

Log R-593



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

Date: February 8, 1988

In reply refer to: R-87-61 through -63

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On October 9, 1986, eastbound National Railroad Passenger Corporation (Amtrak) passenger train 8 derailed in Fall River, Wisconsin. Each of the freight trains preceding train 8 received information that prepared them either to cross over from one track to another at Fall River because of track work in the area or to stop at Fall River for instructions. However, the engineer of train 8 did not have any advance notification or train order to indicate that his train was to cross over from the eastward to the westward track in Fall River. As a result, train 8 entered the crossover at 70 mph and the locomotive units overturned. The authorized speed for the crossover was 10 mph. Two locomotive units and 10 passenger cars derailed; the fireman was killed, two crewmembers were injured seriously, and two received moderate injuries. Of the 215 passengers on board, 26 were injured. <sup>1/</sup>

Rule 517 in the General Code of Operating Rules states that radio tests must consist of an exchange of voice transmissions with another radio and the quality and readability of its transmission must be ascertained. There is no requirement by carrier rules or Federal regulation establishing a minimum distance between radios for the transmission test. The Soo Line Railroad management stated it would be permissible for an engineer to test the locomotive radio by making a transmission test with the conductor using a portable radio standing beside the locomotive. While Soo believes that it is in accordance with its rules that a voice test of the radio can be made between the conductor and engineer even if the conductor is standing beside the locomotive, the National Transportation Safety Board does not believe that this test is valid. The proper preparation and the transmission and understanding of train orders are mandatory for the safe operation of trains. While long-distance transmission testing is not required by the operating rules or by Title 49 Code of Federal Regulations Part 220, the Safety Board believes that the Federal Railroad Administration (FRA) should take action to require the long-distance testing of radios used in train service.

The two portable radios that the crewmembers had been using on board train 8 were tested following the accident. Both radios tested and functioned as designed. However, one of the radios had 1.25 inches broken off the antenna. Presently, there are neither carrier operating rules nor regulations in 49 CFR Part 220 that require the testing of radio antennas. The locomotive in this accident had been in the heavy overhaul program

<sup>1/</sup> For more detailed information, read Railroad Accident Report--"Derailment of Amtrak Passenger Train 8 Operating on the Soo Line Railroad at Fall River, Wisconsin, October 9, 1986," (NTSB/RAR-87/06).

less than a month before the accident, but because Amtrak does not test radio antennas unless they fail in service, it is most likely the locomotive left the shop with the antenna problems that were discovered at the Safety Board laboratory. When the antenna was tested at the Safety Board, the transmissions were weak, intermittent, or nonexistent. The faulty antenna was the reason the locomotive engineer was unable to communicate with the operator at Portage. Therefore, the FRA should establish requirements for the testing of the entire radio system on all locomotives, including the antenna.

The Safety Board is also concerned with the visibility of the low switch stand target of the crossover and the absence of an electric switch lock on a mainline crossover. The low switch stand target was reflectorized so that the target displayed a red aspect indicating the crossover was positioned for a diverging route to the westward track. However, the target was dirty and not readily visible because of its proximity to the grade crossing. (The top of the switch target was approximately 12 inches above the top of rail.) It may not have been seen by the traincrew because of its position. Also, signal 153.4 in advance of the crossover was displaying a clear aspect. Since no instructions were received to use the crossover, the traincrew would not have been expecting the switch to be different from its normal position.

The switchtender received his authority to operate the switch directing the train from the eastward track to the westward, but the method of operation used circumvented the safeguards inherent in the signal system. A system that allows a switch to be operated regardless of the location of a train has the concomitant risk that it can be operated immediately in front of any train. One system that prevents the operation of the switch when a train is closely approaching is a switch that is electrically locked at the time a train passes the signal preceding the switch. The Fall River crossover had never been equipped with electric locks. If the railroad had equipped the crossover switches with electric locks, the dispatcher would have had to arrange for the switch to be unlocked so that it could be operated manually by the switchtender. An unlocked situation could not be arranged if a train was in the affected signal block that would change the indication provided by the last signal the traincrew received. If electric locks had been provided on the crossover switches, this accident would not have occurred.

Another area of concern to the Safety Board is the ample evidence of high workload and stress as background factors for the dispatcher in this accident. The Safety Board is disturbed that these factors appear to be a normal part of the job. In a widely cited questionnaire survey of different occupations, Caplan, Cobb, French, Harrison & Pinneau, <sup>2/</sup> discuss job pressures in the workplace that are relevant to issues of worker health. The report concluded that train dispatchers are subject to relatively high workload pressures and that more demands on mental concentration are placed on dispatchers than air traffic controllers. (The researchers selected these two occupations for comparison because both are involved in the "monitoring and dispatching of major conveyances in the nation's transportation system.") Two witnesses (the operator and the switchtender) characterized the dispatcher as less than open to suggestions from fellow workers. A review of the audio tape from the day of the accident, however, did not portray the dispatcher as acting inappropriately. While possibly abrupt compared to other dispatchers, the dispatcher was under a heavy workload and was behaving within bounds appropriate to the task. There is no clear evidence that personality considerations for the dispatcher were a factor in the accident.

<sup>2/</sup> Caplan, R.D., Cobb, S., French, T.R.P., Jr., Van Harrison, R., and Pinneau, S.R., Jr., "Job Demands and Worker Health," Survey Research Center, Institute for Social Research, University of Michigan, 1980.

