National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: June 12, 2001

In reply refer to: R-01-7

All Class I Railroads (See attached list)

The National Transportation Safety Board is an independent Federal agency charged by Congress with investigating transportation accidents, determining their probable cause, and making recommendations to prevent similar accidents from occurring. We are providing the following information to urge your organization to take action on the safety recommendation in this letter. The Safety Board is vitally interested in this recommendation because it is designed to prevent accidents and save lives.

This recommendation addresses train movement under reduced visibility conditions. The recommendation is derived from the Safety Board's investigation of the January 17, 1999, railroad accident in Bryan, Ohio, and is consistent with the evidence we found and the analysis we performed. As a result of this investigation, the Safety Board has issued six safety recommendations, one of which is addressed to all Class I railroads. Information supporting this recommendation is discussed below. The Safety Board would appreciate a response from you within 90 days addressing the actions you have taken or intend to take to implement our recommendation.

About 1:58 a.m. eastern standard time on January 17, 1999, three Consolidated Rail Corporation (Conrail) freight trains operating in fog on a double main track were involved in an accident near Bryan, Ohio. Westbound Mail-9, traveling near maximum authorized speed on track No. 1, struck the rear of a slower moving westbound train, TV-7, at milepost (MP) 337.22. The collision caused the derailment of the 3 locomotive units and the first 13 cars of Mail-9 and the last 3 cars of TV-7. The derailed equipment fouled the No. 2 track area and struck the 12th car of train MGL-16, which was operating eastbound on the adjacent track. The impact caused 18 cars in the MGL-16 consist to derail. The engineer and conductor of Mail-9 were killed in the accident. The crewmembers of TV-7 and MGL-16 were not injured. Total estimated damages were $5.3 million.[1]

The National Transportation Safety Board determined that the probable cause of this accident was the failure of the crew of train Mail-9 to comply with restrictive signal indications while operating at or near maximum authorized speed in dense fog. Contributing to the accident was the lack of uniformity and consistency in the operating practices of Consolidated Rail

[1] For more information, see National Transportation Safety Board, *Collision Involving Three Consolidated Rail Corporation Freight Trains Operating in Fog at Bryan, Ohio, January 17, 1999*, Railroad Accident Report NTSB/RAR-01/01 (Washington, D.C.: NTSB, 2001).

Corporation train crews when they encountered conditions of reduced visibility. Also contributing to the accident was the lack of a backup safety system that would have helped alert the crewmembers of train Mail-9 to the restrictive signal indications.

Between 12:15 a.m. and 1:08 a.m. on January 17, 1999, four westbound Conrail freight trains departed Toledo and were routed, one behind the other, onto Chicago main line track No. 1. When the lead train, PIEL-6A, was a little more than an hour out of Toledo, the train engineer radioed the dispatcher that he had run into very heavy fog at signal 3341W. The dispatcher did not, nor was he required to, notify the trailing van trains about the visibility or advise them to adjust their speeds for the fog.

The first two van trains, TV-99 and TV-7, operating near maximum authorized speed, passed signal 3341W on *clear* indications less than 5 minutes apart. Based on radio communications with PIEL-6A, the TV-99 engineer then slowed his train, passing 3351W (the next signal after 3341W) at 42 mph. Because of the dense fog, the TV-7 engineer slowed his train from 60 mph at 3341W to 39 mph at 3351W. When he saw that 3351W displayed an *approach* indication, he continued to slow his train because he could not see the signals until he "was just about on top of them," and he thought the next one (3381W) would be displaying a *stop and proceed* indication.

Following another radio communication with the PIEL-6A engineer, the TV-99 engineer radioed TV-7 that he was moving slowly toward a specified control point. About 2 minutes later, the TV-99 engineer had to stop his train at the control point because PIEL-6A occupied the block ahead. The TV-99 engineer radioed the TV-7 engineer that he was stopped. Because of the denseness of the fog, the TV-7 engineer slowed his train more than usual after passing 3351W. About 1 mile west of 3351W, TV-7 was operating at 6 mph.

