

## **Head-on Collision on Shigaraki Kogen Railway May 15, 1991 Shigaraki Kogen Railway at Shigaraki, Shiga**

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The JR West special three-car train, 501D traveling from Kyoto to Shigaraki for The World Ceramic Festival, and the Shigaraki Kogen Railway (SKR) four-car railbus, 534D from Shigaraki to Kibugawa collided head-on between the Onodani Signal Station and the Shigarakinomiyaato Station. 42 people died and 614 were injured. Basic rules in the safety check procedures, which are the most critical in train operations, were neglected. This caused the accident. Photo 1 is a press photo of the accident.

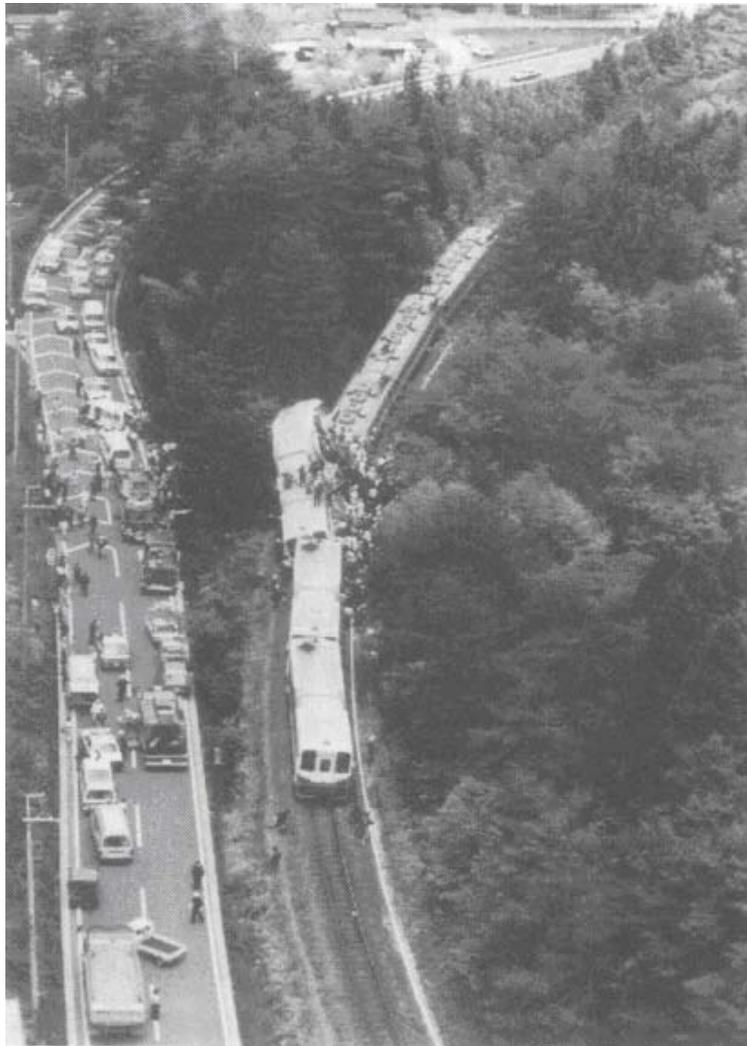


Photo 1. SKR Collision [1]

### **1. Event**

The JR West special three-car train bound for The World Ceramic Festival, 501D (Kyoto to Shigaraki) and the SKR four-car railbus, 534D (Shigaraki to Kibugawa) collided head-on between the Onodani Signal Station and the Shigarakinomiyaato Station. 42 people died and 614 were injured.

## 2. Course

SKR is the 14.7-km single-track diesel line which branches off from the Kibugawa Station on the JR West Kusatsu line (Figure 1).

On May 14, the JR West special express train 501D bound for The World Ceramic Festival left Kyoto at 09:30 after a five-minute delay carrying 2.5 times its normal capacity (716 people). Around 09:44, personnel at the Kameyama CTC Center (Kameyama, Mie), which controls Kusatsu line operations, noticed the eastbound train 501D was behind schedule and turned on the “Direction Priority Lever” (DDL) remotely. The DDL is to be used when there is an eastbound train delay. It is supposed to activate a red signal for westbound trains at the Onodani Signal Station to keep them from departing. This should allow the two trains to safely pass by each other at the Onodani Signal Station. The eastbound train 501D slightly recovered from its delay by cutting the stopping time at stations, and at 10:18, left the Kibugawa Station with a two-minute delay.

In the meantime, as the red signal at the Shigaraki Station did not change to the go signal, the westbound train 534D could not depart on time and was halted. At 10:24, without communicating with the Onodani Signal Station, SKR switched to hand signals and had the train depart with a ten-minute delay.

However, the device to detect the westbound train’s erroneous departure from the Shigaraki Station did not function and failed to change the signal for eastbound trains to red. The signal for eastbound trains at the Onodani Signal Station stayed green.

Prior to the accident, on April 8, 12 and May 3, a westbound train had departed when a red signal had been on. The “Faulty Departure Detector (FDD)” then had functioned properly, changing the signal to red at the Onodani Signal Station, and the eastbound train had safely stayed in the escape line at the Onodani Signal Station.

On May 14, the eastbound train passed the Onodani Signal Station although the operators, somewhat puzzled, did not see the westbound train to alternate with in the escape line (a “Green” signal means “Move forward aggressively” especially when a train is behind schedule).

