

Ly R-413B

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: JUN 19 1982

Forwarded to:

Honorable Robert Blanchette
Administrator
Federal Railroad Administration
Washington, D.C. 20590

SAFETY RECOMMENDATION(S)

R-82-48

About 8:20 a.m. on Saturday, November 28, 1981, Norfolk & Western Railway Company (N & W) freight train No. 6BS78, after receiving a clear signal indicating a clear main track route, entered a misaligned crossover leading from the eastbound main track onto yard track No. 1 at Crewe, Virginia, and sideswiped coal-laden hopper cars being handled by the yard shifter, and then caromed into freight cars of freight train No. 67HNP, which was on the adjacent westbound main track. Two locomotive units and seven cars of train No. 6BS78, nine cars of train No. 67HNP, seven cars on yard track No. 1, and four cars standing on yard track No. 3 were derailed or damaged. The conductor of train No. 67HNP and the front brakeman of train No. 6BS78 received minor injuries as a result of the accident. Damage was estimated to be about \$690,305. ^{1/}

Shortly before 8:20 a.m., train No. 6BS78 was arriving at the Crewe yard on the eastbound main track. The engineer radioed the yardmaster and received permission to enter the Crewe yard limits. The engineer and front brakeman called out the signal indications to each other at signal Nos. 1304 and 1296 as required by the operating rules. Both signals indicated green (clear) aspects. As the train approached the crossover from the eastbound main track to yard track No. 1, it was proceeding through a 2-degree curve to the right. Because the engineer was preparing to stop the train for a change of crews, the speed of the train had been reduced from about 45 miles per hour to about 27 miles per hour. The engineer and brakeman observed the switch lined into yard track No. 1 when they were about one or two car lengths away from the switch, and they both applied the automatic air brake in emergency at the same time. They then lay on the floor. The train entered the west switch of the crossover at about 27 miles per hour and was routed from the eastbound main track to yard track No. 1 where it collided with the coal hopper cars being handled by the yard shifter. Train No. 6BS78 then struck the hopper cars of train No. 67HNP on the westbound main track.

^{1/} For more detailed information, see Railroad Accident Report—"Side Collision and Derailment of Norfolk & Western Railway Company Trains Nos. 6BS78, Yard Shifter, and 67HNP, Crewe, Virginia, November 28, 1981" (NTSB-RAR-82-3).

Investigation of the west switch of the crossover revealed that the right-hand switch point and its mating stock rail had been recently renewed. The Safety Board also noted that the stock rail had not been drilled to accept the rail connectors for the shunt wires leading to the switch circuit controller. The shunt wires and rail connectors were found lying unconnected in the ballast under the stock rail. The rail connector studs were bent over and the stud ends exhibited fracture surfaces which were covered with rust. Even though the Safety Board believes that the section foreman may have requested the services of a signal maintainer, the Board believes that a signal maintainer was not present during the replacement of the switch point and stock rail. A qualified and experienced signal maintainer would not have broken off the connector studs in a manner that rendered them unfit for reuse and would not have left the shunt wires unconnected to the new stock rail. The Maintenance of Way and Signal and Communication Departments' lack of specific procedures and guidelines to coordinate requests for a signal maintainer's assistance may have contributed to the failure to establish a working arrangement between the section foreman and the signal maintainer. The Board also noted that signal system tests and inspections were not being performed in a timely and proper manner as required by both Federal regulations and N & W company rules.

The installation of a series break-type circuit, a variation of the shunt circuit which was involved in this accident, would have provided more positive protection. The involved shunt circuit was not designed on the closed-circuit principle and did not have the inherent fail-safe feature of the series break-type circuit. If the involved shunt circuit had been so designed, signal No. 1296 would have displayed a red (stop and proceed) aspect because of the unconnected shunt wires. The display of such a red (stop and proceed) aspect even with no train occupying the governed signal block would have indicated a fault within the signal system. The Safety Board believes that had a series break-type circuit been in place at the time of the accident, a red aspect would have been displayed, and the accident could have been avoided.

In its report of the investigation of a signal failure leading to the collision of a passenger train at Spencer, North Carolina, on October 8, 1977, ^{2/} the Safety Board noted several factors that have also been revealed in this accident. The circuit controller and shunt circuit which failed and caused a false proceed aspect at Spencer was the same type system which failed and caused a false proceed aspect at Crewe. In both accidents, the operating procedures that were used to augment the signal system for the protection of trains proved inadequate. As a result of its investigation at Spencer, the Safety Board recommended that the Federal Railroad Administration (FRA):

Require that the track shunt circuit imposed by contact closure in a circuit controller be phased out as soon as practicable and a series break-type circuit, which will satisfy the requirements of the FRA's Rules, Standards, and Instructions, be used in place thereof. (Class II, Priority Action) (R-78-23)

The FRA has not yet taken any action in response to the recommendation and it remains in an "Open--Unacceptable Action" status. The FRA responded that a shunt circuit is not an electrical circuit and therefore not subject to the provisions of 49 CFR 236.5. The Safety Board believes this interpretation is not realistic since the shunt circuit functions as an integral component of the electrical control circuit and is, by definition,

^{2/} For more detailed information, read Railroad Accident Report--"Side Collision of Southern Railway Company Trains Nos. 1 and 152, Spencer, North Carolina, October 8, 1977" (NTSB-RAR-78-3).

a by-path in an electrical circuit. The application of a shunt circuit not designed on the closed-circuit principle to a control circuit which, by regulatory requirement, is designed on the closed-circuit principle nullifies the fail-safe concept of the signal system and affects the safety of train operation. The Safety Board believes the benefit of safety requires the FRA to revise the appropriate regulation, or interpretation thereof, to eliminate this inconsistency.

The FRA further responded that the conversion costs would be prohibitive. The Safety Board recognizes that the implementation of this recommendation would be a large undertaking. However, the replacement of switch shunting circuits with series break-type circuits could be accomplished by assignment of priority. Passenger train routes and routes over which substantial amounts of hazardous materials are shipped should receive such conversions first. The remaining switch shunting circuits could be replaced with series break-type circuits based on a lifespan replacement cycle.

It should be noted that a sequence of events such as occurred in this accident is not the only means by which shunt wires become disconnected. Routine maintenance operations, such as machine switch tamping, can and often does result in broken shunt wires. If the track shunt circuit protection is not a fail-safe design, a potential false proceed condition may occur.

As a result of its investigation of this accident, the National Transportation Safety Board recommends that the Federal Railroad Administration:

Revise the appropriate regulation, within the Rules, Standards, and Instructions for signal systems, or the interpretation thereof, to require track shunt circuit switch protection to be of the series break-type circuit and require the replacement of track shunt circuit protection systems with series break-type circuits on a priority basis. (Class II, Priority Action) (R-82-48)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and McADAMS and BURSLEY, Members, concurred in this recommendation.


By: Jim Burnett
Chairman