Meanwhile, the third van train, Mail-9, was approaching the slowed trains at or near maximum authorized speed. Mail-9 crewmembers did not lower their train speed despite the reduced visibility, and they appear not to have been aware that the trains ahead of them were stopping or slowing considerably. They continued to operate their train as if all conditions were normal, as if appropriate spacing were being maintained between all the trains on that section of track, and as if they would be able to see and comply with all signal indications. At no time did Mail-9 deviate by more than a few miles per hour from the maximum authorized speed, and locomotive event recorder data indicated that neither dynamic brakes nor automatic air brakes were applied from the time the train passed the *approach* indication at signal 3341W until the collision with the rear of train TV-7.

The Safety Board attempted to determine why the Mail-9 crew proceeded past two restrictive signal indications without appreciably slowing the train.

Event recorder data show the speeds at which train Mail-9 proceeded through the blocks controlled by signals 3341W and 3351W. Based on measurements taken from the engineer's position inside the locomotive cab, Safety Board investigators determined the engineer's likely field of view as the locomotive approached and passed the signals. Investigators then used time and distance calculations to help determine how much time Mail-9 crewmembers would have had, under low-visibility conditions, to see and respond to the two signals immediately before the point of collision.

Even at a visibility of 200 feet, which is substantially better than the visibility estimated by those on the scene at the time, the 28-foot-high signal 3341W that the Mail-9 operator failed to comply with (which showed an *approach*, or yellow, aspect) would have been within his field of view for about 1.5 seconds or less as he passed it at about 56 mph. Had the engineer been even momentarily distracted, or had he taken a few seconds to check his speed or even scan the instrument panel, he could easily have missed the signal.

At a visibility of 100 feet, the yellow signal would have been within the engineer's field of view for less than 0.21 seconds. The 17-foot-high signal 3351W (which displayed a *stop and proceed*, or red, aspect) would have been within the engineer's view for less than 1.2 seconds before it passed to the right of his cab window.

Based on witness statements, the visibility at the time of the accident was only 10 to 25 feet. Under these conditions, the Mail-9 engineer could not have seen the yellow signal at all before it passed out of his field of view. The red signal would have been visible for less than 0.23 seconds as it passed across the right edge of the windshield, behind the pillar, and across the side window. The Safety Board acknowledges that the actual visibility conditions at the signal locations at the time Mail-9 passed cannot be known. Furthermore, one or both of the crewmembers could have been positioned where their angle of view would have been greater than the one calculated. Nevertheless, based on all available information, the Safety Board concluded that because of the diminished signal visibility in the dense fog and the speed of the train, the Mail-9 crew probably did not see either the *approach* or the *stop and proceed* signal that indicated the presence of another train on the same track ahead. For operations on a traffic control system (TCS) railroad to be safe, locomotive engineers must comply with signal indications and operate at a proper speed. When engineers traveling in dense fog try to anticipate the signal indications or operate the train at speeds that are too great to facilitate recognition of or compliance with the signals, they compromise the system.

Northeast Operating Rules Advisory Committee operating rule No. 958 stipulates that an engineer must regulate the train's speed to ensure safety whenever weather conditions "make observation of signals in any way doubtful." Yet, despite fog so dense that seeing and perhaps identifying signal indications in the Bryan area was difficult, most of the van train engineers operating in that area at the time of the accident were operating their trains at imprudent speeds. Several crewmembers described unsafe practices on the night of the accident. The MGL-16 engineer said that while he was waiting for another train to pass, fog enveloped the wayside signal where he was stopped. He pulled closer to the signal and waited for it to clear so that he would not have to "search" for the next signal in the fog. He then ran the train about 50 mph despite his visibility being less than 200 feet.

Even the TV-7 engineer, the only train handler who significantly adjusted the speed of his train for the dense fog, probably was not operating slowly enough for optimum safety. By his own calculations, he estimated that braking at 7 or 10 mph would take "four or five car lengths" to stop the train. He admitted that, on the night of the accident, he had not been able to see the signals from that distance.

Obviously, the Mail-9 crewmembers would have reduced the likelihood of their missing signals if they had slowed their train commensurate with the reduced visibility. The Safety Board considered various explanations as to why the Mail-9 engineer did not slow his train.

