



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

109# R-588A

Date: December 9, 1987

In reply refer to: R-87-59 and -60

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On Friday, June 19, 1987, about 4:30 a.m., 21 cars of a 135-car eastbound CSX Corporation (CSX) freight train, with a pusher locomotive on the rear, derailed near the Takoma Park station of the Washington Metropolitan Area Transit Authority (Metro) and intruded onto the track of the Metro Red Line. Ten of the 21 derailed cars broke through the intrusion detection warning (IDW) chain link and barbed-wired fence that separates CSX and Metro tracks and blocked both Metro tracks in the area. An automatic warning of the intrusion was received in Metro's operation control center, but Metro trains were not in operation at the time.

On September 5, 1987, a 90-car eastbound CSX train derailed 12 cars and intruded onto the tracks of Metro's Red Line about 1 mile north of the Fort Totten station. The derailed cars blocked all four tracks in the area (two CSX and two Metro). There were two Metro trains in the vicinity of the derailment; one train was stopped automatically due to derailment damage to the tracks ahead, and the other train was held in a nearby station because of an IDW alarm.

In addition to the derailments, on September 17, 1987, vandals abandoned a piece of heavy construction equipment (backhoe) on CSX tracks just north of the Silver Spring station. A CSX train struck and pushed the backhoe through the fence separating the CSX and Metro tracks. The debris from the collision was deposited on Metro's tracks. A warning was provided by the IDW system and, although a parked Metro train was showered with debris, there was no damage or injury.

The derailments and the vandalism incident occurred within a 6.5-mile common corridor where two Metro tracks are located between two CSX tracks that handle freight, commuter, and passenger trains. The derailments and the backhoe incident have highlighted the National Transportation Safety Board's concern that the risks involved in this type of common corridor operation may be higher than originally projected by Metro. As a result the Safety Board decided to conduct a special investigation into the intrusion detection and warning systems used by Metro in common transportation corridors.

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The fact that Metro's cars do not have crashworthiness characteristics to cope with the forces that can be imposed in collisions with freight and conventional passenger cars has long been a matter of concern to the Safety Board. The Safety Board reviewed the proposed design for the Metro system in 1970 <sup>1/</sup> and identified safety problems within the system including the hazards of locating Metro tracks adjacent to the tracks of a conventional railroad and the lack of protection afforded transit passengers by the light structure of the transit cars in the event of a collision, derailment, or other emergency.

As a result of the 1970 Safety Board report and expression of concern about the common corridor, Metro and the Chessie System (now CSX Corporation) decided in March 1973 to conduct their own study of the common corridor operation. The study group decided that it was improbable that an effective crash barrier could be designed, and it recommended that an IDW system be installed. The IDW system consists of a chain link and barbed-wire fence designed to send an alarm signal to the Metro operation control center (OCC) when the fence is breached. Metro plans an elapsed time after an intrusion of no more than 10 seconds to radio a stop order to Metro trains and 1 minute for freight trains on the adjacent railroad tracks to stop. The human link involved in using the OCC to stop trains could add critical seconds to the emergency procedure. Past suggestions to automatically link the IDW system into the signal and train control network were not adopted by Metro on the theory that delays could be caused by false alarms emitted by the sensitive IDW system. This deficiency is now considered to be correctable by Metro and automatic response between the IDW and the signal system is considered feasible. Consequently, the Safety Board believes that CSX should modify the signal system on its tracks to automatically display stop indications when an intrusion is detected and that Metro should modify its train control system so that the train operator's console automatically displays a zero speed indication when an intrusion is detected.

On September 9, 1987, Metro and CSX executives met, as a result of concerns similar to those of the Safety Board, about a possible increase in risk along the common corridor, and established a Joint Operating and Safety Committee. This committee consists of two members from CSX and Washington Metro and a mutually agreed-upon safety consultant. As safety measures pending the consultant's final report, <sup>2/</sup> CSX began daily track inspections and agreed to reduce passenger and freight train speeds in the common corridor. Both CSX and Metro agreed to monthly track inspections by an independent engineering firm which will report the results to both parties. The Joint Operations and Safety Committee also agreed to review the signal and intrusion systems, review the communications system, re-examine possible impact barrier systems, and review operating schedules and speeds. In addition, Metro agreed to study its operating and safety procedures in all joint corridors.