Around 10:40, the 501D train and the 534D train collided head-on and the crashed cars caught a large number of people killing 42 and injuring 614 others.

Due to this accident, the World Ceramic Festival at Shigaraki was canceled.

SKR lost five train operators out of twenty and two train cars out of four in this accident. The line reopened on December 8, 1991.

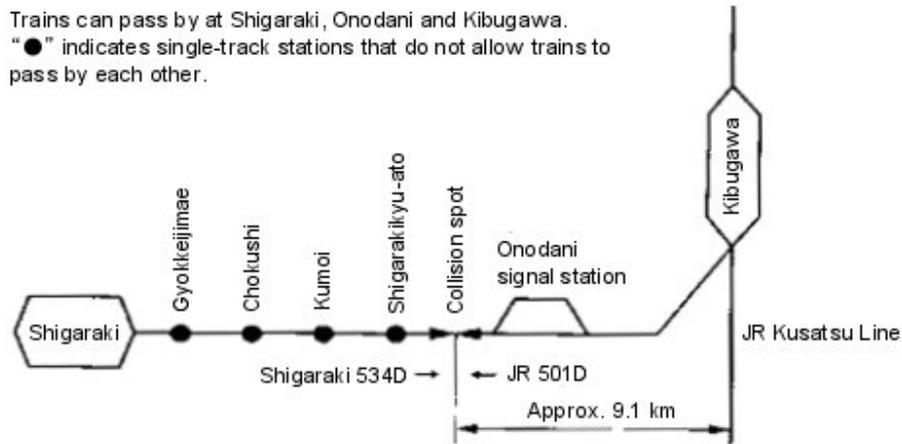


Figure 1. SKR Railroad Map [1]

### 3. Cause

SKR's negligence in observing the basic rules in the safety check procedures, which are the most critical in train operations, caused this accident. SKR did not follow the safety measures (communication with the Onodani Signal Station) when it switched from the "Regular Blocking System" (the signal system used regularly) to the "Alternative Blocking System" (hand signal), and it let the 534D train to depart from the Shigaraki Station.

Secondly, the FDD did not function properly at the time of the accident, and it failed to detect the erroneous departure of the westbound train. (As to the reason of the FDD malfunction, the Ministry of Transport Railroad Bureau investigation report concluded: "It is assumed that the signal circuit was not connected properly at the time, but the cause is undetermined." Hence, the reason remains unknown.)

Finally, both JR West and SKR changed the signal security system (including the DDL installation) bypassing the procedures required by regulations, and this also contributed to the collision.

### 4. Immediate Action

The police immediately started an investigation, and the Ministry of Transport set up an investigation committee to start investigating the cause of the accident. One year and seven months later, the Ministry of Transport Railroad Bureau published a 12-page-long report on the accident. Some, however, pointed out that the police investigation's priority was to find out whether there was criminal negligence, and that the report did not provide factual analysis on the accident cause.

### 5. Countermeasure

JR West stopped the train services on the SKR line. JR East also aborted its train services plan on the Kashima Rinkai Railway line to provide connection between its main line and the appendix line (some claim this decision to be an over-reaction). SKR stopped using the newly built Onodani Signal Station, and the train schedule was reverted to run trains once an hour from every 30 minutes. The railway company sacrificed its

service for securing safety.

## 6. Summary

Upon the “Regular Blocking System” failure, SKR operators switched to the “Alternative Blocking System” (hand signal) without taking proper safety measures and allowed a train to depart, resulting in the head-on collision. The SKR operators simply assumed that the FDD would function properly and switch the signal for oncoming trains to red even if they skipped some safety procedures, and expected the JR West train to be waiting. Such inadvertent oversights of operators lead to the accident.

## 7. Knowledge

- (1) It must not be assumed that “Someone will take care of it” when it comes to safety.
- (2) Back-up systems are not guaranteed to function without failure. They may malfunction.
- (3) Gut feelings such as “unusual” and “something strange” need to be taken seriously and considered as warnings of a potential disaster.
- (4) Good communication and cooperation are essential when multiple organizations are involved in an operation.

## 8. Background

SKR is a third-sector (joint-stock) railway which was formerly the JNR Shigaraki line. The Shigaraki line was abolished by the JNR Reform Law as it was unprofitable. Some of the abolished former JNR local lines had converted to bus lines, whereas others turned into third-sector railways subsidized by local governments such as SKR. Such third-sector railways do not have strong business operating foundations in general.

SKR is the 14.7-km single-track diesel line which branches off from the Kibugawa Station on the JR West Kusatsu line. It used to run without an interchange system, and only SKR trains carried passengers between Kibugawa and Shigaraki.

For the World Ceramic Festival, SKR decided to accept the JR West trains to run on their line, and they built the Onodani Signal Station for interchange. The Onodani Signal Station made it possible for trains to run every 30 minutes instead of every hour, and the carrying capacity had doubled.

## 9. On the Side

JR West tried to conceal their involvement in the DDL installation from the police investigation. Although JR West knew that the SKR operators had ignored red signals a few times prior to the accident, they did not request SKR to enforce stopping when signals were red. JR West lost a civil law suit and admitted their negligence. The JR West’s corporate culture that let reckless negligence may have contributed to the fatal JR West Fukuchiyama line accident.

## 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.