

Executive Summary

TRA's Train No.118 at Xinxing Lane Level Crossing

On December 31, 2019, Tze-Chiang Limited Express Train No. 118, operated by the Taiwan Railways Administration (TRA), an agency under the Ministry of Transportation and Communications (MOTC), was scheduled to travel from Chaozhou Station in Pingtung to Qidu Station in Keelung. At approximately 12:11 PM, the train collided with a forklift at location K234+046, between Shetou Station and Yuanlin Station on west line, and then derailed.

This occurrence was confirmed by the TTSB as a major transport accident, and an investigation task force was convened for investigation according to the provisions of the Transportation Occurrences Investigation Act. The TRA and the Railway Bureau, MOTC were invited to participate in the investigation. This report was reviewed and approved at the 23rd TTSB Board meeting on March 5, 2021.

Findings

This investigation report summarizes three categories of investigation findings on the basis of factual information and comprehensive analyses collected during the investigation period: **investigation findings related to probable cause, findings related to risk, and other findings.**

Findings related to probable cause

1. The forklift operator violated regulations by driving through the opening west side of the Xinxing Lane Level Crossing, which resulted in the forklift being stuck in the track area of the west line, after which it was hit by the Tze-Chiang Limited Express (Train No. 118), causing

the train to derail.

Findings related to risk

1. The forklift operator considered the opening width of the Xinxing Lane Level Crossing to be sufficient for passage based on his previous experience. Thus, the action December 31 was not his first time driving through this level crossing.
2. The designated authority of roads beyond the edge of the level crossing board and their pavement and maintenance standards are not specified in existing regulations. In particular, regulations on the width from the edge of the asphalt pavement to the edge of the road at the level crossing are not mentioned; neither are requirements for slope–height differences with respect to the intersection between the edge of the asphalt pavement and the track ballast.
3. Although regular inspections of level crossings had yielded favorable results, however, only visual inspections by TRA personnel had been conducted. The results of visual inspection failed to reflect the actual conditions of the level crossings.
4. Had Xinxing Lane Level Crossing been equipped with an emergency button, and had the forklift operator who illegally entered the level crossing pressed the said button immediately, the train driver approaching the railway section could have received a radio signal and seen the warning light designed for train protection on the wayside. Such measures could have enabled the train driver to immediately slow down the train, thereby avoiding collision and derailment or reducing potential financial losses from such an incident.
5. None of the three surveillance cameras at Xinxing Lane Level Crossing were connected to the General Dispatch Office. Thus, the dispatcher

could not handle the on-site situation through real-time images captured by the cameras upon receiving the report, which delayed the dispatcher's decision making.

Other findings

1. The TRA had not included the classification of level crossings and the specifications for installing level crossing equipment in existing regulations.
2. Before the accident, no anomalies had been observed in the monthly inspection of Xinxing Lane Level Crossing.
3. The train was traveling below the speed limit through the mentioned level crossing.
4. The activation and deactivation of the level crossing meet the requirements of traffic signal design logic.
5. After hitting the forklift, the train driver followed the regulations and first activated the radio signal for train protection before notifying Yuanlin Station, its conductors, and its dispatchers of the situation.
6. Because the railway track geometry at the Xinxing Lane Level Crossing is straight, the driver's sight distance was not compromised by the curve of the track. The traffic signal equipment and the leaves from the banana trees nearby might have partially obscured the forklift from the view of the train driver.

Safety Recommendations

For Changhua County Government

1. Reinforce safety promotion and law enforcement with regard to forklift usage within the county.

2. Reconsider the necessity of Xinxing Lane Level Crossing in accordance with the level crossing installation standards, the traffic volume at the level crossing, and the locations of adjacent level crossings.

For the Ministry of Transportation and Communications

1. The MOTC should work with railway operating agencies and institutions to review the classification of level crossings and the installation standards for warning devices at such level crossings. Furthermore, it should ensure the proper implementation of these measures. If a decision is made to retain the semi-enclosed level crossing, this type of level crossing requirements should be included in regulations, such as the Standards and Expense Allocation Regulations for Installing Railway Flying Junction and Level Crossing Protection Facilities, wherein the relevant provisions should be clearly defined. If a consensus is reached to remove the semi-enclosed level crossing, the MOTC should schedule a demolition date with the local government.
2. The MOTC should specify the competent authority and the standards for paving and maintaining the road between the edge of the level crossing board and the railway's right of way. In particular, regulations on the width from the edge of the asphalt pavement to the edge of the road at the level crossing, as well as requirements for slope–height differences with respect to the intersection between the edge of the asphalt pavement and the track ballast, should be clearly defined.

For the TRA, Ministry of Transportation and Communications

1. The TRA should work with the MOTC to review the classification of level crossings and the installation standards for warning devices at

such level crossings. Furthermore, it should ensure the proper implementation of these measures. If a decision is made to retain the semi-enclosed level crossing, this type of level crossing requirements should be included in regulations, such as the Standards and Expense Allocation Regulations for Installing Railway Flying Junction and Level Crossing Protection Facilities, wherein the relevant provisions should be clearly defined. If a consensus is reached to remove the semi-enclosed level crossing, the MOTC should schedule a demolition date with the local government.

2. Regulations governing maintenance and regular inspections of track ballast and asphalt pavements at intersections should be established.
3. Connect surveillance cameras at level crossings to the General Dispatch Office to ensure real-time surveillance and timely dispatcher notification.

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