Log R-546

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

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Forwarded to:

Mr. Graham Claytor
Chairman and President
National Railroad Passenger Corporation
400 North Capitol Street, N.W.
Washington, D. C. 20001

SAFETY RECOMMENDATION(S)

R-85-125 through -128

About 6:50 a.m, on July 7, 1984, northbound Amtrak passenger train No. 60, the Montrealer, derailed while passing over a washed-out section of gravel embankment under the main track of the Central Vermont Railway (CV) near Essex Junction, Vermont. Two locomotive units and the forward seven cars of the train derailed and were destroyed or heavily damaged. Three passengers and an Amtrak sleeping car attendant were killed; one CV crewmember died about 3 hours after the accident as a result of injuries sustained in the accident. One CV crewmember, two Amtrak attendants, and 26 passengers were seriously injured. Damage was estimated to be $6,812,838. 1/

Heritage Class coach No. 4729 and food service car No. 28302 received severe impacts as they dropped into the opening and struck slumbercoach No. 2083. Both cars remained upright and their occupants ultimately left them through end doors. The rear half of the right side of the Heritage coach was crushed inward as much as a foot as a result of colliding with the food service car during the derailment sequence. Four paired seats in this section were damaged with seat mounts torn loose or tilted inward; 3 of these seat pairs were rotated to some degree as were 16 other seat pairs elsewhere in the car. Postderailment impacts and rapid deceleration caused passengers to be thrown from their seats to the floor, against foot and leg rests, or into the seats in front of them. Several passengers received severe head and facial injuries when thrown into sheetmetal headrest supports that were exposed when the covering cushions came off them. Unrestrained baggage was thrown from overhead racks in this car and others, striking and injuring passengers, and some wall mirrors in the lounges were shattered.

About 20 persons were in forward food service car No. 28302; many were thrown from seated or standing positions by the postderailment impacts. Table tops were detached from their pedestals. Microwave ovens, storage compartment liners, coffee pots, food containers, and other unsecured items in the food dispensing area were thrown about. Some struck and injured passengers and attendants. Much of the debris blocked aisles and impeded rescue and evacuation efforts.

1/ For more detailed information, read Railroad Accident Report—"Derailment of Amtrak Passenger Train No. 60, The Montrealer, on the Central Vermont Railway near Essex Junction, Vermont, July 7, 1984" (NTSB/RAR-85/14).

Several passengers in the sleeping cars were cut when they were thrown into and shattered the glass mirrors on their compartment bulkheads and doors. Some wall mirrors in the lounges of the Heritage coaches were broken in the accident, as well.

The effects of rapid deceleration and derailment in producing injuries to persons in the coaches and food service cars paralleled that noted in previous Amtrak train accidents that the Safety Board has investigated. Seats were rotated, seat mounts were torn loose, and cushions were detached from sheetmetal headrest supports. Many passengers sustained facial and head injuries when they were pitched from their seats; others were injured when struck by unrestrained baggage that was thrown from open overhead luggage racks. Persons in the food service cars were injured by unsecured equipment, such as microwave ovens and food containers, which were thrown from the counter areas. Some sleeping car and coach passengers were lacerated when they were thrown into ordinary glass mirrors that shattered as a result.

In its report of the investigation of a 1983 Amtrak derailment at Wilmington, Illinois, 2/ the Safety Board issued Safety Recommendation R-84-40 on November 29, 1984, which recommended that Amtrak:

> Correct the identified design deficiencies in the interior features of existing and new passenger cars, which can cause injuries in accidents, including the baggage retention capabilities of overhead luggage racks, inadequately secured seats, and inadequately secured equipment in food service cars.

Safety Recommendation R-84-40 was reiterated on February 4, 1985, in the Safety Board's report of the investigation of an Amtrak derailment at Woodlawn, Texas, on November 12, 1983. 3/

Amtrak responded to Safety Recommendation R-84-40 on March 13, 1985, reporting that as its coaches were overhauled the locking devices intended to prevent seat rotation would be modified to include a positive locking feature that would prevent undesired rotation. Additionally, Amtrak reported that it was replacing complete car sets of seat frames with a design equipped with a step latch with positive locking device that prevents the seat from falling away from the coach wall, as well as undesired seat rotation. In addition, Amtrak will equip all newly constructed coaches with the improved seat frames.

Regarding the problem of unsecured baggage in overhead racks, Amtrak responded that it has designed a web-type retention device to be applied to the racks of a new prototype sleeping car it has ordered. This and other baggage retention devices are to be evaluated for potential application on a new prototype coach. However, Amtrak reported that it does not plan to retrofit existing cars with baggage retention devices. As for unsecured equipment in food service cars, Amtrak advised that it still will enhance securement of microwave and convection ovens by adding an extra steel bar across the top of the ovens to prevent displacement under extreme shock. The modification was being implemented as food service cars undergo overhaul and 120-day maintenance programs.

