 in the diagram below) using a diamond wire saw. Due to seabed conditions, this was one of a number of dives dedicated to making conditions suitable for the conductor cutting. As the divers continued dredging, the conductor moved unexpectedly and came to rest against an adjacent conductor (E2 in the diagram below).

Diver 2's umbilical was found to be in free span between the two conductors. As a precaution, the decision was made to secure the conductor to the vessel crane and manoeuvre the vessel to allow the umbilical to be released. This was conducted successfully, and the divers recovered to bell with no injury nor damage to umbilical.



What were the causes?

Our member noted the following:

- **Immediate Cause** - Conductor toppled at a severance point due to displacement of surrounding seabed and grout during dredging operations;

- **Underlying Causes -** assumption that the conductor was stable, due to:
  - Information relating to the task (an incomplete sub-surface cut) had not been highlighted during client work pack compilation
  - Unclear datum measurement with respect to the as-found mudline and potential scouring.
- **Root Cause** – the vessel team did not have all the relevant information they needed, to complete a suitable Management of Change to move from internal to external cutting of the conductor.

Actions

- Change to methodology for diver work around conductors, so that they are restrained with rigging prior to any dredging operations;
- Ensure suitable verification of data by client during onshore project preparation phase;
- Refine and update existing engineering best practice and risk assessment for cutting operations;
- Ensure management of change procedure provides suitable guidance on process for evaluating and approving change request in line with agreed risk level.

Members may wish to refer to:

- Diver trapped by Anchor Chain
- Near miss: diver's umbilical trapped
- Diver fatality during subsea lifting operations

3 Defective embarkation ladder quarantined – a reminder

What happened

During routine inspection of the port side embarkation ladder on a vessel operating in a tropical environment, it was observed that the embarkation ladder rope has become very weak and snapped, when pulled apart by hands. This could likely have led to a man overboard situation had the ladder been used.

What were the causes?

Our member noted the following preliminary causes:

- The protective canvas cover was inadequate, not providing adequate protection for the ladder;
- The crew had a poor culture of routine inspection;
- Exposure to seawater and sunlight (actinic degradation).

Actions

- Pilot ladders and other ladders should be appropriately and carefully stored, checked regularly as part of a planned maintenance system, and defective ladders removed from service immediately.

Members may wish to refer to:

- Failure of natural fibre rope in embarkation ladder
- OCIMF: Pilot ladder side rope failure: Unsafe pilot transfer
- Safe embarkation and disembarkation of Marine Pilots
- Poor condition of on-board equipment

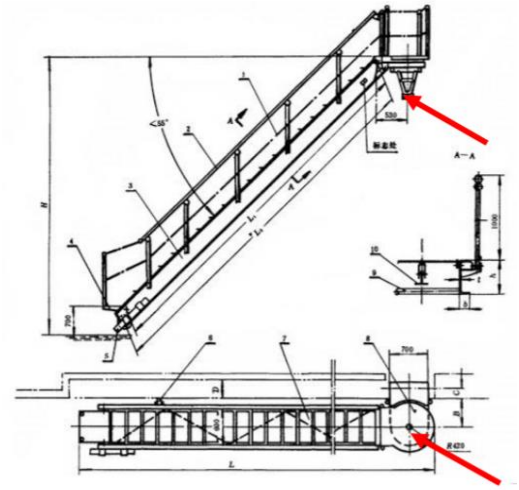
4 USCG: Corrosion causing structural failure on accommodation ladders

The United States Coast Guard (USCG) has published Safety Alert 05-21 relating to corroded turntable pins on accommodation ladders.

What happened

The USCG reported that "*a recent marine casualty resulting in an injury of a crewmember onboard a foreign freight vessel brought to light a potentially dangerous situation involving the* ***turntable pin on accommodation ladders****. Currently, there are no established timelines or requirements to replace turntable pins. Without proper and periodic examination and replacement, corrosion can ultimately lead to structural failure.*"

The USCG noted multiple foreign (not American) flagged vessels had accommodation ladder turntable pins in service for more than 20 years without replacement. Guidelines on the maintenance of accommodation ladders is contained within 74 SOLAS (14) II-1/3-9, MSC.1/Circ. 1331, and 74 SOLAS (14) III/20.7.2; however, none of the aforementioned references include maintenance guidelines for the turntable pins.



Pin location on the Accommodation Ladder Turntable

The USCG notes that while the turntable pin may seem like a minor component, its failure can cause significant harm to all persons utilizing the accommodation ladder. In this instance, the vessel's crew was in the process of stowing the accommodation ladder when the turntable pin failed. As a result, a crewmember who was on the accommodation ladder at the time fell approximately 30 feet and sustained serious injuries.

Accommodation ladder connection pin with severe corrosion over the pin's fracture surface & sidewall and on the surface of the hub.

The Coast Guard strongly recommends that vessel owners and operators:

- Maintain the turntable pins;
- Periodically inspect the condition of the turntable pins and replace then when necessary;
- Revise accommodation ladder maintenance plans to include turntable pins.

Members may wish to refer to:

- Poor condition of on-board equipment;
- Incidents involving accommodation ladders (2003)

5 UK HSE: Lubrication of circuit breakers – safety notice

Applicable Life Saving Rule(s)

Bypassing Safety Controls

Energy Isolation

The UK Health and Safety Executive (HSE) has published a Safety Notice regarding the lubrication of circuit breakers in both HV and LV equipment. The key issues covered are the incorrect use and application of lubrication on HV and LV circuit breakers.

What happened

There was a catastrophic failure and explosion of a HV circuit breaker leading to a fire which could have resulted in fatal injuries.

What went wrong

The HSE report noted that *"maintenance of HV and LV circuit breakers typically involves both the cleaning and lubricating of the operating mechanism. The HSE investigation found that the same physical product was used for both maintenance activities, but evidence shows the product was in fact only suitable for cleaning and NOT lubrication. This situation may have arisen because of the availability of different products, (for different purposes), within the same product range, or changes to the products composition over time whilst retaining the original name. It is essential that the correct product is used for each task."*

What was the cause?

- 'stiction' in the failed circuit breaker may have been a result of an incorrect aerosol based multi-purpose lubricant being used on the circuit breaker;
- Independent forensic analysis showed that the multipurpose lubricant used during the maintenance of the failed circuit breaker prior to the incident, evaporated by 75% of its original weight within 2 weeks of application. The analysis concluded that for this reason, multi-purpose lubricants containing solvents (e.g. white spirit) are unsuitable for use as a lubricant of this type of HV and LV switchgear.

Actions

- Review maintenance procedures associated with cleaning and lubrication of HV and LV circuit breakers;
- Check that the maintenance procedure ensures that the manufacturer instructions on cleaning and lubrication of the circuit breaker mechanism are followed at appropriate intervals, including the selection and application of the correctly specified lubricants (typically this will be two separate types of product).

Photograph of the HV oil circuit breaker taken after the catastrophic failure, which resulted in fire and explosion within the substation.

HV and LV circuit breaker mechanisms need to operate at high speed to reliably disconnect electrical faults from an associated electrical system. To ensure the required performance is retained it is vital that the circuit breaker operating mechanisms are functionally checked and maintained periodically as defined in relevant good practice guidance and in manufacturer's instructions.

Members may wish to refer to:

- Burns suffered in confined space
- First aid injury: Electric shock
- HSSE 031 *Offshore vessel high voltage safety*
- IMCA C 010 *High voltage training: A syllabus for training offshore workers involved with high voltage equipment*
- IMCA R 005 *Guidance on safety procedures for isolation of ROV high voltage equipment (above 1 kV)*