<sup>1/</sup> For more detailed information, read "NTSB Study of Washington Metropolitan Area Transit Authority's Safety Procedures for the Proposed Metro System," August 12, 1970 (NTSB/RSS-70/01).

<sup>2/</sup> According to WMATA, the consultant's final report is due July 1988.

The Safety Board acknowledges that Metro has publicly proposed to modify the IDW system so that it will cut off electrical power in the affected portion of the rail system in the event of an intrusion. Under these circumstances, although power cutoff may provide some positive safety benefit, the Safety Board believes that modification of the IDW system to provide an automatic stop (zero speed) indication in the signal system rather than the proposed power cutoff would provide the flexibility required to move trains in case of a fire, a hazardous materials spill, or a necessary evacuation. Additionally, the Safety Board believes that the 8- to 10-second brake application delay that is built into the power cut off system could allow a train to travel from 400 to 800 feet before brakes are applied, whereas a zero speed indication would require that the brakes be applied without delay. Metro staff indicated to the Safety Board that it will consider modification of the IDW system to provide a zero-speed indication in the event of an intrusion.

The Safety Board's initial investigation raised immediate concerns in two other areas. The first area of concern deals with locations along the joint corridor where the intrusion detection fence is near or below the height of the CSX rail. At these locations, it may be possible for a derailed car to intrude on to the Metro track without triggering the alarm system. The Safety Board believes that this deficiency should be corrected on a priority basis.

The other area of concern is the use of pusher locomotives. The grade slopes downward in the eastbound direction in the joint corridor; therefore, the pusher locomotives are not needed for power. Also, the probability of a derailment as well as an increase in the severity of a derailment is higher on a train that has all of the slack removed when the lead locomotive is in a dynamic braking mode on a downgrade or when emergency brakes are applied. Since CSX has told Safety Board investigators that it is CSX policy to remove the pusher locomotives at Gaithersburg, Maryland, the Safety Board believes that this policy should be enforced to eliminate the possibility of additional power being applied to the rear of a train in the joint corridor and the resultant possibility of an increase in lateral excursion of derailed cars if the pusher locomotives remain on the trains.

As a result of its investigation, the National Transportation Safety Board recommends that the Washington Metropolitan Area Transit Authority:

Raise the intrusion detection warning system to a uniform height above the top of the CSX Corporation rail beds. (Class II, Priority Action) (R-87-59)

Modify the existing intrusion detection warning system to ensure that the signal system on the Metro tracks and the CSX Corporation tracks automatically display stop indications for all trains when an intrusion is detected. (Class II, Priority Action) (R-87-60)

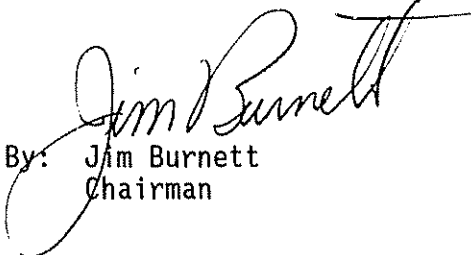
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3/ For more detailed information, read Railroad Accident Report--"Derailment of Steam Excursion Train Norfolk and Western Railway Company train Extra 611 West Suffolk, Virginia, May 18, 1986" (NTSB/RAR-87/05).

Also as a result of its investigation, the Safety Board issued Safety Recommendations R-87-57 and -58 to the CSX 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-87-59 and -60 in your reply.

BURNETT, Chairman, GOLDMAN, Vice Chairman, LAUBER and NALL, Members, concurred in these recommendations. KOLSTAD, Member, did not concur.

  
By: Jim Burnett  
Chairman