



# National Transportation Safety Board

Washington, D. C. 20594

Safety Recommendation

Log R-~~1113~~<sup>611B</sup>

Date: November 29, 1988

In reply refer to: R-88-81 and -82

Mr. Graham Claytor, Jr.  
Chairman and President  
National Railroad Passenger Corporation  
400 North Capitol St., N.W.  
Washington, D.C. 20001

---

On November 12, 1987, National Railroad Passenger Corporation (Amtrak)/Massachusetts Bay Transportation Authority (MBTA) commuter train 8110 was standing partially berthed at the Back Bay station platform in Boston, Massachusetts, when it was struck from the rear by Amtrak/MBTA commuter train 8114.<sup>1</sup>

The signal system along the Attleboro to Boston route was installed as a result of the Northeast Corridor Improvement Project (NECIP). The NECIP made significant changes in grade, curvature, and other physical characteristics. Engineers, conductors, operating supervisors, instructors, and train dispatchers were unconventionally qualified on the accident district's new physical characteristics by viewing a video and taking a trip in a high-rail vehicle. Taking a trip in a high-rail vehicle and viewing a video may familiarize personnel with the district for train dispatching purposes; however, engineers and conductors make critical speed and stopping decisions based on train weight, length, power, braking capability, and grade. Since the video Amtrak used was not connected to any signal, throttle, or braking situations, there was no opportunity to practice or become familiar with train handling skills as related to that specific railroad district. Thus, the engineers were allowed to operate trains carrying passengers without first having operated trains, under supervision, on this newly and completely renovated territory. There was little opportunity to train or qualify personnel on the new signal system because the signal system was not operational at the time the traincrews were qualified. This was particularly unfortunate since these engineers never operated trains over territory in which signal blocks were subdivided into sections that allowed cab signal aspects to change within the block at intermediate code change points. Thus, questions that later arose about signal system operations, when the signal system actually performed as intended, were confused with instances where the signal system was apparently malfunctioning. While the National Transportation Safety Board supports classroom training, it further believes that training must be

---

<sup>1</sup>For more detailed information, read--Railroad Accident Report--Rear-End Collision of Amtrak/Massachusetts Bay Transportation Authority Commuter Trains at Back Bay Station, Boston, Massachusetts, November 12, 1987 (NTSB/RAR-88/05).

conducted in a way in which employees can demonstrate their knowledge and ability to operate trains over the territory in which they will be operating. This includes being familiar with the signal system as well as the geography and topography. Had the crews of these trains been properly trained on the territory with the new signal system operating, it is far less likely that the engineers would have mistaken proper cab signal changes at the intermediate code change points for cab signal problems.

The automatic train control system on train 8114 did not provide positive separation between trains 8114 and 8110. These same types of automatic train control systems are being used on most Amtrak locomotives operating on the Northeast Corridor. Further, they are being installed on those locomotives that are not equipped with such devices as a result of Safety Recommendation R-87-1 issued to Amtrak following the collision at Chase, Maryland, on January 4, 1987.<sup>2</sup>

#### R-87-1

Immediately initiate a program which will assure that all locomotives operating on the high speed passenger train trackage of the Northeast Corridor are equipped with a device which will control the train automatically as required by the signal if the engineer fails to do so.

These automatic train control systems will stop the train if the engineer fails to take appropriate action. However, they also will permit a train to be operated at speeds up to 20 mph, through stop and proceed or stop wayside signal indications, if the train speed has been reduced below 20 mph and the engineer has also acknowledged (by pushing a button, lever, or other such device) the audio warning of the cab signal change. That is, if the engineer acknowledges the cab signal change and reduces the speed of his train to below 20 mph, the train will not be automatically stopped by the automatic train control system. Further, the suppression feature of the system will permit the engineer to use power and brakes even when a situation requires braking only.

Because of these limitations, the automatic train control systems do not comply fully with the intent of Safety Recommendation R-87-1. However, the Safety Board also acknowledges that they appear to be the best currently available means of train control on the Northeast Corridor. Thus, Safety Recommendation R-87-1 is classified "Open--Acceptable Alternate Action" pending the completion of Amtrak's program to have these types of devices installed on all locomotives operating on the main lines of the Northeast Corridor.

However, because the Safety Board recognized the limitations of these automatic train control devices and the alternate need for a system that will provide for positive separation of trains, it issued Safety Recommendation R-87-16 to the Federal Railroad Administration (FRA) following its investigation of a rear-end collision between a commuter train and a Conrail freight train at Brighton, Massachusetts, on May 7, 1986.<sup>3</sup>

<sup>2</sup>Railroad Accident Report--Rear-End Collision of Amtrak Passenger Train 94 and Conrail Train ENS-121 on the Northeast Corridor, Chase, Maryland, January 4, 1987 (NTSB/RAR-88/01).

<sup>3</sup>Railroad Accident Report--Rear End Collision between Boston and Maine Corporation Commuter Train No. 5324 and Consolidated Rail Corporation Train TV-14, Brighton, Massachusetts, May 7, 1986 (NTSB/RAR-87/02).

R-87-16

Promulgate Federal standards to require the installation and operation of a train control system on mainline tracks which will provide for positive separation of all trains.

The installation and operation of an Advanced Train Control System (ATCS) system can provide for positive separation of trains operating on the same tracks.

As cited in the Brighton accident report, "The railroad industry is involved in an Advanced Train Control Systems (ATCS) Project which is adapting modern technology to train operating problems." That report further states:

The railroad supply industry is moving rapidly to perfect and furnish railroad companies with the hardware and software to implement ATCS. The ATCS is comprised of four elements: a data communications network system; computers and display screens on locomotives; a transponder network or a satellite communications system; and a central computer for dispatching purposes.

However, the Safety Board also recognizes that the development and installation of an ATCS system with the positive train separation feature is a long-term project and is especially unlikely to be implemented on the Northeast Corridor for many years (given the very large investment by Amtrak in its current system). Therefore, the Safety Board believes that Amtrak should explore thoroughly and evaluate all possible means of modifying the current automatic train control system to minimize or eliminate its limitations.

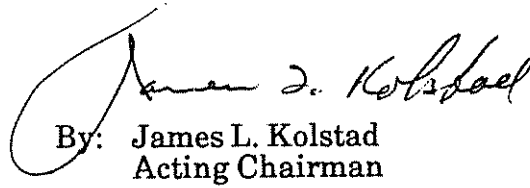
Therefore, as a result of its investigation, the National Transportation Safety Board recommends that the National Railroad Passenger Corporation:

When requiring traincrew personnel to qualify on the physical characteristics of a particular territory, either train those personnel in simulated operational situations with a system that immediately integrates a trainee's responses to power and braking or perform the qualifying test on the same type of equipment and in the actual operational environment that those employees will encounter later. (Class II, Priority Action) (R-88-81)

Evaluate thoroughly all possible means of modifying the current automatic train control (speed control) system used on locomotives on the Northeast Corridor to eliminate the features of the system that may permit an engineer to operate a train by a stop aspect of a wayside signal. (Class II, Priority Action) (R-88-82)

Also, the Safety Board issued Safety Recommendations R-88-78 and -79 to the Federal Railroad Administration and R-88-80 to the city of Boston.

KOLSTAD, Acting Chairman, and BURNETT, LAUBER, NALL, and DICKINSON, Members, concurred in these recommendations.



By: James L. Kolstad  
Acting Chairman