



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: November 23, 2005

In reply refer to: R-05-9 and -10 and R-01-6

Honorable Joseph H. Boardman
Administrator
Federal Railroad Administration
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On October 12, 2003, about 4:38 p.m., central daylight time, westbound Northeast Illinois Regional Commuter Railroad (Metra) train 519 derailed its two locomotives and five passenger cars as it traversed a crossover from track 1 to track 2 near Control Point 48th Street in Chicago, Illinois.¹ The train derailed at a recorded speed of about 68 mph. The maximum authorized speed through the crossover was 10 mph. There were about 375 passengers and a crew of 3 on board. As a result of the accident, 47 passengers were transported to eight local hospitals. Of these, 44 were treated and released, and 3 were admitted for observation. Damages from the accident exceeded \$5 million.

The National Transportation Safety Board determined that the probable cause of the derailment of Metra train 519 was the locomotive engineer's loss of situational awareness minutes before the derailment because of his preoccupation with certain aspects of train operations that led to his failure to observe and comply with signal indications. Contributing to the accident was the lack of a positive train control system at the accident location.

The locomotive engineer's most critical task was to observe wayside signals and comply with signal indications; had he done so, the accident would not have happened. Therefore, the Safety Board attempted to determine what might have caused the engineer to fail to comply with two critical and consecutive wayside signals.

The Safety Board examined the engineer's account of the events leading up to the accident and his ability to manage the tasks he faced during the accident trip. The investigation also focused on his exposure to nonroutine operations and his previous experience operating the train equipment. Neither of these factors, in and of themselves, was abnormal or unmanageable by the engineer. However, when his belief that he was operating on clear signals was coupled with his unresolved concerns about the location of the work crew, when he would be crossed over, and other tasks, his ability to operate the train safely was affected. The Safety Board,

¹ For additional information, see National Transportation Safety Board, *Derailed of Northeast Illinois Regional Commuter Railroad Train 519 in Chicago, Illinois, October 12, 2003*, Railroad Accident Report NTSB/RAR-05/03 (Washington, DC: NTSB, 2005).

therefore, concluded that the cumulative operating concerns of the engineer likely diverted his attention from the safety-critical task of observing and complying with signal indications.

On the day of the accident, the engineer was confronted with a number of tasks that he should have handled more effectively. Training programs should help prepare students for “real-world” situations and teach them how to prioritize conflicting tasks effectively. One way that Metra attempted to prepare trainees was to have them use locomotive simulators. Although simulators can help prepare engineers to operate trains safely under both normal and abnormal situations, the simulator training Metra’s engineers took utilized a predefined sequence of events and, therefore, did not allow interactive altering of trip events that can challenge a trainee’s knowledge and skills or teach the development of task strategy management during atypical situations.

In surveying some large railroads, the Board found that a trainee’s task management skills are typically reinforced during supervised rides, if at all. Those railroads that use simulators do so primarily to develop train handling skills, not to prepare trainees to cope with situations requiring them to manage tasks simultaneously. Accidents can result not only from poor management of emergency situations, but also from a crew’s failure to manage routine tasks and normal workload. Using locomotive simulators to present trainees with simultaneous operational challenges that they may face in the field can develop a trainee’s ability to prioritize tasks and build confidence, thus preparing the engineer to operate safely even while coping with unusual or unexpected circumstances. The Safety Board concluded that training an engineer to develop task management skills may provide strategies that will allow the engineer to operate safely when encountering a high workload or atypical situations.

As stated earlier, the accident engineer’s most critical task was to observe and comply with wayside signal indications; however, he stated that when he saw multiple clear signals ahead he felt comfortable having time to focus his attention elsewhere. If the engineer had been required to call out these upcoming signal indications over the radio, then he likely would not have perceived the situation prior to the accident as an opportunity to divert his attention elsewhere; instead he likely would have been monitoring his location relative to each signal in preparation for making each callout. Therefore, calling out all signal indications would have better focused the engineer’s attention on the safety-critical task of complying with the wayside signal system.

Further, a crewmember hearing the engineer radio “approach diverging” would have expected the train to slow, so when it accelerated, a crewmember might have radioed the engineer for clarification or intervened. Although the calling out of signal indications does not prevent missed signals or incorrectly perceived called signals, the Safety Board concluded that had the engineer been required to call out all signal indications over the radio, there would have been a greater likelihood that he or another crewmember would have responded to the wayside signals.

