

Multiple train collision at Mikawashima May 3, 1962 at Mikawashima on the Joban line

Masayuki Nakao (Institute of Engineering Innovation, School of Engineering, The University of Tokyo)

A multiple train collision occurred 350m east of the Mikawashima Station of JNR, involving a freight train on the outbound Joban freight line and passenger trains on the outbound and the inbound Joban lines. The primary causes were the train operators' red light running and a delay in the stationmaster's accident notification. After the initial collision between two trains, 160 passengers were killed and 296 were injured by the accident. Many of them were passengers of the outbound-train who were walking on the inbound line towards the Mikawashima Station after getting out of the train through doors opened using emergency handles. They were run over by an incoming train on the inbound Joban line.

1. Event

A multiple train collision occurred 350m east of the Mikawashima Station of JNR, involving a freight train on the outbound Joban freight line and passenger trains on the outbound and inbound Joban lines. 160 passengers were killed and 296 were injured in the accident.

2. Course (Figure 1 and 2)

The first collision: At 21:36, a freight train 287 from the Tahashi Switchyard bound for Mito on the outbound Joban freight line was traveling to join the main line at Mikawashima Station. The freight train operator missed the red signal at the main line (the freight line was to wait for 2117H train on the main outbound passenger line to leave the station). At 21:36:30, the freight train broke through onto the safety siding. The signal connected to the safety siding activated the fail-safe device, preventing the freight train from entering into the main line, however, the loco and first tanker wagon derailed to block the main outbound passenger line.

The second collision: The 7-car passenger train 2117H bound for Toride from the Ueno Station departed the Mikawashima Station at 21:36, 4 minutes behind schedule. At 21:36:40, the passenger train, which was traveling at 40km/h at that time, struck the derailed freighter. The first two cars derailed and blocked the main inbound passenger line. The safety siding prevented a devastating collision, resulted in only 25 injuries. Passengers of the 2117H opened doors using emergency handles and started walking on the inbound line towards the Mikawashima Station. The Mikawashima East Signal Station located 100m from the accident site had 2 operators, but they were too busy confirming and reporting to their manager about the accident to stop the departure of the next passenger train.

The third collision: 5 minutes and 50 seconds after the second collision, the passenger train 2000H bound for Ueno arrived on the main inbound passenger line, ran over people escaping from the accident site and collided with the derailed 2117H. Its first car was smashed and its second cars through the fourth derailed,

resulting in a total of 160 lost lives and 296 injuries. This third collision brought devastation to the accident.

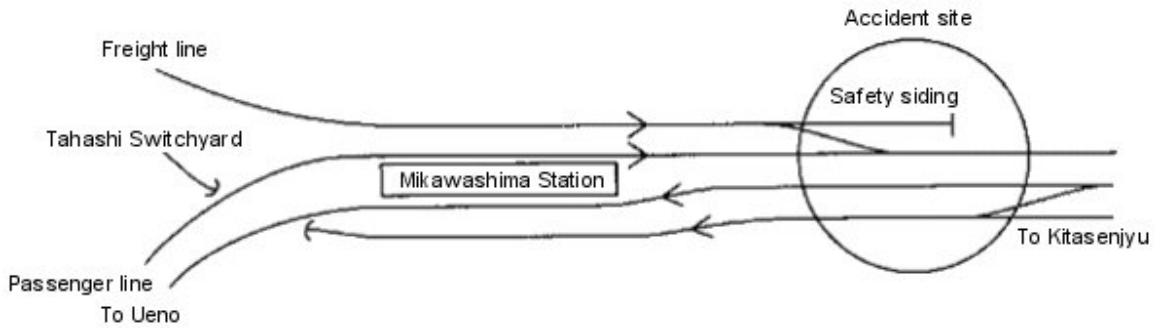


Figure 1. Mikawashima Station on the Joban Line [1]

(The passenger line and the freight line join the main line at the Mikawashima Station.)

