National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: December 20, 2001

In reply refer to: R-01-21

Mr. Allan Rutter
Administrator
Federal Railroad Administration
1120 Vermont Avenue, N.W.
Washington, D.C. 20590

At about 11:40 a.m., eastern standard time, on February 5, 2001, eastbound Amtrak train 286, with 100 passengers and 4 crewmembers, struck the rear of eastbound CSX Transportation (CSXT) freight train Q620 on the CSXT railroad near Syracuse, New York. On impact, the lead Amtrak locomotive unit and four of the train's five cars derailed. The rear truck of the last car of the 92-car CSXT freight train derailed, and the car lost a portion of its load of lumber. At the time of impact, the passenger train was traveling 35 mph; the freight train was traveling 7 mph. The accident resulted in injuries to all 4 crewmembers and 58 of the passengers aboard the Amtrak train. No CSXT crewmember was injured. A small amount of diesel fuel spilled from the fuel tank on the lead Amtrak locomotive unit, but no fire resulted. Total damages were estimated to be about $280,600.[1]

The National Transportation Safety Board determined that the probable cause of the February 5, 2001, collision of Amtrak train 286 with the rear of CSXT freight train Q620 was the Amtrak engineer's inattention to the operation of his train, which led to his failure to recognize and comply with the speed limit imposed by the governing wayside signal, and the lack of any safety redundancy system capable of preventing a collision in the event of human failure.

When Amtrak train 286 departed the Syracuse station, it was to take its place behind several other trains on the only available mainline track—track No. 1. As a way of expediting train movements despite the dense traffic, the dispatcher was using restrictive signals to permit trains to follow one another at relatively close intervals. The restrictive signals required locomotive engineers to progress at restricted speed while looking out for the rear of the train ahead.

As Amtrak train 286 approached the interlocking at control point (CP) 290, the dispatcher had set signal 6E as *restricting*, indicating that the engineer should (1) slow his train to a speed

[1] For more information, see National Transportation Safety Board, *Rear-End Collision of National Railroad Passenger Corporation (Amtrak) Train 286 With CSXT Freight Train Q620 on the CSX Railroad at Syracuse New York, February 5, 2001*, Railroad Accident Report NTSB/RAR-01/04 (Washington, D.C.: NTSB, 2001).

no greater than 15 mph that would allow him to stop within half his sight distance, and (2) be on the alert for trains or other obstructions on the track ahead.

But the Amtrak engineer stated that he thought the signal indication was *medium approach*, requiring that he slow to 30 mph and be prepared to stop at the next signal. By implication, a *medium approach* signal indication signifies that the block immediately ahead is clear of other trains and that the engineer need only be concerned about the possibility of a train in the block controlled by the next signal.

Shortly after the Amtrak train passed signal 6E, the engineer activated the locomotive isolation switch that effectively doubled the motive power being applied to the train, and the train's speed began to increase. The engineer said that he then took his eyes off the track ahead and began going through his bag for track bulletins. While he did so, the train's speed continued to increase well past either restricted or medium approach speed. The engineer said that the distraction of retrieving bulletins (which he could, and should, have retrieved and placed in an accessible location before he departed the Syracuse station) from his bag prevented his noticing the speed increase.

Meanwhile, CSXT freight train Q620, which was immediately in front of the Amtrak train, had reached a speed of 7 mph after having stopped for a *stop and proceed* signal indication. The Amtrak engineer said that he looked up to see the rear of the freight train ahead. By that time, the Amtrak train had reached a speed of about 59 mph. The engineer said that once he determined that the train was on the same track, he placed the train in emergency, but it was not able to stop before striking the rear of CSXT train Q620. The Amtrak train was traveling about 35 mph when it struck the rear of the freight train.

The Amtrak engineer was operating by himself in the locomotive control cab at the time of the accident. One- or lone-engineer operation is common in Amtrak operations nationwide. On the Northeast Corridor between Washington, D.C., and Boston, a positive train control system provides a level of safety redundancy in the event the engineer is incapacitated or fails to take appropriate action in response to a signal. With this system, if the engineer fails to comply with a more restrictive signal, the train is automatically brought to a stop by a penalty application of the brakes. No fail-safe positive train control system was in operation at the site of this accident.

The Safety Board is concerned about the safety of passenger train service when the train is being operated by a lone engineer and backup systems are not available to intervene if the engineer operates his train improperly or fails to comply with wayside signals. The Safety Board has long argued that the most effective way to avoid train-to-train collisions—regardless of the number of persons in the operating compartment—is through the use of positive train control systems. Such systems prevent train collisions by automatically assuming some control of the train when the engineer does not comply with the requirements of a signal indication. Although the signals in the area of the accident were operating properly, the train control system did not include any mechanism to help make the engineer aware of signal indications and did not incorporate safeguards to prevent the engineer from accidentally or intentionally failing to comply with restrictive signals.