2/ Railroad/Highway Accident Report--"Collision of Amtrak Passenger Train No. 301 on Illinois Central Gulf Railroad with MMS Terminals, Inc., Delivery Truck, Wilmington, Illinois, July 28, 1983" (NTSB/RHR-84/02).

3/ Railroad Accident Report--"Derailment of Amtrak Train No. 21 (The Eagle) on the Missouri Pacific Railroad, Woodlawn, Texas, November 12, 1983" (NTSB/RAR-85/01).

On July 29, 1985, the Safety Board informed Amtrak that it was pleased that Amtrak was working to eliminate design inadequacies in its coach seats and oven securement in food service cars, but was keeping Safety Recommendation R-84-40 in an "Open--Unacceptable Action" status inasmuch as Amtrak did not plan to retrofit the overhead luggage racks in its existing cars with retention devices. In this regard, the Board cited an Amtrak derailment at Queens, New York, on July 23, 1984, in which passengers were struck by loose baggage dislodged from overhead racks.

In the Amtrak derailment at Connellsville, Pennsylvania, on May 29, 1984, 4/ coach passengers reported to Safety Board investigators that personal belongings and baggage "were flying everywhere." One woman was struck repeatedly and was literally buried under suitcases that fell from an overhead rack. Passengers reported that timely evacuation of the coaches was difficult because the aisles were full of fallen luggage. Considering the range of options that could be employed to effectively modify the existing luggage racks, the Safety Board believes that Amtrak should reconsider its position and move energetically to eliminate this common cause of injuries to coach passengers in derailments. Similarly, the use of shatterproof material in mirrors would prevent serious injuries to passengers in sleeping car compartments and coach lounges. Amtrak also should investigate measures to prevent the exposure of headrest frames as a result of cushion displacement on its Heritage class coaches as well as its other coach cars.

Based on the findings in these latest accidents, the Safety Board is placing Safety Recommendation R-84-40 in a "Closed--Unacceptable Action/Superseded" status and is issuing new recommendations that Amtrak take action to correct the luggage retention problem as well as the nonshatterproof mirrors and seat cushion displacement problems.

The accident location was in such a remote location that trees screened it from view in all directions, except along the railroad's right-of-way. It could not even be seen from the landfill access road. Nevertheless, had someone seen the washed-out embankment during the brief period of daylight and reported the fact to the CV dispatcher, there was little chance that the dispatcher could have contacted and warned the train crew. There were no open stations and there were no signals that could be set to stop the train. Only radio could be used to contact the crew, and the radios on the locomotive units were not equipped to operate on CV's frequencies. The train crew had small 5-watt portable radios with an effective range of 1 to 3 miles under optimum conditions, but the radios were not likely to receive a transmission unless they were close to one of the base stations, which were 25 miles or more apart. A measure of the ineffectiveness of the portable radios as replacements for the long-range radios on the locomotive units was the failure of the dispatcher to hear the extra brakeman's repeated calls for help over his portable radio, although the brakeman was about 2 miles away from the base station at Essex Junction.

Train No. 60 did not have a locomotive radio which would transmit and receive over the CV frequencies because Amtrak's motive power dispatcher permitted the train to leave New Haven, Connecticut, without one. There was a proper radio in fully serviceable condition at New Haven, but it was locked up in the radio shop. There was adequate time to correct the situation, but this was not done. CV was informed of the radio deficiency by Amtrak, and the train had been frequently accepted by CV without a proper radio in the past. There were no rules or regulations prohibiting this, but given the high degree to which CV relies on radio communication in its operations, the Safety Board

4/ Railroad Accident/Incident Summary Reports--"Derailment of Amtrak Passenger Train, The Capital Limited, near Connellsville, Pennsylvania, May 29, 1984" (NTSB/RAR-85/01/SUM).

believes this was a matter of poor judgment on the parts of both Amtrak and CV. Necessary steps were promptly taken after the accident to assure that such a situation would not occur again, but Amtrak should make certain that similar deficiencies do not occur elsewhere in operations that involve running its trains over several different railroads with different radio frequencies.

Even if the locomotive radio on train No. 60 had been equipped to function on the CV frequencies, it would not have been possible for the enginemen to communicate with the dispatcher because the locomotive battery boxes were destroyed when the locomotive units derailed. The location of the batteries under the frame of the locomotive units, which is peculiar to Amtrak's F4OPH units, makes them highly vulnerable when a locomotive unit derails and the carbody separates from the trucks. Such separation also occurred in the July 7 accident, the Amtrak derailment at Connellsville, Pennsylvania, on May 28, 1984, and the derailment of Amtrak's California Zephyr due to a washout near Granby, Colorado, on April 16, 1985. 5/ At Granby, as at Essex Junction, it was necessary for an engineman to walk about a half mile to reach a telephone and report the accident. In the Connellsville accident, an engineman walked 2 1/2 miles to use the telephone in a private residence. In all three accidents, the locations were relatively remote. Sixteen persons were seriously injured in the Granby derailment; 23 persons were injured, 4 seriously, in the Connellsville accident. In this day of almost total reliance on radios for communications on the railroads, it is intolerable that help for the injured occupants of passenger trains is delayed because it is necessary for train crewmembers to walk to the nearest telephone. The Safety Board believes that reliable emergency power for radio usage or an ability for the radio to broadcast an emergency message in the event of a serious accident is essential on Amtrak locomotives.