On February 20, 1996, the Federal Railroad Administration (FRA), in response to two fatal train accidents, issued Emergency Order No. 20, Notice No. 1, (EO20) to reduce the risks that train passengers and crews face under certain operating conditions. EO20 was aimed at commuter and intercity passenger operators and freight railroads, where push-pull passenger

operations are conducted. FRA's EO20 requirement for calling out certain signal indications is intended to add safety redundancy by involving other crewmembers in helping to ensure compliance with wayside signals in the absence of the protection provided by cab signals, automatic train stop, or an automatic train control system. In this situation, the approach diverging and diverging clear signals required the accident engineer to slow the train to 10 mph so that it could negotiate the crossover. The Safety Board understands that these signals did not meet FRA's definition of signal indications that must be called out.

Metra had designated several miles of track near where the accident occurred as a terminal area that was exempt from the requirement for signal callouts. Within this defined terminal area, there is no wayside cab signal equipment, positive train control, or other safety redundant system to compensate for human errors. Further highlighting the potentially severe consequences of failing to comply with signal indications through this area is the existence of a freight railroad crossing less than 2 miles from Chicago.

Currently, CSX Transportation (CSX) and the Norfolk Southern Railway Company (NS) require train crews to call all signal indications over the radio. Both CSX and NS have push-pull passenger operations on their systems: the Virginia Railway Express (VRE) and MARC. Accordingly, both VRE and MARC call out all signal indications when operating on these railroads. Further, several other railroads require train crews to call out signals under various circumstances and conditions.

The Safety Board is also concerned about the safety of railroad operations when backup systems are not available to intervene if a train crew operates a train improperly or fails to comply with wayside signals. Safety Board railroad accident investigations over the past three decades have shown conclusively that the most effective way to avoid train-to-train collisions is through the use of a positive train control system that will automatically assume some control of a train when the train crew does not comply with the requirements of a signal indication. In fact, positive train control has been on the Safety Board's Most Wanted Transportation Safety Improvements list since the list was developed in 1990.

The Safety Board concluded that this Metra accident is another in a series of accidents that could have been prevented had there been a positive train control system at the accident location. Such a system could have detected the engineer's lack of response to signal indications and then could have either stopped the train or slowed it to a speed at which it could have safely moved through the crossover.

The Safety Board's most recent positive train control-related safety recommendation, R-01-6, was issued to the FRA as a result of the Board's investigation of the train collision involving three freight trains in Bryan, Ohio,² and it was reiterated following the Placentia, California,³ accident. Currently, the Board classifies this recommendation as an "Open–

² For additional information, see National Transportation Safety Board, *Collision Involving Three Consolidated Rail Corporation Freight Trains Operating in Fog on a Double Main Track near Bryan, Ohio, January 17, 1999*, Railroad Accident Report NTSB/RAR-01/01 (Washington, DC: NTSB, 2001).

³ For additional information, see National Transportation Safety Board, *Collision of Burlington Northern Santa Fe Freight Train With Metrolink Passenger Train, Placentia, California, April 23, 2002*, Railroad Accident Report NTSB/RAR-03/04 (Washington, DC: NTSB, 2003).

Acceptable Response.” The FRA issued a final rule that became effective on June 6, 2005, that establishes performance-based standards for processor-based signal and train control systems. According to the FRA, this rule will facilitate the introduction and implementation of train control systems by providing technology-neutral performance-based criteria for determining safety. Additionally, the FRA provided the Safety Board with information about several positive train control development projects that it continues to fund, and the FRA participated in the Positive Train Control Symposium sponsored by the Board in March 2005. However, the Board remains concerned about the lack of positive train control systems on many passenger train routes and is convinced that these systems provide the best approach to reduce human-error accidents.

Based on its investigation of the October 12, 2003, Metra train derailment in Chicago, Illinois, the National Transportation Safety Board makes the following safety recommendations to the FRA:

Develop guidelines for locomotive engineer simulator training programs that go beyond developing basic skills and teach strategies for effectively managing multiple concurrent tasks and atypical situations. (R-05-9)

Require train crews to call out all signal indications over the radio, including clear signals, at all locations that are not equipped with automatic cab signals with enforcement or a positive train control system. (R-05-10)

In addition, the Safety Board reiterates the following, previously issued, safety recommendation to the FRA:

R-01-6

Facilitate actions necessary for development and implementation of positive train control systems that include collision avoidance, and require implementation of positive train control systems on main line tracks, establishing priority requirements for high-risk corridors such as those where commuter and intercity passenger railroads operate.

The Safety Board also issued safety recommendations to the Northeast Illinois Regional Commuter Railroad (Metra).

Please refer to Safety Recommendations R-05-9 and –10 and R-01-6 in your reply. If you need additional information, you may call (202) 314-6177.

Acting Chairman ROSENKER and Members ENGLEMAN CONNERS and HERSMAN concurred in these recommendations. Member HERSMAN filed a concurring statement which is included in the Board's final report on this accident.

[Original Signed]

By: Mark V. Rosenker
Acting Chairman