Most Amtrak locomotives, including the lead locomotive on Amtrak train 286, have automatic cab signal equipment that is designed to display signal indications inside the locomotive cab. However, the track in the accident area was not equipped with the wayside equipment to transmit signal information to the locomotive, although such equipment was installed much further east, starting at milepost (MP) 169 outside Schenectady, New York. Had there been a functioning cab signal system in place in the accident area, the restrictive signal in this accident would have been displayed inside the cab of the lead Amtrak locomotive unit 414, where it might have been observed correctly and properly responded to by the engineer.

At one time, the Chicago main line through the accident area was equipped with an intermittent automatic train stop system that was designed to automatically apply the air brakes and stop the train should the engineer fail to acknowledge an audible alarm within a few seconds of passing a more restrictive wayside signal. This feature, however, was removed with the approval of the Federal Railroad Administration (FRA) in the early 1970s after the Penn Central Railroad was created from the merger of the Pennsylvania and New York Central Railroads.[2]

Even though a working automatic cab signal or automatic train stop system might have helped prevent this accident, the Safety Board notes that these systems, too, rely for their effectiveness on the alertness, judgment, and responsiveness of the train crew. For example, the automatic cab signal system displays signal indications but does nothing to ensure that the crew responds appropriately. Similarly, the automatic train stop system, while offering a level of safety beyond that of cab signals, does not enforce compliance with restrictive signal indications. So long as the engineer pushes a button or turns a lever to acknowledge and silence the system alarm, the automatic stop system will not activate.

The Safety Board has long been a proponent of automated systems that prevent train collisions by automatically interceding in the operation of a train when the engineer does not comply with the requirements of the signal indication.[3] Had Amtrak train 286 been equipped with such a system, the system would have intervened by slowing the train when the train engineer failed to slow in response to passing the *restricting* signal indication, whether or not the engineer misinterpreted or missed seeing the signal. The Safety Board concluded that had a fail-safe safety redundancy system such as positive train control been installed and operational throughout the accident area, the accident would probably not have occurred.

The most recent positive train control safety recommendation issued by the Safety Board came as a result of the Board's investigation of a January 17, 1999, train collision in Bryan, Ohio.[4] In that accident, a freight train locomotive crew, operating in dense fog, failed to see and appropriately respond to two restrictive signal indications. As a result, the train struck the rear of a slower moving freight train. The derailed equipment also struck and caused the derailment of

[2] Automatic train stop was installed by the New York Central System railroad through the accident area from Croton, New York, to Englewood, Illinois, between 1922 and 1934.

[3] For a more detailed discussion of Safety Board activities in the area of positive train control, 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 RAR-01/01 (Washington, D.C.: NTSB, 2001).

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

some cars of a passing train on an adjacent track. As a result of the investigation of the Bryan, Ohio, accident, the Safety Board, on June 12, 2001, made the following 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 CSXT Chicago Line involved in this accident is the same line that was involved in the Bryan, Ohio, accident. Since the line carries intercity passenger traffic, it should be subject to the priority requirements identified in the recommendation. As of November 2001, the Safety Board had received no response from the FRA to this recommendation.

The absence of a positive train control system is of particular concern where passenger trains operate because of the number of lives that can be put at risk in the event of human error. In the view of the Safety Board, the risk of operating without a fail-safe train control system may be exacerbated when passenger trains operate with a single crewmember in the operating compartment.

Passenger trains have operated with only one person in the locomotive cab along the Northeast Corridor between Washington, D.C., and Boston, Massachusetts, since the 1960s, and Amtrak continues lone-engineer operation along that route today. However, the safety of lone-engineer operation on the Northeast Corridor is enhanced by a fail-safe train control system, known as the advanced train control system,[5] that helps prevent collisions. But Amtrak routinely employs lone-engineer operation systemwide in locations, such as the Syracuse area, where no redundant train control system is in place.

Amtrak asserts that locomotive alerters help ensure that lone-engineer operation is safe. But alerters cannot prevent an engineer from misreading a signal, speeding, or colliding with another train, as in this accident. Alerters can only help ensure the engineer is responsive to cues and is, to some degree, "alert"; they cannot ensure that an engineer will make no mistakes or intervene if the engineer does make a mistake. Alerters are therefore not a replacement for safety redundancies such as positive train control, or even automatic train stop, nor can they always substitute for another person in the cab who could question the actions of the engineer.

The Transportation Safety Board of Canada recently published its report of an accident investigation involving one-person, or lone-engineer, operation that, like the Syracuse accident, was also a rear-end collision through a restricting signal.[6]

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[5] The advanced train control system (ATC) will intervene to slow or stop a train in response to a signal indication should an engineer fail to do so. However, it does not enforce curve or other non-signaled speed restrictions well, nor does it enforce positive stops at interlocking home signals. A new system, advanced civil speed enforcement system (ACSES), is currently being installed to overlay the ATC system and overcome the limitations of that system. ACSES is already in place on about 198 miles of track along the Northeast Corridor.

