

R-643C

## NATIONAL TRANSPORTATION SAFETY BOARD

Washington, D.C. 20594



### Safety Recommendation

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**Date:** July 29, 1993

**In Reply Refer To:** R-93-15

Mr. Robert A. Matthews, President  
Railway Progress Institute  
700 North Fairfax Street  
Alexandria, Virginia 22314-2098

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On August 30, 1991, the eastbound Burlington Northern Railroad (BN) freight train 602 departed Shelby, Montana, heading south. Westbound BN freight train 603 departed Great Falls, Montana, proceeding north. Both trains were routed over BN unsignaled single track line between Shelby and Great Falls. A branch line dispatcher in Seattle, Washington, controlled the trains' movements by issuing track warrants (TWs) through a computerized track warrant control system.

At 5:50 p.m. mountain daylight time at milepost 85.55 north of Ledger, Montana, the two trains collided head on at a closing speed of 87 mph. After impact, fire ensued from spilled locomotive diesel fuel, burning locomotive units, two freight cars, and grass. Nine locomotive units and 22 cars were destroyed; 9 cars were damaged. Track damage, equipment replacement, and clean-up costs were estimated at \$19 million. Three crewmen were killed, and four were severely injured.<sup>1</sup>

The principle of safely and successfully operating more than one train on a given railroad segment is predicated on the establishment of a system that will keep trains separated. A system to ensure positive train separation has for many years been a National Transportation Safety Board concern and has always been on its "Most Wanted List." With either an Advanced Railroad Electronics System (ARES) or an Advanced Train Control System (ATCS) in effect,

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<sup>1</sup>For more detailed information, read Railroad Accident Report--*Head-on Collision Between Burlington Northern Railroad Freight Trains 602 and 603 Near Ledger, Montana, on August 30, 1991* (NTSB/RAR-93/01).

the TW would have appeared on a cab mounted screen, and a fully implemented system would have automatically limited train 603 from advancing beyond Ledger. Therefore, the Safety Board concludes that had an ATCS been installed and working in the accident area, the accident probably would have been prevented.

After its investigation of a train accident at Sugar Valley, Georgia,<sup>2</sup> the Safety Board issued recommendations to the Federal Railroad Administration (FRA) (R-91-25), to the Association of American Railroads (AAR) (R-91-31), and to the Railway Progress Institute (RPI) (R-91-32). It recommended that in conjunction with each other, they expand the effort being made to develop and install ATCS for the purpose of positive train separation.

In December 1991, the AAR president stated that the AAR and its member railroads actively support the ATCS design and development and that in the past year, significant progress had been made refining the system logic and control flow specifications, which would improve the ATCS capability to perform the intended train control application. He added that the AAR and the RPI are working closely with the FRA to ensure that all concerns are addressed as the system logic is further developed and refined. Safety Recommendations R-91-25, -31, and -32 have been classified "Open--Acceptable Response."

AAR member railroads have been testing components of ATCS since 1991. The National Railroad Passenger Corporation (Amtrak), for example, has installed transponders at selected locations on the Northeast Corridor that have the ability to slow trains (using the current cab signal system) for permanent speed restrictions. Amtrak plans to update the signal system on the Northeast Corridor to include nine speed commands up to 150 mph. The application of onboard computers to Northeast Corridor locomotives may eventually provide true positive train separation. The AAR, however, has yet to demonstrate a fully implemented ATCS that provides positive train separation. Although the activities of Amtrak and other AAR member railroads in developing and testing ATCS components are laudable, the Safety Board concludes that the development of a practical positive train separation system has not progressed as quickly as it should have.

Until 1992, BN had ARES, a working positive train separation system. The Safety Board was greatly disappointed when BN abandoned ARES. The ARES approach for wayside, locomotive, and dispatcher control was very similar to the AAR-proposed ATCS; however, ARES used continuous Global Positioning Satellite system signals instead of in-track transponders. Through these signals, an onboard computer calculated the specific location of the train, which was transmitted by very high frequency 160 megahertz data radio to a central office. Based on Rockwell International receivers, train locations could be determined within a 150-foot accuracy.

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<sup>2</sup>Railroad Accident Report--*Collision and Derailement of Norfolk Southern Train 188 with Norfolk Southern Train G-38 at Sugar Valley, Georgia, August 9, 1990* (NTSB/RAR-91/02).

Whether ARES or ATCS, a fully implemented positive train separation system will supply information to the dispatcher's computer monitor to indicate whether the engineer has train control. If the engineer fails to adhere to a speed restriction or to obey a signal, the locomotive computer can stop the train.

The Safety Board is greatly interested in systems such as ARES and ATCS and knows that system technology exists because its staff had the opportunity to see the ARES demonstration program. However, the only active program, the ATCS project, is limited to work order reporting, track warrants, and installation of ultrahigh frequency radio systems. These activities have no bearing on positive train separation or its benefits. More emphasis should be placed on positive train separation, particularly since FRA records indicate that from 1987 through 1991, 1,483 head-end, rear-end, and side collisions have occurred.

ARES made a lasting impression on many carriers in the railroad industry. Amtrak requested that ARES be installed on BN track where Amtrak passenger trains operate. Amtrak also requested that ARES be installed on its own track between Porter, Indiana, and Kalamazoo, Michigan. BN indicated that the area in the Ledger accident, the 4th Subdivision, would have been included if ARES had been adopted. The advanced, field tested and demonstrated ARES technology has been abandoned in favor of ATCS, which has not been field proven.

The Safety Board believes that the RPI, in conjunction with the FRA and the AAR, should establish a firm timetable that includes, at a minimum, dates for final development of required ATCS hardware, dates for implementation of a fully developed ATCS, and a commitment to a date for having the ATCS ready for installation on the general railroad system.

Therefore, the National Transportation Safety Board recommends that the Railway Progress Institute:

In conjunction with the Federal Railroad Administration and the Association of American Railroads, establish a firm timetable that includes, at a minimum, dates for final development of required Advanced Train Control System hardware, dates for implementation of a fully developed Advanced Train Control System, and a commitment to a date for having the Advanced Train Control System ready for installation on the general railroad system. (Class II, Priority Action) (R-93-15)

Also, the Safety Board issued Safety Recommendations R-93-5 through -10 to the Burlington Northern Railroad, R-93-11 and -12 to the Federal Railroad Administration, and R-93-13 and -14 to the Association of American Railroads.

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 action taken as a result of its safety recommendations. Therefore, it would appreciate a response from you regarding action taken or contemplated with respect to the recommendation in this letter. Please refer to Safety Recommendation R-93-15 in your reply. If you need additional information, you may call (202) 382-6840.

Chairman VOGT, Vice Chairman COUGHLIN, and Members LAUBER, HART, and HAMMERSCHMIDT concurred in this recommendation.

A handwritten signature in black ink, appearing to read 'W. Vogt', written in a cursive style.

By: Carl W. Vogt  
Chairman