



# National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

*Log B-620B*

Date: February 12, 1990

In reply refer to: R-89-80

Honorable Samuel K. Skinner  
Secretary  
Department of Transportation  
400 7th Street, S.W.  
Washington, D. C. 20590

About 4:30 a.m. mountain standard time on February 2, 1989, freight cars from Montana Rail Link Inc. (MRL) westbound train 1-121-28 (train 121) rolled eastward down a mountain grade and struck a stopped helper locomotive consist, Helper 1, in Helena, Montana. The locomotive consist of train 121 included three helper units (Helper 2) and three road units positioned at the head end of a 49-car train. The crewmembers of train 121 had uncoupled the locomotive units from the train to rearrange the locomotive consist while stopped on a mountain grade. In the collision and derailment, 15 cars from train 121 derailed, including 3 tank cars containing hydrogen peroxide, isopropyl alcohol, and acetone. Hazardous material released in the accident later resulted in a fire and explosions. About 3,500 residents of Helena were evacuated. Two crewmembers of Helper 1 were only slightly injured. The estimated damage (including clean-up and lading) as a result of this accident exceeded \$6 million.<sup>1</sup>

The National Transportation Safety Board determined that the probable cause of this accident was the failure of the crew of train 1-121-28 to properly secure their train by placing the train brakes in emergency and applying hand brakes when it was left standing unattended on a mountain grade. Contributing to the accident was the decision of the engineer of Helper 2 to rearrange the locomotive consist and leave the train unattended on the mountain grade, and the effects of the extreme cold weather on the airbrake system of the train and the crewmembers. Also contributing was the failure of the operating management of the Montana Rail Link to adequately

<sup>1</sup> For more detailed information, read Railroad Accident Report-- "Collision and Derailment of Montana Rail Link Freight Train with Locomotive Units, and Hazardous Materials Release at Helena, Montana, February 2, 1989." (NTSB/RAR-89/05)

assess the qualifications and training of employees placed in train service. Contributing to the severity of the accident was the release and ignition of hazardous materials.

Since the existing tank car standards for hydrogen peroxide and flammable liquids such as isopropyl alcohol and acetone predate the existence of RSPA and DOT, they were developed under the authority of the ICC. As noted in the Safety Board's 1981 report on DOT's hazardous materials regulatory program,<sup>2</sup> the ICC relied upon and accepted industry-developed standards without analysis or established criteria. Consequently, the existing tank car standards for hydrogen peroxide, isopropyl alcohol, acetone, and most other hazardous materials were based upon industry-developed standards. While the performance history of tank cars transporting these products has generally been good, RSPA has not indicated that there has been any reassessment of these pre-DOT tank car standards. Since more and different hazardous materials are being shipped through more densely populated areas than in the past, a greater danger to the public exists. Thus safety factors considered, if any, when the industry standards were initially developed may no longer be appropriate.

The regulatory changes made by RSPA in the last 15 years have been in response to tank car accidents. These changes include vertical restraint couplers for all tank cars transporting hazardous materials and tank head protection for specification 105, 111, 112, and 114 tank cars transporting flammable gases, anhydrous ammonia, and ethylene oxide. The use of tank car performance history and accident analysis is a valid method, in part, for evaluating the adequacy of protection afforded tank cars with respect to the hazards of the product. However, RSPA's almost total reliance upon this method to modify tank car standards has placed RSPA in the position of continually reacting to individual safety problems rather than identifying in advance potential problems through safety analyses and developing solutions prior to an accident.

Determination of the degree of protection for tank cars transporting hazardous materials is most effectively accomplished through a safety analysis that determines: (1) the acceptable level of risks; (2) the level of risk from a release; and (3) the protection requirements needed to reduce identified risks to an acceptable level.

In a letter dated October 15, 1980, to the Materials Transportation Bureau (MTB) of RSPA concerning proposed specification 105 tank car standards, the Safety Board stated:

The amended request should call for information about the danger areas resulting from releases of various types of products in DOT 105 tank cars, the time in which danger areas evolve, the radius of exposure to people and property to the danger, and the ultimate

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<sup>2</sup>Safety Report (NTSB-SR-81-2).

harmful effects to those exposed persons and properties. With this information, and numerous models of dispersion patterns that are available...a 'probable harm' rank ordering of the different types of shipments in 105 tank cars could be devised.

When this type of ranking is developed, and available, a second step is needed. That step is to review these rankings and make a finding by the Secretary that the transportation of certain hazardous materials may pose unreasonable risk to health and safety or property....

Once the decision is reached that risks are unacceptably high action must be taken to reduce such risks to an acceptable level.<sup>3</sup>

In its 1981 safety report, the Safety Board further noted that as a result of its evaluation of DOT's efforts to assess the threat posed to the public safety from derailments of trains carrying hazardous materials:

DOT 112A/114A tank cars were designed by the tank car and railroad industries to maximize economies, and no specific safety methodology to determine unreasonable risk to the public was employed.

