



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

Date: July 14, 1989

In Reply refer to: R-89-52 through -54

Honorable Travis P. Dungan  
Administrator  
Research and Special Programs Administration  
400 Seventh Street, S.W.  
Washington, D.C. 20590

About 11:44 a.m. central daylight savings time on July 30, 1988, Iowa Interstate Railroad Ltd. (IAIS) freight trains Extra 470 West and Extra 406 East collided head on within the yard limits of Altoona, Iowa, about 10 miles east of Des Moines, Iowa. All 5 locomotive units from both trains; 11 cars of Extra 406 East; and 3 cars, including 2 tank cars containing denatured alcohol, of Extra 470 West derailed. The denatured alcohol, which was released through the pressure relief valves and the manway domes of the two derailed tank cars, was ignited by the fire resulting from the collision of the locomotives. Both crewmembers of Extra 470 West were fatally injured; the two crewmembers of Extra 406 East were only slightly injured. The estimated damage (including lading) as a result of this accident exceeded \$1 million.<sup>1</sup>

In addition to the accident at Altoona, on July 30, 1988, four other rail equipment accidents in which damages exceeded \$150,000.00 have occurred on the IAIS since it began operations. One of the accidents involved the release of hazardous materials. Although each of the four accidents met the Safety Board's accident notification criteria, the Board was not notified of any of the accidents. The chief operating officer of the IAIS stated that he was not aware of the Safety Board's accident notification criteria. Testimony of the chief dispatcher indicated there were no written procedures or list of numbers to call in the event of any emergency. Although required by Federal regulations, the carrier failed to report the two accidents that involved the release of hazardous materials to the Research and Special Programs Administration (RSPA) of the U.S. DOT. The IAIS did file a rail equipment report with the Federal Railroad Administration (FRA) for each of the five accidents, and, according to the chief operating officer, the

<sup>1</sup>For more detailed information, read Railroad Accident Report: "Head-on Collision Between Iowa Interstate Railroad Extra 470 West and Extra 406 East with Release of Hazardous Materials near Altoona, Iowa on July 30, 1988" (NTSB/RAR-89/04).

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company official responsible for reporting to the FRA would also be responsible for reporting any hazardous materials reports.

Although RSPA has received hazardous materials incident reports filed by various carriers in which tank cars shipped by the Archer Daniels Midland's (ADM) Cedar Rapids plant have released hazardous materials, ADM's plant manager at Cedar Rapids stated that he had not received any formal notification from carriers regarding problems with tank cars loaded at his facility. The investigation of this accident revealed that IAIS had not planned to contact the shipper of the hazardous materials until urged to do so by a Safety Board investigator. The shipper has the responsibility under Federal regulations to properly prepare the hazardous materials for transportation. The Safety Board is concerned, however, that without specific direction, a carrier is not obligated to contact a shipper if a problem occurs during transportation with the shipper's tank car or other type of container. If shippers are unaware of problems involving their containers during shipment, they cannot be expected to take corrective action. Shippers could be easily notified of hazardous materials incidents involving their containers if the carriers provided the shippers with a copy of the Hazardous Materials Incident Report that carriers are now required to submit to RSPA. The Safety Board believes that such action would make shippers aware of problems, and urges RSPA to amend 49 CFR 71.16 to require carriers to provide the shippers with a copy of the written incident report submitted to RSPA.

Existing tank car design specifications in 49 CFR Part 179 do not address accident performance standards, particularly with respect to closure fittings on tank cars, or require that dynamic loads be calculated to determine if a tank car and its fittings can withstand the dynamic forces generated by liquid surging or sloshing in a derailment or overturning. Since calculation of the loading forces on the manways and other closures is not required or done as part of the tank design or approval process, the Safety Board could not determine if the dynamic forces generated in this accident exerted pressures that would have exceeded the rated pressures of the relief valves and the manways, had they been properly secured. Secondly, the performance of the pressure relief valves has been tested only in a vertical position. The performance of these relief valves in positions other than the vertical has not been proven, particularly since one pressure relief valve observed to be leaking in a horizontal position later performed nearly to manufacturer's specifications in a vertical position during the bench tests. The Safety Board believes that in accidents that are survivable by the rail tank, particularly with the small amount of structural damage as seen in this accident, it is reasonable to expect the closure fittings on the rail tank to maintain their integrity as well. Accordingly, the Safety Board urges that the FRA, with the cooperation and assistance of RSPA, amend 49 CFR Part 179 to require that closure fittings on hazardous materials rail tanks be designed to maintain their integrity in accidents that are typically survivable by the rail tank.

The ability to mount bolted supports for fittings such as pressure relief valves and or to secure bolted fittings such as manway openings to provide a liquid or vapor tight seal depends upon tightening the fastening

bolts not just so that they appear secure, but to the proper torque levels. Further, this requires the use of gaskets of the proper dimensions, thickness, and material. Therefore, the Safety Board also urges that the FRA, with the cooperation and assistance of RSPA, amend 49 CFR Part 179 to require that tank car designers and manufacturers determine and provide the specifications to secure closure fittings, such as minimum torque values for sealing bolted closures and gasket specifications.

