Maritime Accident Case Studies

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1. Collapse of Francis Scott Key Bridge, Baltimore — Collision with Container Vessel Dali (2024-03-26)

1. Incident Overview

The Singapore-flagged container ship *Dali* lost propulsion and steering due to **total electrical blackout** during departure and collided with a bridge pier, causing partial bridge collapse and 6 fatalities.

2. Probable Causes and Sequence (Preliminary)

- HV/LV circuit breakers opened → power loss → main engine and steering pump shutdown → vessel adrift and contacted bridge pier (investigation ongoing).

3. Reporting and Initial Actions

- Classified by the **U.S. Coast Guard (USCG)** as a "Major Marine Casualty."
- Immediate search, rescue, and site control initiated.

4. Rescue and Emergency Response

- Search and recovery of workers carried out in parallel with ship and site safety securing.

5. Agency Roles

- **NTSB** leading the safety investigation.
- USCG, Maryland Transportation Authority (MDTA), and other relevant bodies participating.

6. On-Site Safety/Response Guidelines (Key Points)

- For large vessels approaching bridges: immediate implementation of blackout emergency procedures, notification to VTS, and traffic suspension.
- In loss of control: prioritize collision mitigation (anchoring, speed reduction, tug/ pilot repositioning).

7. Follow-Up Measures

- NTSB issued preliminary reports and continues investigation into electrical systems and bridge protection measures.

2. Explosion and Fire on Chemical Tanker Stolt Groenland, Ulsan Port (2019-09-28)

1. Incident Overview

While berthed in Ulsan, runaway polymerisation of styrene monomer led to tank rupture, explosion, and fire.

2. Causes and Sequence (Final Report)

- Heating of adjacent tanks accelerated temperature-sensitive cargo reaction → massive vapor release → ignition.

3. Reporting and Initial Actions

- Large-scale deployment: 700+ firefighters, 100+ units including fireboats and Coast Guard, extinguishing efforts lasted over 6 hours.

4. Rescue and Emergency Response

- Evacuation of on-site personnel, transport of injured, measures to minimize heat and toxic gas exposure.

5. Agency Roles

- MAIB (UK Marine Accident Investigation Branch) conducted investigation and recommendations under international cooperation.
- Korean authorities managed on-site response and control.

6. On-Site Safety/Response Guidelines (Key Points)

- For polymerisable cargoes (e.g., styrene): strict monitoring of temperature, inhibitors (TBC), and ventilation.
- Manage adjacent tank heating, gas detection, ATEX zone control, and maintain foam/monitor watch.

7. Follow-Up Measures

- Recommendations issued for improved temperature control, cargo handling, and alarm systems.

3. Grounding and Major Oil Spill — Bulk Carrier MV Wakashio, Mauritius (2020-07-25)

1. Incident Overview

Wakashio grounded on Pointe d'Esny reef, releasing approx. 1,000 tons of fuel oil, leading to hull break-up and separation.

2. Causes and Sequence (Preliminary)

- Ballast voyage with fuel and lubricants onboard → approached coast and grounded → hull fracture and subsequent release.

3. Reporting and Initial Actions

- Government of Mauritius activated national emergency response.
- IMO and international organizations provided technical support and advice.

4. Rescue and Emergency Response

- Deployment of containment booms, recovery operations, shoreline cleanup, joint civil-military response.

5. Agency Roles

- IMO, UN, OCHA, and neighboring states provided technical and material support.
- Mauritian authorities led on-site command.

6. On-Site Safety/Response Guidelines (Key Points)

- Tiered response (OPRC principles): containment, recovery, shoreline cleanup.
- In marine protected areas, prioritize eco-sensitive response technologies.

7. Follow-Up Measures

- Long-term restoration of coral reef and coastal ecosystems highlighted; international support continues.

4. Fire and Total Loss of Container Ship X-Press Pearl, Sri Lanka (2021-05-20)

1. Incident Overview

At anchorage off Colombo, container fire escalated, prolonged burning resulted in **abandonment and total loss**.

2. Causes and Sequence (Final Report Summary)

- Likely ignition from leaking nitric acid container (IMO Class 8, Subsidiary 5.1).
- Deficiencies in pre-shipment handling, voyage information sharing, and CTU/IMDG compliance noted.

3. Reporting and Initial Actions

- Initial onboard boundary cooling and CO_2 release; salvage master took command; port tugs and fire teams provided support.

4. Rescue and Emergency Response

- Crew abandoned ship in rough weather; environmental hazard assessment and response for oil/microplastics undertaken.

5. Agency Roles

- Sri Lanka MEPA and Ports Authority coordinated response.
- Indian Coast Guard provided assistance.
- **TSIB (Singapore Transport Safety Investigation Bureau)** led investigation.

6. On-Site Safety/Response Guidelines (Key Points)

- For DG cargo leaks: adhere to MSDS, IMDG, and CTU Code requirements (containment, neutralization, ventilation, segregation).
- Pre-share packaging/manifest details; confirm port capability for hazardous handling.

7. Follow-Up Measures

- TSIB Final Report (2023) issued recommendations on cargo transport, stowage, port handling, and environmental risk management.

5. Sinking of VLOC Stellar Daisy, South Atlantic (2017-03-31)

1. Incident Overview

During iron ore carriage, vessel sank in the South Atlantic; of 24 crew, 2 were rescued and 22 presumed dead.

2. Causes and Sequence (Investigation Findings)

- Likely catastrophic structural failure of hull.
- Factors: conversion-related weaknesses, corrosion, cracking, and structural degradation.

3. Reporting and Initial Actions

- Distress signal received; extensive SAR launched; nearby vessel rescued 2 survivors.

4. Rescue and Emergency Response

- Multinational search assets deployed; wreckage and evidence collection continued.

5. Agency Roles

- RMI (Marshall Islands Maritime Administrator) led flag-state investigation.
- Korean authorities, shipowner, and classification society provided cooperation.

6. On-Site Safety/Response Guidelines (Key Points)

- For large bulk carriers/VLOCs: maintain hull integrity monitoring, crack/corrosion management, and establish Emergency Response Services (ERS).

7. Follow-Up Measures

- RMI report recommended enhanced inspections, audits, and operational restrictions.

6. Capsizing of Large Trawl Fishing Vessel, Yeosu Waters (2025-02-09)

1. Incident Overview

139-ton class trawl fishing vessel capsized and sank east of Habaekdo, Yeosu. Resulted in 4 confirmed deaths, multiple missing.

2. Causes and Sequence (As Reported)

- Vessel disappeared from radar before capsizing and sinking.
- Detailed cause under investigation; salvage planned.

3. Reporting and Initial Actions

- Coast Guard and Navy deployed large-scale SAR with ships and aircraft.
- Nearby fishing vessels assisted search.

4. Rescue and Emergency Response

- Survivors transported and treated.
- Divers deployed to search survivable spaces.

5. Agency Roles

- Korea Coast Guard and local government led SAR and family support.
- Central government directed resource mobilization.

6. On-Site Safety/Response Guidelines (Key Points)

- For winter fishing operations: always assess weather, vessel stability, icing hazards.
- Strengthen MOB (man overboard) and hypothermia equipment and training.

7. Follow-Up Measures

- Salvage and causal investigation ongoing.
- Additional safety guidelines and crew education to be developed for regional fisheries.