

Cement Carrier Ta Ho Major Marine Occurrence

Executive Summary

At 0812 on 24 February 2020, the cement carrier Ta Ho, owned by Ta-Ho Maritime Corporation, departed from Port of Su'ao after completing cargo loading and proceeded toward Port of Taichung. The voyage proceeded normally until 2011:35, when the vessel's fire alarm activated throughout the ship. At 2012:54, the master ordered "slow ahead," followed by "stop engine" at 2013:11. After confirming that the generators had stopped, shutting the quick-closing valves and ventilation dampers, and evacuating engine room personnel, the chief engineer released the fixed carbon dioxide fire-extinguishing system at approximately 2014 to suppress the fire. The fire was extinguished at approximately 2033, after which the vessel lost propulsion power. At 1334 the following day, Ta Ho was towed to the Port of Taichung and completed berthing at 1930.

During the occurrence, two personnel were on navigational watch on the bridge, consisting of the third officer and an able seaman, while the engine room was unattended. The fire in the main engine room deck caused damage to No. 1 generator, No. 2 generator, and surrounding areas on that deck. The fuel inlet pulse absorber and fuel return pulse absorber of No. 2 generator ruptured, as did the fuel return pulse absorber of No. 3 generator. All 22 crew members were safe, and no environmental pollution occurred.

In accordance with the Transportation Occurrence Investigation Act, Taiwan, and the definition of major transportation occurrences specified therein, the Taiwan Transportation Safety Board was the independent agency in charge of investigating the marine accident. The organizations and agencies invited to

participate in the investigation included the Maritime and Port Bureau of the Ministry of Transportation and Communications, CR Classification Society, CSBC Corporation, Taiwan and Ta-Ho Maritime Corporation.

After comprehensive investigation and analysis of the factual data, a total of 13 findings and 5 safety recommendations were obtained.

The findings related to probable causes are as follows:

1. Residual lubricating oil from the lubricating oil pipe located above No. 2 generator leaked from a flange connection and came into contact with the exhaust side of the turbocharger of No. 2 generator, resulting in a fire. The fire subsequently spread to the generator monitoring panel and fuel piping.
2. Possible causes of the flange bolt fracture that resulted in residual lubricating oil leakage included vessel vibration, improper installation, uneven bolt loading, and metal fatigue.
3. The rupture patterns of the three pulse absorbers indicated sudden rupture caused by excessive internal pressure. The excessive internal pressure may have resulted from thermal expansion of nitrogen gas inside the absorbers or from spontaneous ignition and explosion caused by fuel leakage into the absorbers.

The findings related to risk are as follows:

1. The lubricating oil piping above the generators in Ta Ho's engine room used flange connections, and the flange joints were not shielded or otherwise adequately protected.
2. The four generators onboard Ta Ho had accumulated more than 76,000 operating hours. Ta-Ho Maritime Corporation did not replace the pulse absorbers or inspect and replace fuel pressure gauge connecting pipes in

accordance with maintenance requirements and technical bulletins issued by DAIHATSU.

3. The onboard maintenance procedures manual, generator maintenance program, and technical bulletin handling mechanism of Ta-Ho Maritime Corporation were insufficiently comprehensive, increasing operational risk.
4. Neither IMO international regulations nor Taiwan's maritime administration required generator manufacturers to proactively issue technical bulletins to vessel owners and shipbuilders to jointly ensure ship safety.
5. DAIHATSU may not have proactively provided technical bulletins related to DK-series diesel generators to CSBC Corporation, Taiwan and Ta-Ho Maritime Corporation, resulting in the failure to replace and shield the pulse absorbers onboard Ta Ho.

The other findings are as follows:

1. Weather and sea conditions, intentional arson, electrical ignition, friction-generated ignition, static electricity ignition, and external impact causing pulse absorber ignition were excluded as possible factors.
2. The fuel manifold, relief valve, control valve, and safety valve onboard Ta Ho were operating normally, excluding the possibility that abnormal fuel manifold pressure caused the rupture of the three pulse absorbers.
3. Ta Ho completed its most recent annual survey on 10 February 2020. The company's Document of Compliance and the vessel's Safety Management Certificate remained valid, and no abnormalities related to generator inspections were recorded.
4. The CR Classification Society audited Ta Ho's maintenance procedures

manual and maintenance program in accordance with the ISM Code. Inspection records also included machinery, piping systems, associated fittings, and functions.

5. Prior to 2017, Ta-Ho Maritime Corporation maintained vessel records in paper form, and documents exceeding the five-year retention period had been destroyed in accordance with regulations. Therefore, it could not be confirmed whether key components of Ta Ho's generator fuel system had previously been replaced or tested.

Safety Recommendations

To DAIHATSU Diesel MFG. Co., Ltd.

1. Develop measures and proactively issue generator technical bulletins to shipbuilders and vessel owners.

To Ta-Ho Maritime Corporation

1. Implement the ship safety management system and establish maintenance programs in accordance with manufacturers' technical documentation, and ensure such programs are effectively carried out.

To CR Classification Society

1. When conducting ship audits or inspections, ensure that Taiwan-flagged vessels refer to DAIHATSU technical bulletins and carry out replacement or maintenance of pulse absorbers for DK-series diesel generators in order to reduce potential risks.

To Maritime and Port Bureau of the Ministry of Transportation and Communications

1. Supervise T&H Cement Transportation Co., Ltd. in proposing and

implementing concrete maintenance measures to ensure effective implementation of the ship safety management system.

2. Require Taiwan-flagged vessel owners to refer to DAIHATSU technical bulletins regarding DK-series diesel generators and carry out replacement or maintenance of pulse absorbers for DK-series diesel generators in order to reduce potential risks.

Note: The final report of this occurrence investigation is published in Chinese. To facilitate understanding for non-Chinese readers, the Executive Summary has been translated into English. While every effort has been made to ensure accuracy, discrepancies may occur. In the event of any inconsistency, the Chinese version shall prevail.