No adequate safety methodology has been developed by Federal regulatory agencies in order to determine risk for the transportation of hazardous materials by rail as a basis for regulation.<sup>4</sup>

Consequently, in December 1981, the Safety Board recommended that the Secretary, Department of Transportation:

I-81-12

Require the development of safety analysis guidelines and standards appropriate for identifying unreasonable transportation safety risks and require their use by all DOT Administrations when analyzing potential safety problems and evaluating the effectiveness of hazardous materials regulations.

In March of 1982, the DOT responded that due to the complexity of the DOT's hazardous materials safety programs and the realignment of staff and resources, this recommendation and five other related recommendations were still under review. In January 1983, the DOT advised the Safety Board that DOT would respond to the recommendation after further consideration with no date specified. DOT notified the Safety Board in June 1987, that RSPA had

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<sup>3</sup>NTSB letter dated October 15, 1980, to Materials Transportation Bureau, DOT, Comments on ANRPM "Shippers; Specifications for Tank Cars," Docket No. HM-175, Vol. 45 Federal Register p. 48668, July 21, 1980.

<sup>4</sup>Safety Report NTSB-SR-81-2, p. 12.

been directed to respond to the recommendation. In December 1987, RSPA responded by agreeing with the need for safety analyses, but only mentioned studies, selected rulemakings, and international standards work conducted in past years. In a March 1988 letter to DOT, the Safety Board stated it had not seen any changes to indicate that DOT was using safety analyses to identify hazards and evaluate the effectiveness of applied safeguards. Since DOT had failed to act upon and implement this recommendation, it was classified as "Closed--Unacceptable Action."

Although RSPA has a scheme for determining the hazard class to be assigned to a commodity with dual or multiple hazards, the scheme does not rank the various commodities on a basis of relative "probable harm" to those exposed to it. While these items may be a beginning, they do not constitute the safety analysis approach envisioned by the Safety Board. Implementation of such a safety analysis process would allow RSPA to identify potential safety problems in a more effective manner. Tank car performance history and accident analyses can then be used to continually evaluate the adequacy of the safety analysis decisions made.

Despite the assurances of the Secretary in 1983 that DOT would continue its review of the safety rules governing tank cars used for hazardous materials, the lack of any active or projected regulatory efforts does not suggest that the DOT is making such a review. Although the impact testing of aluminum tank cars is not yet completed, this program was initiated as a result of a previous Safety Board recommendation rather than a DOT-initiated review. DOT is again urged to initiate its review of its safety standards for the transportation of hazardous materials in rail tank cars by employing the safety analysis methods long advocated by the Safety Board. The DOT should first be able to identify which of the currently authorized product/tank car combinations fail to provide adequate protection of the public, and then be able to modify existing regulations to achieve an acceptable level of safety for each authorized product/tank car combination. Since DOT is presently conducting a review to develop national transportation policies and goals, the development and implementation of safety analysis methods to evaluate the transportation of hazardous materials in rail tank cars should be incorporated into this effort.

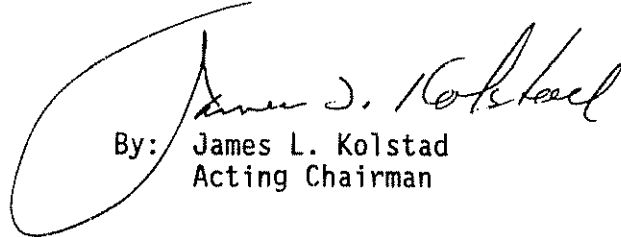
Therefore, the National Transportation Safety Board recommends that the Secretary, U. S. Department of Transportation:

Evaluate present safety standards for tank cars transporting hazardous materials by using safety analysis methods to identify the unacceptable levels of risk and the degree of risk from the release of a hazardous material, and then modify existing regulations to achieve an acceptable level of safety for each product/tank car combination. (Class II, Priority Action) (R-89-80)

Also as a result of its investigation of this accident, the Safety Board issued Safety Recommendations R-89-68 through R-89-77 to Montana Rail Link,

Inc., R-89-78 and R-89-79 to the Burlington Northern Railroad Company, R-89-81 and R-89-82 to the Federal Railroad Administration, R-89-83 to the Research and Special Programs Administration, R-89-84 through R-89-87 to the City of Helena, R-89-88 to the State of Montana, R-89-89 to the Lewis and Clark County Disaster and Emergency Services, and R-89-90 through R-89-92 to the Association of American Railroads.

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

  
By: James L. Kolstad  
Acting Chairman