Interviews with Conrail crewmembers and supervisors indicated that, for a variety of reasons, crews operating on Conrail's Dearborn Division generally made every attempt to maintain their speed and their schedule, even during inclement weather. This reluctance to upset schedules may partially explain why even those train operators who did slow their trains still ran at speeds that could have been considered unsafe given the conditions. In some cases, the crews used the radio to alert other crews to their speeds and locations, but as shown by this accident, such communication can be inconsistent, and the quality of the transmissions cannot be ensured. Furthermore, radio communication between trains, because it is *ad hoc*, can itself lead to misunderstandings that could compromise safety.

As a risk management measure, all railroad operating crews should be reminded about the dangers and potential consequences of operating at speeds that are not appropriate for weather conditions, particularly dense fog. The Safety Board therefore made the following safety recommendations as a result of its investigation of the Bryan, Ohio, accident:

To the Brotherhood of Locomotive Engineers and the United Transportation Union:

> Advise your members of the findings of the National Transportation Safety Board's investigation of the January 17, 1999, railroad accident in Bryan, Ohio, and alert them to the hazards of operating at or near maximum authorized speed during periods of reduced visibility. (R-01-8 and -9)

To the Association of American Railroads and the American Short Line and Regional Railroad Association:

> Advise your member railroads of the findings of the National Transportation Safety Board's investigation of the January 17, 1999, railroad accident in Bryan, Ohio, and alert them to the hazards of operating at or near maximum authorized speed during periods of reduced visibility. (R-01-10 and -11)

The Safety Board is concerned that Conrail's procedures for dealing with fog were inadequate, even though fog is not an infrequent occurrence in the Bryan area and its effect, by obscuring signal indications, can undermine the safety of the traffic control system. The Safety Board notes that officials of Norfolk Southern (which now owns and operates the portion of the Conrail system where this accident occurred) have recognized the dangers posed by fog and have attempted to improve safety on the railroad by issuing special instructions for safe movement in severe conditions that include, among others, dense fog. The Safety Board is concerned, however, that the special instructions may not be sufficient to ensure safety in limited visibility conditions. The instructions still permit different locomotive engineers to respond differently, and not necessarily predictably, when they encounter reduced visibility.

Variations in operating procedures from one engineer to another can pose a potential risk to safety. The effects of fog are variable. A train may move in and out of dense fog, the result being that the engineer who properly slows for poor visibility may not operate at a uniform track

speed. If the fog clears for trailing trains or if the engineers of trailing trains operate at faster speeds, they will catch up with the lead train and line up in succeeding blocks behind it. If visibility remains clear, a close line-up is not necessarily dangerous; however, if dense fog envelopes an area occupied by several trains in proximity to one another, the risk to the train crews increases significantly, particularly if the train engineers do not uniformly alter their operating procedures and train speeds. In the case of the Bryan accident, the lack of uniformity in operating procedures proved fatal. The Safety Board concluded that the variable nature of fog and of the operating styles of train engineers can potentially result in a lack of uniformity in operation that puts train crews at risk when dense fog occurs.

The operating areas of most major railroads are so expansive that almost all of the companies have areas of track where fog or other conditions can pose visibility problems. In the view of the Safety Board, an effective management oversight and monitoring program is necessary if railroad management is to ensure that its train crews are following proven, consistent, uniform, and safe operating practices during periods of reduced visibility. But any oversight program must be supplemented by efficiency testing designed to ensure that those crews are prepared to respond consistently to reduced visibility conditions.

The National Transportation Safety Board therefore makes the following safety recommendation to all Class I railroads:

> Include, in your operational (efficiency) testing program, specific signal tests designed to ensure that your train crews consistently follow uniform operating procedures when they encounter reduced visibility conditions en route. (R-01-7)

In addition to the recommendations, referenced in the body of this letter, to the Brotherhood of Locomotive Engineers, the United Transportation Union, the Association of American Railroads, and the American Short Line and Regional Railroad Association, the Safety Board also made safety recommendations to the Federal Railroad Administration.

In your response to the recommendation in this letter, please refer to Safety Recommendation R-01-7. If you need additional information, you may call (202) 314-6607.

Acting Chairman CARMODY and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in this recommendation.

Original signed

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Acting Chairman

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