



NATIONAL TRANSPORTATION SAFETY BOARD
DEPARTMENT OF TRANSPORTATION

WASHINGTON, D.C. 20591

7-7-70

**OFFICE OF
THE CHAIRMAN**

Sent To AAR, President of Most Railroads:

The National Transportation Safety Board has been conducting an investigation of the accident on June 21, 1970, in which 12 tank cars of liquefied petroleum gas were involved in the derailment of a Toledo, Peoria, and Western freight train at Crescent City, Illinois. In this accident, 10 of the cars burned and/or exploded, rocketed long distances, destroyed much of the town of Crescent City, and injured more than 65 persons. The Safety Board believes prompt corrective action is required to reduce the probability of similar catastrophic accidents, and to minimize the resultant casualties and damage.

All of the tank cars involved in the Crescent City accident were of similar construction: a type of car having a capacity exceeding 25,000 gallons, designed without a center sill frame so that the tank itself serves as supporting frame of the car. These tanks are approved by the Department of Transportation under DOT Specifications 112A and 114A for the transport of liquefied flammable gas by rail.

The accident at Crescent City is at least the fourth in which tank cars of this design exploded and rocketed long distances. This and similar accidents prove that this type of car can explode or rocket when loaded with other liquefied flammable gases. In the Crescent City accident, the puncturing of one tank caused a fire which spread to other tanks jammed together by the derailment. Some tanks exploded as a result of the heat of nearby burning cars and produced enormous fire balls. Some of the tanks ruptured circumferentially, cutting the car in half near the center since there was no separate frame. The expanding gas then propelled the two ends by the jet reaction of the expanding gas, as much as 2,000 feet from the tracks. One section, estimated to weigh 15 tons, produced a fire trail more than 50 feet wide over one and one-half blocks before the 10-foot diameter tank finally crashed through the wall of a house.

Similar behavior of this type of tank car is described in the Safety Board's report of the accident at Laurel, Mississippi, on January 25, 1969. The Laurel accident also occurred in a residential area and resulted in two fatalities, 33 serious injuries, destruction of 54 residences, and damage to more than 1,350 residences. Other accidents involving this type of tank car in large scale explosions and rocketing occurred in open country near Battelle, Alabama, in January 1969, and near Pringle, Texas, in March 1969. In the Laurel and Crescent City accidents, major parts of tank cars, weighing in excess of 15 tons, were propelled long distances at great heights. The maximum trajectories in these accidents were: Laurel, Mississippi, 1,600 feet; Crescent City, Illinois, 2,000 feet; and Battelle, Alabama, 1,900 feet.

The accident causes in the railroad derailments are varied; however, the factors which brought catastrophe to Crescent City and Laurel, are quite similar. First, the violence of the derailments jammed a number of high capacity propane tanks together so that fire effects from one tank could spread to an adjoining tank, producing a fire which could not be approached safely. The large amount of propane released in the explosions produced rapid spread of the fire near the railroad tracks. At Laurel, Mississippi, the speed at derailment was 30 m.p.h.; at Crescent City, the speed was 49 m.p.h. These speeds tend to pile up adjacent cars. Second, the rocketing phenomenon is almost unique to this type of tank. Because there was no underframe (center sill), the tank ends could separate completely, so that they were free to be propelled by the jet reaction effect.

Cars carrying other liquified flammable gases such as vinyl chloride and butadiene have also exhibited this same explosion phenomenon at Dunreith, Indiana; East Germantown, Indiana; and Glendora, Mississippi. Although there are no examples of large scale catastrophes involving large numbers of these cars, they are susceptible to involvement in this type accident. They are potentially as dangerous as those carrying liquefied petroleum gas.

The Safety Board, in its October 6, 1969, report of the accident at Laurel, Mississippi, recommended that the Department of Transportation develop a cooperative program with the Association of American Railroads, manufacturers of tank cars, and producers and shippers of hazardous materials to develop a full range of technical improvements to completely resolve the problems noted above. We are aware that the Railway Progress Institute, the Association of American Railroads, and major tank car builders and lessors recently jointly announced the launching and funding of a joint research program to find ways to improve the protection level for tank cars under abnormal conditions such as at Crescent City. Even though this work is in process, the accident at Crescent City indicates that interim solutions to prevent the hazards posed by this type tank car are urgent while studies and research are pursued and more permanent solutions are sought.

In addition, the Crescent City disaster resulted in severe burns to firefighters who were fighting the initial fire at close range when the tanks of propane exploded. It was noted that the evacuation of persons near the track prevented an even larger number of casualties. The Board believes that this type of accident requires immediate evacuation and that the need for such evacuation should be made known to public authorities throughout the Nation. In its report of the accident which occurred at Dunreith, Indiana, on January 1, 1969, the Safety Board recommended to DOT that special training should be provided for local fire departments. Additional similar recommendations to the Association of American Railroads were made in the Safety Board's report of the accident at Laurel, Mississippi. The Crescent City accident once again demonstrates that when such large-scale accidents occur, local firefighters are still exposed to a high degree of risk due to their lack of immediate knowledge as to the best procedures for fighting the fire.*

*An example of commendable voluntary action taken in his regard is the creation by the Southern Railway Company of hazardous materials "GO TEAMS" with special training and equipment to combat hazardous materials accidents. These teams are touring their entire system, informing fire departments of the problems involved in the release of hazardous materials.

We understand that the General Committee of the Operating - Transportation Division of the Association of American Railroads will consider these problems as part of their agenda at their regular meeting on July 9, 1970. The Board hopes that a positive program for prompt corrective action will result from this meeting. The long-term correction of this explosion and rocketing tendency depends on research and development, including full-scale testing such as the Board recommended in its report of the Laurel accident. We recommend to the Association of American Railroads and to all railroads, that the following interim and long range actions be considered:

1. Appropriate control of the speeds of trains containing DOT Specifications 112A and 114A tank cars exceeding 25,000 gallons when such cars transport liquefied flammable gases. Southern Railway limited speeds to 15 miles per hour through towns after the Laurel accident.
2. When practicable, cars of DOT Specifications 112A and 114A exceeding 25,000 gallons capacity carrying flammable liquefied gases, should be separated by cars containing commodities not regulated under 49 CFR 171-179, inclusive, or noncombustible commodities regulated under 49 CFR 171-179, inclusive.
3. As feasible, reduce the use of the above type cars in transporting liquefied flammable gases.
4. Steps be taken to advise local firefighters of the hazards when they are combatting fires in the vicinity of burning tank cars containing liquefied flammable gases and of the need for the evacuation of persons.
5. Modification of DOT Specifications 112A and 114A for tank cars exceeding 25,000-gallon capacity so that they can safely carry liquefied flammable gases.

The Board wishes to commend the Association of American Railroads for establishing a full time director of safety in their Safety Section. We are confident that industry leaders recognize the critical nature of the problem described in this letter and we are hopeful that positive corrective action will be taken at your meeting this week. We would appreciate being advised of the interim and permanent steps proposed to be taken by the Association of American Railroads, the General Committee, and the individual railroads.

Sincerely yours,

/s/John H. Reed
Chairman