

Executive Summary

TRA's Train No. 207 at Fulong Station

At around 08:52 a.m., December 1, 2021, the Taiwan Railway Administration (TRA) Taroko Express Train No. 207, departed from Shoufeng Station bound for Shulin Station, the cockpit window was hit and crashed by the rail pile which slides from the side slope worksite around K32+800 (between Dali, Yilan and Fulong, New Taipei City). There were no fatalities 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 TRA, C.Y.L Engineering Consulting INC., United Geotech, INC. and Dainshin Construction LTD. were invited to participate in the investigation.

The investigation report was approved by the 48th Board Meeting on March 3, 2023, and published on March 13, 2023.

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

Findings

Findings related to probable causes

1. The clamp of the pile driver used by Dainshin Construction Ltd. had worn seriously, leading to uneven pressure distribution among

gripping teeth. When the pile driver stopped rotating, the rail pile began to swing due to inertia and collided with the gripping teeth, leading the rail pile to bend and break from the breach, then falling from the pile driver.

2. The prevent-falling steel cable installed by Dainshin Construction Ltd. for the pile driver was not able to hold the broken, dropping rail pile. In addition, the height of fall prevention facilities and temporary construction frames were insufficient, unable to block the falling rail pile from landing on the mainline, resulting in colliding with the passing train.
3. Dainshin Construction Ltd. did not properly implement the regulation that personnel should immediately halt work when the lookout warned a train was approaching; the function of the site control protected by lookout was unable to be brought into play.

Findings related to risk

1. When designing and planning, United Geotech, Inc. did not consider the risk of TRA's discarded steel rails breaking during hoisting and arranged the construction work in the daytime.
2. TRA and the supervising unit, United Geotech, Inc., did not properly supervise the adherence to the regulation by construction personnel that work should immediately halt when they receive notifications from the lookout.
3. Dainshin Construction Ltd. Failed to implement worksite safety self-inspections, used a pile driver with seriously worn gripping teeth to lift rail piles, and allowed the operator without a heavy machinery license to operate the pile driver. TRA, United Geotech, Inc., and Dainshin Construction Ltd. failed to execute the worksite safety supervision and inspection.

Other findings

1. TRA's "Precautions to Ensure Train Operation Safety During Construction Work Along Tracks" makes no clear stipulations for "Relatively Dangerous Construction that May Threaten Train Operating Safety," easily giving rise to contractors adopting different methods due to different judgments and making it difficult to maintain operational safety.
2. Temporary speed restriction signs were set up within the section of the construction area rather than at the northern and southern boundaries of the construction site. It may not be able to reduce the train speed to the prescribed limit in time, thereby increasing the risk of trains exceeding the speed limit while passing through the construction zone.
3. According to "The Safety and Health Regulations of Taiwan Railway Administration," whistle signs are required to install beside the tracks to protect personnel working on the mainline. If whistle boards were set up at the northern and southern boundaries of the construction area along the tracks, although the construction site in this accident did not involve work on the mainline, the driver would have been able to warn workers in the construction site nearby the mainline to stop working by sounding the whistle.

Safety Recommendations

To TRA

1. TRA should first review and filter out defective rail materials and supervise the use of operating machinery with complete functions by construction suppliers, re-assess construction time zone and hazard risk in response to construction material characteristics, and formulate thorough measures at the construction site to prevent intrusion of

foreign objects onto the tracks.

2. Supervise the enhancement and implementation of worksite safety self-inspections by the construction supplier and ensure that personnel complies with the warnings of the lookout.
3. Review regulations for the lookout, whistle, and temporary speed restriction signs, enhance the warning mechanism for construction personnel, and ensure that trains pass through the construction section according to the temporary speed restriction.

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.

To C.Y.L Engineering Consulting INC.

1. Enhance the responsibilities of the construction supervisor to monitor the construction.

To UNITED GEOTECH, INC.

1. Ensure that the construction supervisor executes construction site safety self-inspections.
2. Supervise the formulation of complete risk response measures by the construction supplier in line with the risk assessment report and review risk assessment for the period of construction work along tracks.
3. Supervise the construction supervisor to comply with the lookout warning mechanism.

To Dainshin Construction LTD.

1. Enhance and implement worksite safety self-inspection.
2. Formulate complete risk response measures for the contents of the risk assessment report.
3. Enhance and implement the construction personnel to comply with the lookout warning mechanism.

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.