

Executive Summary

On June 14, 2023, at 4:44 a.m., a tractor of Tung Yong Transportation Co., Ltd. carrying an acetone mixture trailer overturned at 90K+412 on the northbound lane of the Zhubei section of National Highway No. 1 after colliding with the guiderail on the right. As a result, the acetone mixture leaked and caught fire, and the driver was injured.

In accordance with the Transportation Occurrence Investigation Act, the Taiwan Transportation Safety Board (TTSB) is an independent transportation occurrence investigation agency and responsible for conducting the investigation. The investigation team also included members from the Highway Bureau, Ministry of Transportation and Communications (MOTC), the Freeway Bureau, MOTC, the Vehicle Safety Certification Center (VSCC), Tung Yong Transportation Co., Ltd., and Nan Pao Resins Chemical Co., Ltd.

The draft for this investigation report was completed in August 2024, and then, according to procedures, sent to relevant agencies (institutions) for their opinions. After summarizing relevant opinions, the investigation report was reviewed and approved in the TTSB's 70th Board Meeting on December 13th, 2024.

After comprehensive investigation and analysis of the factual data, a total of 13 findings and 8 safety recommendations were obtained.

I. Investigation Findings

Findings Related to Probable Causes

1. The driver was in poor mental condition and failed to maintain sufficient alertness and concentration to operate the tractor stably when

driving through the construction section. It caused the vehicle to swerve and hit the outer guiderail. After the collision, overloading of the vehicle in the occurrence might have made it difficult to operate, and subsequently caused the vehicle to overturn.

2. After the intermediate bulk container (IBC) on the trailer fell to the ground, it was immediately crushed and dragged by the trailer, causing the container to exceed its load and rupture. The acetone mixture, which is a flammable substance in the IBC, leaked and caught fire from the sparks generated by the vehicle's collision, eventually causing the entire vehicle to burn down in the occurrence.

Findings Related to Risks

1. The driver, mainly slept during the day, took short naps or rested temporarily to relieve fatigue when he was on duty at night. It messed up his biological clock and made him hard to fall asleep or damaged his sleep pattern. In addition, after being scheduled for consecutive night shifts, the driver was hard to get enough sleep to relieve fatigue.
2. Tung Yong only scheduled shifts based on business volume, which resulted in the driver often working excessively long hours and getting insufficient rest periods. This shows that Tung Yong does not properly manage the attendance and rest periods of drivers, which increases the risk of drowsy driving.
3. The United States and the European Union have clear regulations regarding the working hours, rest periods, and driving time of truck drivers. In contrast, there are no specific regulations for the rest periods and driving time of truck drivers, only the Labor Standards Act applies to truck drivers in Taiwan.
4. When the supervisory authority inspects the working hours of freight industry drivers in accordance with the current safety assessment mechanism, it is difficult to detect whether the working hours are normal. For example, in this occurrence, the driver worked or drove for excessively long hours and had insufficient rest periods.
5. Nan Pao Resins did not establish management procedures for the

intermediate bulk containers (IBCs) in use, which may lead to risks in the loading, storage, and transportation of dangerous goods due to the use of IBCs that are from unknown sources or in poor condition, or that were not inspected or tested.

6. In contrast with the Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR), which has complete regulations and standards for the manufacturing, testing, and periodic inspection of intermediate bulk containers (IBCs), Taiwan only established specifications for bulk containers (high pressure) and fixed containers (non-pressure and high pressure) for dangerous goods, and lacks management measures for IBCs. Therefore, when users choose IBCs, except for purchasing types certified by foreign certification agencies, there is no way to know whether their quality. The IBCs in use have not been inspected, so their safety and reliability cannot be ensured.
7. Tung Yong's storage site does not have a truck scale and cannot effectively determine the actual total weight of trucks. After calculation, the actual total weight of the vehicle exceeded the maximum total weight by 20%. Overloading might have made it difficult for the driver to operate the vehicle.
8. Although the Freeway Bureau, Ministry of Transportation and Communications, established directions for compliance regarding truck scales in weigh stations, there was a period when all weigh stations were not open, making it impossible to effectively weigh the load of freight vehicles. Freight vehicles might be difficult to operate due to overloading; however, because no weight stations were open, such vehicles could not be ordered to immediately rectify the situation (unloading, re-packaging) or be prohibited from passing.

Other Findings

1. Tung Yong was aware of the regulations on the carriage of dangerous goods, but still assigned an unqualified driver, used a vehicle that lacked adequate warnings, and transported dangerous goods without confirming the contents of the goods, which shows that Tung Yong did not have sufficient risk awareness.

2. When the supervisory authority carried out the safety assessment of the three freight industries, it did not stipulate relevant assessment items for operators transporting dangerous goods. The assessment is no different from that of general freight operators, so it is impossible to detect situations where vehicles transporting dangerous goods do not comply with regulations, as in this occurrence.
3. According to the Manual on Uniform Traffic Control Devices of the United States and the traffic control measures set up by the Freeway Bureau, Ministry of Transportation and Communications, a yellow construction warning light or a yellow reflection mark installed on the outer guiderail during nighttime construction would be a clear visual guidance for drivers and also be able to enhance safety.

II. Safety Recommendations

To Tung Yong Transportation Co., Ltd.

1. Implement a driver management system, accurately monitor the working hours and driving time of drivers, properly schedule duties based on business needs, and provide sufficient rest periods to prevent drivers from driving vehicles in a fatigued state.
2. Strengthen the safety management system for vehicles transporting dangerous goods, and ensure that the training qualifications of transport personnel, vehicle loads, and vehicle flags and signs are all in compliance with regulations.

To Nan Pao Resins Chemical Co., Ltd.

1. Understand the source and usage status of the company's intermediate bulk containers (IBCs), and establish management procedures for IBCs to avoid safety risks caused by using IBCs that are in poor condition to load, store, and transport dangerous goods.

To the Ministry of Transportation and Communications

1. Strengthen the management mechanism for drivers of vehicles carrying dangerous goods and evaluate to manage the driving time and rest

periods of drivers of vehicles carrying dangerous goods.

2. Evaluate to add intermediate bulk container (IBC) transportation management measures and require all IBCs transporting dangerous goods to pass inspection, so as to ensure the safety and reliability of using IBCs to transport dangerous goods.

To the Highway Bureau, MOTC

1. Supervise operators transporting dangerous goods to properly monitor the working hours or driving time of drivers, in order to reduce the risk of accidents due to fatigue. Also evaluate the use of Global Positioning System equipment to collect the operating time of vehicles transporting dangerous goods, in order to help operators to effectively manage their drivers' working hours or driving time.
2. Strengthen the directions for safety assessments of the three freight industries, and distinguish between operators transporting dangerous goods and general freight when conducting assessments, so as to ensure that operators transporting dangerous goods engage in the transportation business under the conditions set forth in Article 84 of the Regulations Governing Road Traffic Safety.

To the Freeway Bureau, MOTC

1. Establish a coordination mechanism for weigh stations on the freeway to prevent any loopholes caused by the simultaneous closure of all weigh stations, so as to enhance the efficiency of heavy vehicle management and prevent overloading.

Note: The language used in the occurrence investigation Final Report is in Chinese. To provide a general understanding of this investigation for the non-Chinese reader, the Executive Summary of the Final Report was translated into English. Although efforts are made to translate it as accurately as possible, discrepancies may occur. In this case, the Chinese version will be the official version.