[6] Transportation Safety Board of Canada, Report No. R96Q0050, and *Reflexions*, Issue 17, Winter 2001.

According to the report, on July 14, 1996, about 10:45 a.m., a Quebec North Shore and Labrador Railway (QNS&L)[7] southbound freight train collided with the rear end of a stationary freight train at Mile 131.68 of the Wacouna Subdivision. The last three rail cars of the stationary train derailed and were extensively damaged. The lead locomotive unit of the moving train was extensively damaged. The locomotive engineer of the moving train sustained minor injuries.

The report of the accident concluded, among other things:

- There was no other railway employee in a position to question the actions taken by the locomotive engineer;
- The possibility that fatigue may have contributed to the locomotive engineer's decision not to comply with the governing signal indication cannot be ignored;
- Locomotive-engineer-only train operations were implemented on the QNS&L without the benefit of a comprehensive analysis of the impact a further crew reduction would have on their operation and without the introduction of countermeasures that would ensure an equivalent level of safety.

The Transportation Safety Board of Canada determined that the collision occurred because:

> The moving train was operated past a governing restrictive signal at a speed at which the locomotive engineer was unable to stop short of the stationary equipment. The implementation of the major operational change to locomotive-engineer-only train operation without a comprehensive analysis of its impact and without the implementation of effective compensatory safety measures contributed to this occurrence.

After the accident, Transport Canada[8] prohibited the railway from operating trains with only a locomotive engineer until the railway had received appropriate exemptions from the Canadian Rail operating rules. Transport Canada stipulated 13 specific safety-related conditions (including the bulleted items below) that had to be met before the exemptions could be granted. The railway met the conditions, and appropriate exemptions were granted on April 24, 1997.

As a result of the Canadian investigation, a working group was established comprising Transport Canada staff and representatives of the QNS&L Railway and the United Transportation Union. The working group outlined more than 65 needed improvements, to include the following:

- The installation and operation of a proximity detection device on all lead locomotive units, track units, and on-track vehicles operating on main line track;

- Increased supervision;

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[7] The QNS&L runs between the St. Lawrence port at Sept Isle, Quebec, north though Labrador to the site of the now closed Schefferville, Quebec, iron mine. The line comprises 357 track miles (260 road miles). A 37-mile-long branch line located 224 miles north of Sept Iles, at Ross Bay Junction, runs to Labrador City, where mining operations continue.

[8] Transport Canada is the Canadian equivalent of the FRA.

- More intensive engineer training, including 120 to 130 hours of simulator training, first aid, fire extinguisher use, proper interpretation and application of the rules, proper use of the proximity detection device system, and applicable emergency procedures;

- A requirement that the railway implement and maintain an engineer performance record data system with indicators and tracking mechanisms;

- Specialized training of dispatchers working with lone engineers;

- Specialized training of supervisors of lone engineers;

- Additional fatigue mitigation training and practices, including:
  Implementation of crew calling windows;
  Recognized and scheduled rest periods; and
  Specific time off;

- Lone-engineer checklists and standard operating procedures;

- Required cab conditions;

- A requirement to call signals over the radio;

- Specified radio procedures and practices;

- Provision of feedback mechanisms for engineers; and

- Additional emergency procedures.

After the Canadian accident, Transport Canada commissioned a study[9] of one-person train operations. The Canadian study found that many foreign railroads employed lone-engineer operation, but that all had some degree of safety redundancy built in, either with equipment and/or training and supervision. Currently in Canada, only the QNS&L Railway has been approved for lone-engineer operation; however, Transport Canada has indicated it will consider lone-engineer operation on a waiver basis for other Canadian railroads as long as certain conditions are met.

In the view of the Safety Board, some of the requirements developed by Transport Canada to address any additional risk presented by lone-engineer operation may be appropriate for U.S. railroads, at least until such time as positive train control systems are in place along railroad main lines.

[9] Transport Canada, TP 12974E, "Study of One-Person Train Operations," Beauchemin-Beaton-Lapointe Inc., 1997.

Therefore, the National Transportation Safety Board issues the following safety recommendation to the Federal Railroad Administration:

> Evaluate the applicability to U.S. operations of the safety requirements established by Transport Canada for lone-engineer operation on the Quebec North Shore & Labrador Railway, and implement any found to have interim utility for U.S. passenger trains that operate in areas now lacking a system of positive train control. (R-01-21)

The Safety Board also issued safety recommendations to the National Emergency Number Association, the Association of American Railroads, the American Short Line and Regional Railroad Association, and Amtrak.

Please refer to Safety Recommendation R-01-21 in your reply. If you need additional information, you may call (202) 314-6607.

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

Original Signed

By: Marion C. Blakey
Chairman