

Executive Summary

Alishan Forest Railway and Cultural Heritage Office Train No. 664 at Chainage 70K on Main Line

On October 15, 2020, around 01:00 p.m., the Train No. 664 of Alishan Forest Railway and Cultural Heritage Office (AFRCHO), departed from Alishan Station to Erwanping Station, was composed by one locomotive hauling three wagons and one caboose. The three wagons and one caboose derailed at Chainage 70k on Main line. There were four staffs on board, and three staffs suffered minor injuries.

According to the Transportation Occurrences Investigation Act, the Taiwan Transportation Safety Board is responsible for investigating major transportation occurrences that arise in the R.O.C. territory. This accident is considered as a major transportation occurrence within the scope of investigation. The Railway Bureau and Forestry Bureau, Council of Agriculture, Executive Yuan were invited to participate in the investigation.

The investigation report was approved by the 37th Board Meeting on April 1, 2022, and published on April 28, 2022.

After comprehensive investigation and analysis of the factual data, a total of eleven conclusions and seven safety recommendations were obtained, which are detailed as follows:

Findings

Findings related to probable causes

1. Driver B was driving the train and applied the service brake to slow down on descending from Alishan Station towards Erwanping Station.

However, he did not heed the brake pressure and speedometer. Even though the train was speeding, he was still using the service brake instead of the emergency brake or informing other crew members to assist with the deceleration. Although Driver A had applied the emergency brake when approaching the curved section, the train still derailed and overturned at 69K+966, at 44 km/h, exceeding the estimated critical overturning speed of 42.6 km/h.

Findings related to risk

1. The operating regulations do not require the driver to constantly monitor the speedometer during the operation to comply with the speed limits and do not clearly define the timing of using the emergency brake. As a result, the driver failed to detect the overspeed of the train promptly and immediately applied the emergency brakes to slow down the train.
2. There was no speedometer in the brake van. The train conductor can only rely on visual cues to determine the train speed, resulting in the loss of the function for train speed monitoring.
3. The braking air control devices for freight trains and passenger trains are different, the brake operation also. The Alishan Forest Railway and Cultural Heritage Office only conducts qualification assessment and onsite training for drivers based on passenger trains, and does not have assessment in operating freight trains. The driver may be unfamiliar with the freight train braking system, which can apply the brakes in stages but cannot release brakes in stages, resulting in unable to control train speed accurately.
4. The Alishan Forest Railway and Cultural Heritage Office did not properly weigh the cargo according to load-carrying capacity regulation and specify the maximum loading height on the train.

Overweight and over-height cargo may increase operational safety risks.

Other findings

1. According to the test results of the accident train, the air compressor, the independent braking, the automatic braking, and the emergency braking system are normal.
2. Alishan Forest Railway and Cultural Heritage Office did not stipulate the train pre-departure inspection procedure and standards for train drivers, resulting in inconsistent inspection results, as drivers may rely on their own experience to perform inspections and make determinations.
3. Alishan Forest Railway and Cultural Heritage Office did not stipulate that the train drivers should check again whether the onboard dashcam has been turned on and is operating normally before train leaves the depot or before departure.
4. Alishan Forest Railway and Cultural Heritage Office did not specify brake system inspection criteria and the data should be recorded, which can lead to maintenance personnel relying on their own experience as the standard for qualification of the maintenance items, resulting in discrepancies in the inspections and may not accurately present the actual status of the brake system.
5. Alishan Forest Railway and Cultural Heritage Office did not include the inspection items, operating hours, and inspection cycle suggested by manufacturer repair manual into each inspection level of diesel locomotive to ensure its normal operation.
6. The Railway Act does not include industrial railway drivers in the scope of assessment and certification by MOTC. The Railway Bureau, a supervisory agency, doesn't know the driver assessment and

certification methods of The Office well, making it difficult to bring the safety supervision function into play.

Safety Recommendations

To Forestry Bureau, Council of Agriculture, Executive Yuan

1. Review and revise driver standard operation procedures, with emphasis on monitoring train speed, handling of excess speed, and timing for operating the train emergency brakes.
2. Review and enhance the driver assessment and training systems and add Freight train assessment and on-the-job training to ensure that drivers are familiar with the differences between passenger and freight trains.
3. Improve the method of monitoring train speed in the brake van for conductors, such as installing a speedometer.
4. Establish a mechanism for implementation of cargo transportation regulations with emphasis on its load weight and dimensions.
5. Review the suggestions according to the original manufacturer repair manual and stipulate quantitative determination criteria for every level of train maintenance. Incorporate these criteria into inspection forms and require personnel to record data, ensuring consistency and compliance with the basic maintenance requirements of the manufacturer.
6. Stipulate driver pre-departure inspection and determination criteria.

To Railway Bureau, MOTC

1. Enhance the assessment and certification regulations for passenger and freight train drivers of industry rail.

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.