

Executive Summary

TRA's Train No. 7142 at Chenggong Station

On May 4, 2021, Train No. 7142, the northbound cargo train of Taiwan Railways Administration (TRA), departed from Changhua Station to Houli Station. At 09:35 when the train entered the mainline from the siding of Chenggong Station, the No.19 switch was not flipped to the reverse position, causing the point switch of turnout squeezed by the wheelset of the bogie. The driver stopped the train immediately, while the train conductor informed the driver to operate the train backward. The train then derailed at the junction of siding and mainline and stopped at K203+552. There were no fatalities or injuries in this occurrence.

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 TRA were invited to participate in the investigation.

The investigation report was approved by the 47th Board Meeting on February 2, 2023, and published on February 10, 2023.

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

Findings

Findings related to probable causes

1. The train conductor of train NO.7142 demanded the train driver trainee and instructor to stop in front of a switch through dispatch radio. Both train drivers did not confirm the number and location of the switch and did not confirm the shunting single was unlit by the pointing and calling mechanism either, that as incompatible of regulations. The train then passed the 5L shunting signal of Yuen Foong Yu level crossing at danger and ran through the NO.19 switch of the East mainline from the siding of Chenggong Station.
2. shunting, the train conductor in the brake van did not stand in a position which could confirm the signal and route that was clear as required. The train conductor reported shunting was completed to the duty station master before train NO.7142 completely entered the East mainline. When train NO.7142 ran through the NO.19 switch of the East mainline and stopped, the train conductor did not check train location and inform the duty station master immediately as required by regulations, and demanded the train driver to reverse the train, causing the train to derail at the junction of the siding and the East mainline.

Findings related to risk

1. TRA does not draw up the integral shunting plan for shunting personnel, such as the train stop location before entering the mainline from the siding, signals to pass, and the position of switches, which is unfavorable for the train driver to handle during shunting operations.
2. The TRA regulations for train shunting do not cover key items related to safety, such as the guidance method used by the train conductor before the train enters the mainline and the timing of the switchman's train monitoring at the switch. As a result, it can't ensure that shunting personnel can cooperate in their work and achieve the functions of guidance and warning.

3. The TRA's "SOP for Train Crew" does not stipulate the procedures when a train passes the signal at danger, which is not favorable for train drivers to handle the situation.
4. The shunting signals at the jurisdiction of TRA Changhua Electrical Engineering Branch are ordinarily unlit and only illuminated when shunting is authorized. The display method may cause train drivers to neglect the extinguished lights, posing a risk of passing a signal at danger and damage to a switch.
5. TRA does not provide complete training and teaching materials to the instructors, which is unfavorable to training the trainee in a safe and systematic manner, making it difficult to prevent human errors by trainees that could affect safety operations.
6. The duty station master did not notice the occupancy indication of the 3RAT section, East mainline, shown on the CVDU panel before setting the shunting route.

Other findings

1. The switchman did not carry signal flags (lights) as required by regulations during shunting.
2. Train NO.7142, from Chenggong Station siding, passed the 5L shunting signal at danger and entered the East mainline. Due to the NO. 19 switch in normal position, the signal electronic interlocking system displayed the occupancy indication in section 3RAT East mainline.
3. Although train NO.7142 had the automatic train protection (ATP) system, when train NO.7142 passed the 5L shunting signal at danger, the ATP would not activate the emergency brake and stop the train automatically as no balise installed on Chenggong Station siding.
4. By testing, the malfunction warning detection of the No.19 switch of Chenggong Station was functioning well. No malfunction icon and

voice warning were shown on the CVDU when train No.7142 ran through the switch, probably due to the movement volume of the detector rod less than 5mm.

Safety Recommendations

To TRA

1. Review shunting and operating procedures, ensuring the procedures should at least include shunting routes planning, information delivery, position for the train to stop before entering the mainline, and the procedure of running through a closed switch by train, to ensure shunting personnel can collaborate and perform safety operations.
2. Review the consistency of the single light display method in each jurisdiction of The Electrical Engineering Department to comply with the "continuous lighting" requirement in the Regulations for Electronic Interlocking System.
3. Review and evaluate commonly used sidings that trains can enter the mainline from stations and take protective measures to prevent trains from passing the signal at danger.
4. Enhance train drivers to execute the call-reply mechanism.
5. Establish training courses for driver trainees and set regulations for instructor drivers, stipulating the onsite training hours, responsibilities, and division of work of driver instructors and trainees.
6. Implement training for station operation personnel, especially on the operation, monitoring, and troubleshooting procedures for the axel counter system on the CVDU panel, ensuring the staff has sufficient skills and knowledge to operate the new system.

To Railway Bureau, MOTC

1. The Railway Bureau, MOTC, based on its authority supervision, and management responsibilities, should integrate all safety recommendations made in this case to TRA into periodic and non-periodic inspection items in accordance with the Railway Act, to supervise TRA and track their progress.

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.