When the crew of Extra 470 West made up the train in Newton on the morning of the accident, they failed to position properly the two alcohol tank cars. After setting out a car in Colfax, the crew again failed to reposition the two tank cars in the middle of the train leaving the two tank cars even closer to the locomotive. Since the cars immediately following the two tank cars did not derail during the collision, it is reasonable to assume that the two tank cars, had they been the fourth and fifth cars behind the locomotive upon leaving Newton, may not have derailed. Although the positioning of the tank cars was not a factor in the cause of the accident, the position of the tank cars resulted in their derailment, the subsequent release of hazardous materials, and the resulting fire. The release of the alcohol and the fire prolonged the duration of the emergency and increased risk to life and property. Further, the bodies of the crewmembers of Extra 470 West were found under the tank cars, and the autopsy reports attributed the cause of death to crushing. Since the Safety Board could not determine if the crewmembers of Extra 470 West jumped from their locomotive prior to the collision or were thrown from the locomotive during the collision sequence, the Safety Board could reach no conclusion concerning what role the positioning of the tank cars had in terms of the death of the crewmembers.

Federal regulations address the positioning of placarded tank cars in trains, and the IAIS had included these instructions in its timetable. Both the superintendent of operations and the assistant superintendent of operations at Newton stated, however, that, based on their interpretation of the regulations, the tank cars should have been the last two cars of the train. The Federal regulations as currently written, however, do not address the positioning of placarded tank cars in a caboosless train. The IAIS officials' interpretation of the regulations gives credence to the Safety Board's position that current regulations need to be revised to address the placement of tank cars carrying hazardous materials on caboosless trains.

The Safety Board believes that positioning placarded cars at the end of a caboosless train poses significant hazards. One purpose of positioning placarded cars in the middle of a train is to separate them from the occupied locomotive and caboose. With the elimination of cabooses, the rear of the train does provide the greatest separation from the crew in the locomotive. However, the Safety Board believes that there is a need to buffer placarded cars not only from head-on collisions but from rear-end collisions as well to protect the head-end crew of the striking train. The Safety Board has previously expressed concern about placement of hazardous materials cars at the rear of caboosless trains and recommended that RSPA:

R-87-17

Change the current railroad hazardous material car placement regulations in 49 CFR Part 174, Subpart D, to read "end-of-train" in lieu of "occupied caboose."

RSPA, in its response of March 1, 1988, to the recommendation, indicated that it would work with the FRA to develop and issue an Advance Notice of Proposed Rulemaking (ANPRM) on the subject of the safety recommendation. Based on this indication, the safety recommendation was classified as "Open--Acceptable Action" on April 25, 1988, pending the change in the regulations. As of this report, RSPA has not issued an ANPRM, and no date has been provided for the issuance of the ANPRM. In view of the lack of progress to achieve the intent of this safety recommendation, it is now being held in an "Open--Unacceptable Action" status.

Therefore, as a result of its investigation, the National Transportation Safety Board recommends that the Research and Special Programs Administration:

Establish procedures that require carriers reporting hazardous materials incidents under the provisions of 49 CFR 171.16 to notify shippers whose hazardous materials shipments are involved. (Class II, Priority Action) (R-89-52)

Assist and cooperate with the Federal Railroad Administration in amending 49 CFR Part 179 to require that closure fittings on hazardous materials rail tanks be designed to maintain their integrity in accidents that are typically survivable by the rail tank. (Class II, Priority Action) (R-89-53)

Assist and cooperate with the Federal Railroad Administration in amending 49 CFR Part 179 to require that tank car designers and manufacturers determine and provide the specifications to secure closure fittings, such as *minimum* torque values for sealing bolted closures and gasket specifications. (Class II, Priority Action) (R-89-54)

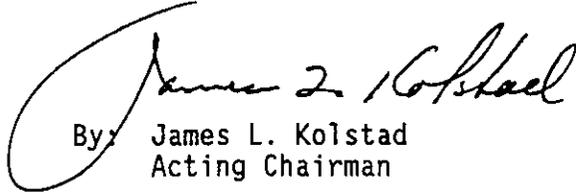
Also, the Safety Board reiterates the following safety recommendation:

Change the current railroad hazardous material car placement regulations in 49 CFR Part 174, Subpart D, to read "end-of-train" in lieu of "occupied caboose." (Class II, Priority Action) (R-87-17)

Also, the Safety Board issued Safety Recommendations R-89-37 through -44 to the Iowa Interstate Railroad; R-89-45 through -51 to the Federal Railroad Administration; R-89-55 to the Archer Daniels Midland Company; R-89-56 to the Chemical Manufacturers Association and the National Industrial Transportation

League; R-89-57 and -58 to the American Short Line Railroad Association; R-89-59 and -60 to the Association of American Railroads; and R-89-61 to the CSX Transportation Company, the Chicago North Western Transportation Company, and METRA.

KOLSTAD, Acting Chairman, and BURNETT, LAUBER, NALL, and DICKINSON, Members, concurred in these recommendations.



By: James L. Kolstad  
Acting Chairman