The dispatcher further stated that he had not taken a lunch or bathroom break because of the workload on the day of the accident. However, he stated that it was not unusual to miss lunch breaks and postpone bathroom breaks. He stated he felt that he was busy and stayed in his chair for long periods of time to take care of the many activities that were going on, that he did not take lunch breaks, and that he postponed bathroom breaks for long periods even after he felt the need for such a break. The dispatcher said, "There are a lot of times I did not go to the toilet when I should have for an hour, hour and 15 minutes, because of the workload." On the day of the accident he had only been away from his desk for 1 minute to get a cup of coffee during his entire tour of duty which began at 8 a.m. He had gone without a bathroom break for approximately 4 hours and 21 minutes when the accident occurred.

Both the dispatcher and the chief dispatcher indicated that the dispatcher position at Milwaukee was extremely busy. Both agreed that the workload had been extremely heavy from the spring up to the time of the accident. However, there is no indication that Soo management eased the workload at Milwaukee. The superintendent stated he thought it was impractical to have a relief position for the dispatcher and that it was not a good business decision to assign another dispatcher in the Milwaukee office. Soo management argued that the dispatcher position is a critical safety-related position. Therefore, it would not have been unreasonable to establish a relief dispatcher position on the day shift to assist during those months when track work is being performed. Instead of correcting the workload problems at Milwaukee after receiving the union complaint, the Soo management coerced the dispatcher into withdrawing the complaint. This action is an indication that Soo management apparently was willing to accept a potentially dangerous situation rather than spend the necessary funds to provide for a dispatcher relief position.

According to standard medical literature, <sup>4/</sup> the conscious need for rest and toilet breaks occurs long before the physical capacities of the human body have been reached. For a healthy 30-year-old male, the type of chronic postponement described by the dispatcher would not generally raise concerns of medical issues. At the same time, however, medical authorities agreed that a tremendous psychological discomfort can be associated with this type of postponement based on a wide variety of sensory inputs. For a worker with heavy job responsibilities, these physical sensations are almost certainly a source of distraction and by their presence may add to the general stress of the situation. The Safety Board believes the FRA should modify its "Hours of Service" regulations to provide for reasonable days-off and necessary rest breaks for safety-critical positions such as dispatchers.

There is little background literature available on the position of operator. However, the evidence suggests that this job (which is being gradually eliminated by the railroad industry through the use of radio orders) appears to be subject to stress. As described by the operator, the job included a curious collection of responsibilities. The operator's primary tasks were to deliver train orders and to monitor the hot box detectors. Both of these tasks are critical to the safe functioning of the railroad and are potentially competing since the operator must physically leave the radio transmitter and the message line to the dispatcher to monitor the detectors. The other assigned tasks, such as janitorial duties, may require the operator to be out of hearing range of the radio. The operator stated that his supervisor occasionally "... looks in the window," but that otherwise he is left alone while carrying out his duties. He noted that other operators do not bid on his job and that his workload has increased as the railroad closed nearby stations and transferred responsibilities to his position.

<sup>4/</sup> Guyton, A.C., "Textbook of Medical Physiology," Philadelphia, W.B. Saunders, 1981; Campbell, M.F., "Urology (Volume 3)," Philadelphia, W.B. Saunders, 1963.

In a 1974 FRA report, 4/ the possible safety dangers of "streamlining" railroads by cutting personnel and transferring duties to the remaining employees. In this accident, there is a possible warning that this streamlining may have gone too far and that the heavy workload of the dispatcher and operator contributed to the accident. The operator was instructed to tell the crew of train 8 about the crossover plans, but in the flurry of radio communications and tasks that he was also required to complete he did not have an opportunity to comply. For both the operator and the dispatcher, there was a more direct effect of workload in that they both were so occupied they may not have had a chance to think carefully about the operation and to recognize the developing danger of the situation. The Safety Board believes that the FRA should take action to require that both dispatchers and operators receive days off and allowance breaks during their tour of duty.

Therefore, as a result of its investigation, the National Transportation Safety Board recommends that the Soo Line Railroad:

Establish at each crew change point a requirement for the testing of the radio by crewmembers to a predetermined point that would be equal to the farthest point the radio would be required to transmit and receive. (Class II, Priority Action) (R-87-61)

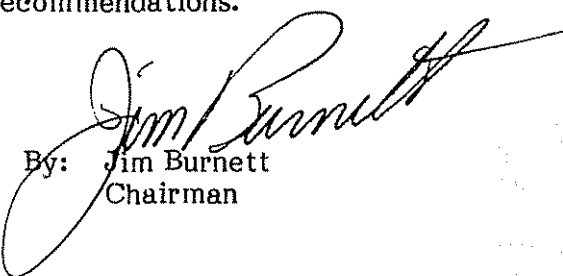
In cooperation with the National Railroad Passenger Corporation (Amtrak) equip all main line switches on routes used by Amtrak passenger trains with electric locks to prohibit the operation of the switch after a train has passed the last signal before a crossover. (Class II, Priority Action) (R-87-62)

Provide train dispatchers and operators at a minimum one off-duty period of 24 hours during any 7-day consecutive work period, a mandatory lunch break, and an additional break in the first half of the shift and one break in the second half of the shift in any 8-hour tour of duty. (Class II, Priority Action) (R-87-63)

Also as a result of its investigation, the Safety Board issued Safety Recommendations R-87-64 through -66 to the Federal Railroad Administration and R-87-67 through -70 to the National Railroad Passenger Corporation.

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility ". . . to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (Public Law 93-633). The Safety Board is vitally interested in any actions taken as a result of its safety recommendations and would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter. Please refer to Safety Recommendations R-87-61 through -63 in your reply.

BURNETT, Chairman, GOLDMAN, Vice Chairman, and LAUBER, NALL, and KOLSTAD, Members, concurred in these recommendations.

  
By: Jim Burnett  
Chairman

4/ Devoe, D. B., "An Analysis of the Job of Train Dispatcher," Report no. FRA-ORD&D-74-37, Washington, D.C., U.S. Department of Transportation, 1974.