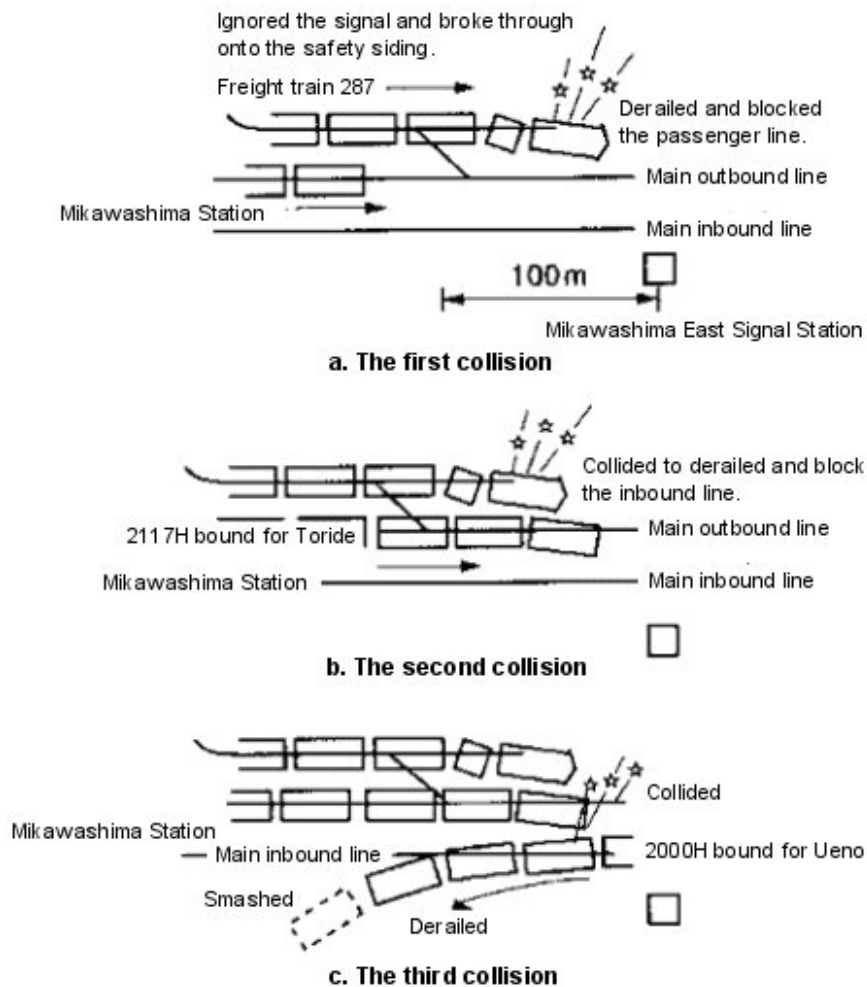


Figure 2. Collision at Mikawashima: Sequence of Events [1]

3. Cause

The direct cause was the freight train operators' missing of a red signal. Although an automatic train stop device was not available at that time to stop the train when the operators missed a signal, the safety siding functioned properly as a fail-safe system for preventing a devastating collision. It prevented the freight train from entering onto the main line.

However, the freight train was traveling too fast to stop on the safety siding. It derailed to block the down passenger line. The collision of the outbound train 2117H with the freight train occurred 10 seconds after the freight train collision. Although it was almost impossible for the 2117H to avoid the accident, the accident itself was very small in scale injuring only 25 people. The safety siding saved lives and minimized damage caused by the accident.

The impact of the accident worsened when passengers, without being instructed by the train operators, opened doors using emergency handles that were installed in response to the Saku-ragi-cho Accident of 1951 (passengers were trapped in the train cars and unable to escape from the train fire), and got off the train onto the railway track.

The delay in stopping the next inbound train 2000H multiplied the damage to the accident. The stationmaster could have taken some action to stop departure of the 2000H in 5 minutes and 5 seconds. However, the relay of information taken by the stationmaster and operators led to delay as shown in Figure 3, resulting in the multiple train collision and many casualties.