In the accident at Granby, radio communications improved between the crash scene and the depot after a locomotive, which was dispatched to pull the train back, arrived at the scene. In addition, portable lights also were provided at the crash site since it was dark and the coach emergency lights were too dim to provide adequate illumination.

The operation of the emergency lights in the cars after an accident are important for several reasons. First, sufficient illumination is necessary for the crew to assist injured passengers. Second, rescue personnel must have sufficient light to be able to locate passengers, conduct them to the triage area, and render medical assistance to those who need it. If the emergency lights are of such a low intensity that rescue personnel must depend on flashlights and lanterns for illumination, their value is negated. Third, sufficient light is needed so that passengers can evacuate the cars at night. The Granby accident occurred in a completely dark canyon in rural Colorado. Also, with the lights on passengers are less likely to become panicky. After the train comes to a stop, confidence is restored once passengers can see each other, the crew, rescue personnel, and the exits.

The Safety Board initially recommended improvements to emergency lighting systems in passenger cars in the Amtrak derailment at Emerson, Iowa, on June 15, 1982. 6/ As a result of its investigation of that accident, the Board issued Safety Recommendation R-83-25, which recommended that Amtrak:

5/ Railroad Accident/Incident Summary Reports--Derailment of Amtrak Passenger Train, The California Zephyr, Near Granby Colorado, April 16, 1985" (NTSB/RAR-85/01/SUM).

6/ Railroad Accident Report--"Derailment of Amtrak Train No. 5 (The San Francisco Zephyr) on the Burlington Northern Railroad, Emerson, Iowa, June 15, 1982" (NTSB/RAR-83/03).

> Evaluate and modify, as necessary, emergency lighting systems in passenger-carrying cars to better protect the functioning of emergency lights in emergency situations.

In a June 23, 1982, fire in a sleeping car of an Amtrak passenger train at Gibson, California, 7/ 2 passengers died, 2 passengers were seriously injured, and 57 passengers and 2 train crewmembers were treated for smoke inhalation. As a result of its investigation, the Safety Board issued Safety Recommendation R-83-66, which recommended that Amtrak:

> Install in each sleeping compartment and all passenger car hallways effective, low mounted emergency lights which provide a lighted escape path in the event of heavy smoke when an emergency evacuation is required.

In response to the Safety Board's recommendations, Amtrak stated:

> In a continuing effort to improve emergency lighting features, Amtrak will use invertor ballast direct current fluorescent lights in the new low level prototype cars. Construction of two sleeping cars and one dining car with this type of lighting is expected to begin in July 1985. If this type of emergency lighting proves to be more beneficial, we will include this lighting system in the new prototype coaches when they are built.
>
> Emergency lights remain dependent upon energy from the storage batteries. We believe that the existing type and placement configuration of storage batteries are adequate.

The Safety Board ultimately placed Safety Recommendation R-83-66 in a "Closed--Unacceptable Action" status since Amtrak does not intend to retrofit the existing fleet of passenger cars. The Board, however, continues to hold Safety Recommendation R-83-25 in an "Open--Unacceptable Action" status since we believe that modifications to the existing fleet are needed.

While improvements in emergency lighting may be and should be built into the new prototype coaches, the low-speed derailment near Granby, in which there was virtually no damage to the coaches (all but one passenger car remained on the tracks and yet a number of the emergency lights in the cars did not function), again demonstrates the need for improved emergency lighting in the existing fleet of passenger cars. Consequently, the Safety Board reiterates Safety Recommendations R-83-25 and -66 as they pertain to the existing fleet of Amtrak passenger cars.

Therefore, as a result of its investigation, the National Transportation Safety Board recommends that the National Railroad Passenger Corporation (Amtrak):

> Eliminate the vulnerability of the battery boxes supplying power for radio usage and lighting on its locomotives in a derailment by relocating them in the carbody, above the underframe of the locomotive units. (Class II, Priority Action) (R-85-125)

7/ Railroad Accident Report—"Fire Onboard Amtrak Passenger Train No. 11, Coast Starlight, Gibson, California, June 23, 1982" (NTSB/RAR-83/03).

Replace the existing mirrors in sleeping car compartments and coach lounges with shatterproof material. (Class II, Priority Action) (R-85-126)

Redesign and modify the coach and seatback cushions in the Heritage-class coaches to prevent their becoming dislodged when they are impacted from behind. (Class II, Priority Action) (R-85-127)

Develop and install effective retention devices on its overhead luggage racks to prevent the dislodging of luggage and other articles in a collision and/or derailment. (Class II, Priority Action) (R-85-128)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and LAUBER, Member, concurred in these recommendations.

By: Jim Burnett
Chairman