

LOG 584A



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

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Date: NOV 27 1995

In Reply Refer To: H-95-37

Honorable D.K. Sharma  
Administrator  
Research and Special Programs Administration  
Washington, D.C. 20590

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About 12:30 a.m., on July 27, 1994, a tractor cargo-tank semitrailer loaded with 9,200 gallons of propane (a liquefied petroleum gas) and operated by Suburban Paraco Corporation was traveling east on Interstate 287 in White Plains, New York. The truck drifted across the left lane onto the left shoulder and struck the guardrail; the tank hit a column of the Grant Avenue overpass. The tractor and the semitrailer separated, and the front head of the tank fractured, releasing the propane, which vaporized into gas. The resulting vapor cloud expanded until it found a source of ignition. When it ignited, according to an eyewitness, a fireball rose 200 or 300 hundred feet in the air. The tank was propelled northward about 300 feet and landed on a frame house, engulfing it in flames.

The driver was killed, 23 people were injured, and an area with a radius of approximately 400 feet was engulfed by fire.<sup>1</sup>

The National Transportation Safety Board has previously addressed its concerns about a cargo tank full of compressed gases failing catastrophically in an accident. In 1975, the Safety Board investigated a highway accident in Eagle Pass, Texas,<sup>2</sup> which involved the catastrophic failure of a tank carrying 8,748 gallons of propane. The tank separated from the tractor, struck a concrete head wall, and ruptured, releasing the propane. Fifty one people were burned in the ensuing fire; and of the 51, 16 died.

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<sup>1</sup>For more information, read Highway Accident Report--*Propane Truck Collision with Bridge Column and Fire, White Plains, New York, July 27, 1994* (NTSB/HAR-95/02).

<sup>2</sup>See Highway Accident Report--*Surtgias, S.A., Tank-Semitrailer Overturn, Explosion, and Fire, near Eagle Pass, Texas, April 29, 1975* (NTSB/HAR-76/4).

As a result of its investigation, the Safety Board recommended that the Department of Transportation:

Initiate a research program to identify new approaches to reduce the injuries and damages caused by the dangerous behavior of pressurized, liquefied flammable gases released from breached tanks on bulk transport vehicles (I-76-5).

In 1978, RSPA contracted for research<sup>3</sup> in this area, and the Board classified the recommendation "Closed--Acceptable Action."

In 1979, after a railroad derailment in Crestview, Florida,<sup>4</sup> that resulted in the failure of several rail tank cars carrying liquefied compressed gases, the Safety Board recommended that RSPA:

Expand current research into 'new approaches for controlling pressurized liquefied flammable gas releases' from breached tanks on bulk transport vehicles to include control of pressurized liquefied nonflammable ammonia and chlorine gas releases. (I-79-12).

In 1991, RSPA advised the Safety Board that the research program to find new approaches for controlling pressurized gas releases had been canceled several years earlier. RSPA noted that the research had not yielded any viable alternatives to railroad shelf-couplers, headshields, and thermal protection, all of which had proven effective in preventing product release. RSPA also noted that further research was not justified and requested that the recommendation be classified "Closed--Acceptable Alternative Action."

In an April 3, 1992, letter to RSPA, the Safety Board agreed that shelf-couplers, headshields, and thermal protection had dramatically improved safety when installed on rail tank cars and had reduced the number of catastrophic failures of pressurized tank cars. However, the Safety Board reminded RSPA, Safety Recommendation I-79-12 was an intermodal recommendation. The Board noted that RSPA had not addressed new approaches for controlling pressurized gas releases from breached highway cargo tanks. To further support the recommended research, the Safety Board told RSPA about the following highway accident investigations that involved the failure of cargo tanks carrying propane.

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<sup>3</sup>Contract DOT-RC-82039, September 26, 1978.

<sup>4</sup>See Railroad Accident Report--*Louisville & Nashville Railroad Company Freight Train Derailment and Puncture of Hazardous Materials Tank Cars, Crestview, Florida, April 8, 1979* (NTSB-RAR-79/11).