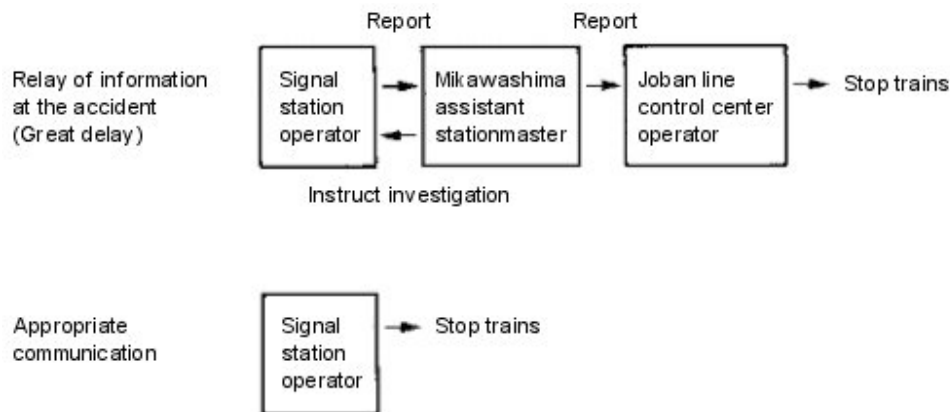


Figure 3. Communication Delay [1]

4. Immediate Action

While it was essential to investigate the direct cause of this accident, a lot of considerations must be given to adequate immediate actions that should have been taken after the first collision occurred.

Inadequate responses to the accident, for example the passengers got off the train onto the railway track

without instruction from the train operators and the stationmaster failed to notify the station up the line as soon as the accident happened, led to the devastating accident.

5. Countermeasure

- (1) An automatic train stop device (ATS) had been installed on all lines of the Japanese National Railways. The ATS activates the emergency brake when the train passes through a red signal.
- (2) The railway's operation policy changed from "do not stop trains unless absolutely necessary" to "stop trains as soon as an accident happens regardless of its scale". To increase safety further, a train radio system was installed to enable direct communication between train operators and the center.

6. Summary

Considering the signaling system at that time, it is understandable that the outbound passenger train was unable to avoid collision with the freight train derailed missing a red signal. The multiple-train collision was due to the railway crew's failure in stopping departure of the next inbound train 2000H. The third collision occurred 5+ minutes after the second collision, which should have given enough time for the railway crew to stop the next train.

The safety plan was ineffective because it did not authorize the signal station operators to stop trains at their own discretion. The railway crew training was also insufficient.

7. Knowledge

When an accident happens, stop traffic first and then determine the accident scale.

Operators should be adequately trained for emergency procedures and authorized to stop operation of their devices at their own discretion.

In response to this Mikawashima accident, the railway implemented an operational policy of "stop trains as soon as an accident happens regardless of its scale". However, 10 years later in 1972, this policy added devastation to the damage in the train fire in the Hokuiku Tunnel (a passenger train made an emergency stop in the tunnel). Required emergency procedures differ depending on the accident's circumstances and an instruction manual cannot cover everything. Training must raise the safety consciousness of operators so that they can always give reasoned judgment even under unexpected circumstances.

8. Background

On October 26, 1943 at around 18:40, a similar multiple train collision occurred near the Tsuchiura South Signal Box at the Tsuchiura Station on the Jo ban line. However, there was little report on the accident because of the time (during the war). The Mikawashima accident (the third collision in particular) may have been prevented, if improvements had been made to the safety plan in response to the Tsuchiura accident.

The emergency door handles that brought a problem in this accident were installed after the train fire at the

Sakuragi-cho Station on the Keihin-Tohoku line, which claimed many lives in 1951. At the Sakuragi-cho Station, the passenger train MOHA-63 touched a sagging overhead wire and sparks caused a disastrous fire. Among the passengers trapped in the train cars, 106 were killed and 92 were injured. The operators were unable to open doors because of short-circuits, and the window structures did not permit evacuation (the middle panel of the three-panel window was fixed to the frame).

Some may argue that this improvement (emergency door handles) invited a large number of casualties, but we need to always remember the basic fact, that is, “railway tracks are for trains to run on, not for people walking on them”.

References

- [1] Yotaro Hatamura (Editor), *Jissai-no Sekkei (Practical Design) Research Foundation (1996) Zoku-Zoku Jissai-no Sekkei (Practical Design III)*, The Nikkan Kogyo Shimbun, LTD.