Date	Location	Burn Injuries	Fatal Burn Injuries
April 29, 1975	Eagle Pass, Texas	51	16
April 6, 1987	Lawrenceville, New Jersey	7	0
December 23, 1988	Memphis, Tennessee	23	9
January 20, 1992	Crawford, Mississippi	4	3

In the Lawrenceville and Memphis accidents, the front heads of the cargo tanks failed after they struck bridge structures. In the Crawford accident, the front head failed after the it struck another vehicle.

In the April 3 letter, the Safety Board again urged RSPA to do the recommended research. RSPA did not respond. Since there was no indication that RSPA had taken action to conduct the recommended research, on June 29, 1994, the Safety Board classified Safety Recommendation I-79-12 "Closed--Unacceptable Action."

On February 4, 1992, the Safety Board adopted a special investigation report on cargo tank rollover protection.<sup>5</sup> The report addressed the need to evaluate the forces that act on cargo tanks during rollover accidents and the need to establish performance standards for rollover protection devices based on analysis of those forces. As part of the special investigation, the Safety Board found that the National Aeronautics and Space Administration (NASA) had used computer analysis to improve the crashworthiness of cargo tanks used to transport rocket fuels. Special design features were incorporated into the cargo tank configuration to protect the tank in the following kinds of impact: a 55-mph frontal collision with an unyielding surface; a 55-mph lateral impact from another tractor-trailer weighing 80,000 pounds; and a rollover and 18-foot fall from an overpass.

The accident in White Plains again demonstrates the destructive potential of a cargo tank carrying flammable compressed gases when it catastrophically fails during a highway accident. The Safety Board is concerned about the adequacy of minimum construction requirements that allow a front tank head to be 33 percent thinner than the tank barrel. In rollover or jackknife accidents, the front head is vulnerable to collision with fixed objects. Therefore, the Safety Board concludes that the front head on a cargo tank is vulnerable to being damaged and subsequently releasing the cargo.

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<sup>5</sup>See Hazardous Materials Special Investigation Report, *Cargo Tank Rollover Protection*, February 4, 1992, (NTSB/SIR-92/01).

The Safety Board has previously recognized the effectiveness of headshields in reducing tank head punctures in train derailments and the efforts of NASA to design a front head impact limiting system for highway cargo tanks it uses to transport rocket fuels. The Safety Board could not determine whether it is reasonable to design tank heads that could have withstood the impact forces involved in this accident. The Safety Board believes that the Federal Highway Administration and RSPA should research methods and develop standards to improve the crashworthiness of front heads on cargo tanks used to transport liquefied flammable gases and potentially lethal nonflammable compressed gases.

The National Transportation Safety Board therefore issues the following safety recommendation to the Research and Special Programs Administration:

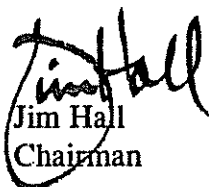
In cooperation with the Federal Highway Administration, study methods and develop standards to improve the crashworthiness of front heads on cargo tanks used to transport liquefied flammable gases and potentially lethal nonflammable compressed gases. (Class II, Priority Action) (H-95-37)

Also, the Safety Board issues Safety Recommendations H-95-32, -33, -34, -35, and 36 to the Federal Highway Administration, Safety Recommendation H-95-38 to the New York State Department of Transportation, Safety Recommendation H-95-39 to the American Association of State Highway and Transportation Officials, Safety Recommendation H-95-40 to the American Association of Motor Vehicle Administrators, Safety Recommendation H-95-41 to the American Trucking Associations, Inc., and Safety Recommendations H-95-42 and -43 to Paraco Gas Corporation, Inc. The Safety Board reiterates Safety Recommendations H-94-5, H-95-3, and H-95-5 to the Federal Highway Administration.

The Safety Board is vitally interested in any action taken as a result of its safety recommendations. Therefore, it would appreciate a response from you regarding action taken or contemplated with respect to the recommendation in this letter. Please refer to Safety Recommendation H-95-37 in your reply. If you need additional information, you may call (202) 382-6813.

Chairman HALL, Vice Chairman FRANCIS, and Members HAMMERSCHMIDT and GOGLIA concurred in these recommendations.

By:

  
Jim Hall  
Chairman