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UNITED STATES OF AMERICA

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C.

ISSUED: December 27, 1971

Adopted by the NATIONAL TRANSPORTATION SAFETY BOARD
at its office in Washington, D. C.
on the 13th day of December 1971.

FORWARDED TO:

State Fire Marshals

SAFETY RECOMMENDATION R-71-38

The National Transportation Safety Board issues the following information and warning as an advisory, pending the completion of the investigation and further analysis of the facts and circumstances of the derailment of Missouri Pacific Railroad Company Freight Train No. 94 at Houston, Texas, on October 19, 1971.

This freight train derailed at Houston, Texas. As the result, 16 cars piled up in the general derailment area. Included were six tank carloads of vinyl chloride, three of fuel oil, one each of acetone, butadiene, and formaldehyde. Vinyl chloride, which escaped from a damaged 48,000-gallon tank car, ignited immediately following the initial derailment.

The Houston Fire Department responded to the scene within a few minutes after the derailment occurred and took steps to control the fire with water. Forty-five minutes after the initial derailment, a second car, containing vinyl chloride, ruptured violently. This abrupt explosion and the subsequent fire resulted in fatal injury to one fireman and burns or injuries to approximately 37 other firemen, reporters, photographers, and spectators. Large sections of a tank car were found approximately 400 feet from the derailment site after the explosion.

The circumstances of this accident are markedly similar to those of the accident that occurred at Crescent City, Illinois, on June 21, 1970. At Crescent City, a 15-car derailment resulted in the initial release of propane from one of the nine cars containing this commodity. Fire ensued immediately thereafter, and fire departments responded to the scene and attempted to fight the fire. Subsequent explosions occurred during a period ranging from approximately 1 to 4 1/2 hours after the initial derailment. Large portions of the involved tank cars "rocketed" up to 1,700 feet from the accident site. Sixty-six firemen, reporters, and photographers were injured as the result of the subsequent explosions. A photograph of the explosion is shown in Appendix No. 2.

The Safety Board has investigated other railroad accidents involving hazardous material where tank cars have exploded and rocketed. A synopsis of the pertinent details of these accidents is included as Appendix No. 1.

Generally, those accidents that have resulted in casualties to emergency service personnel or onlookers have had two distinguishing characteristics, namely:

1. Several tank cars lay adjacent to one another in the wreckage.

2. Fire ensued, enveloped one or more tank cars, impinging upon other relatively undamaged tank cars containing hazardous materials.

These accidents demonstrate that whenever a railroad accident involving several adjacent tank cars occurs, the presence of fire substantially increases the probability of additional flareups or explosions. The reduction in property damage achieved by fire suppression methods used in past accidents, has been generally insufficient compared to the risk assumed of injury and death when acting with inadequate or improper information as to the contents of tank cars.

The risks, however, should be studied as closely as possible in the particular circumstances present, before initiating fire suppression efforts to save the product or other property. Necessary information for this decision-making process should include the rapid identification of all commodities involved, the determination of the firefighting methods by which the risks associated with these commodities can be controlled, and whether the resources needed to cope effectively with the situation are available.

In the absence of the information necessary for an evaluation of the risks of explosion or rocketing in a fire involving several tank cars, a prudent course of action may be the complete evacuation of the area within a radius of 2,000 feet. Exposure of emergency personnel to abrupt flareups or explosions can be kept to the absolute minimum by this method when no other persons or minimal property are at risk. Under no circumstances should spectators be allowed in the potential danger radius of 2,000 feet. However, it is not possible to give all-inclusive advice concerning the degree of risk which should be taken to fight the fire in such accidents because there are so many variables involved. For example, there may be tank car fires in the vicinity of hospitals, schools, or other occupied premises which cannot be evacuated quickly.

Research work to correct the problem of exploding and rocketing tank cars has been underway in the Department of Transportation and the railroad industry since shortly after the accident at Laurel, Mississippi, on January 25, 1969. The problem is potentially reducible by technical changes which are under study.

Because the Safety Board believes the need for additional knowledge for the control of tank car fires is crucial, we held a public hearing in Houston, Texas to gather facts concerning the derailment, fire, and explosion of Missouri Pacific Train No. 94 that occurred October 19, 1971.

Therefore this information and advisory warning is issued as an alert to the potential hazards of tank car derailments.

Reed, Chairman, Laurel, McAdams, Thayer, and Burgess Members, concurred in the above recommendation.

By: John H. Reed
Chairman

Enclosures

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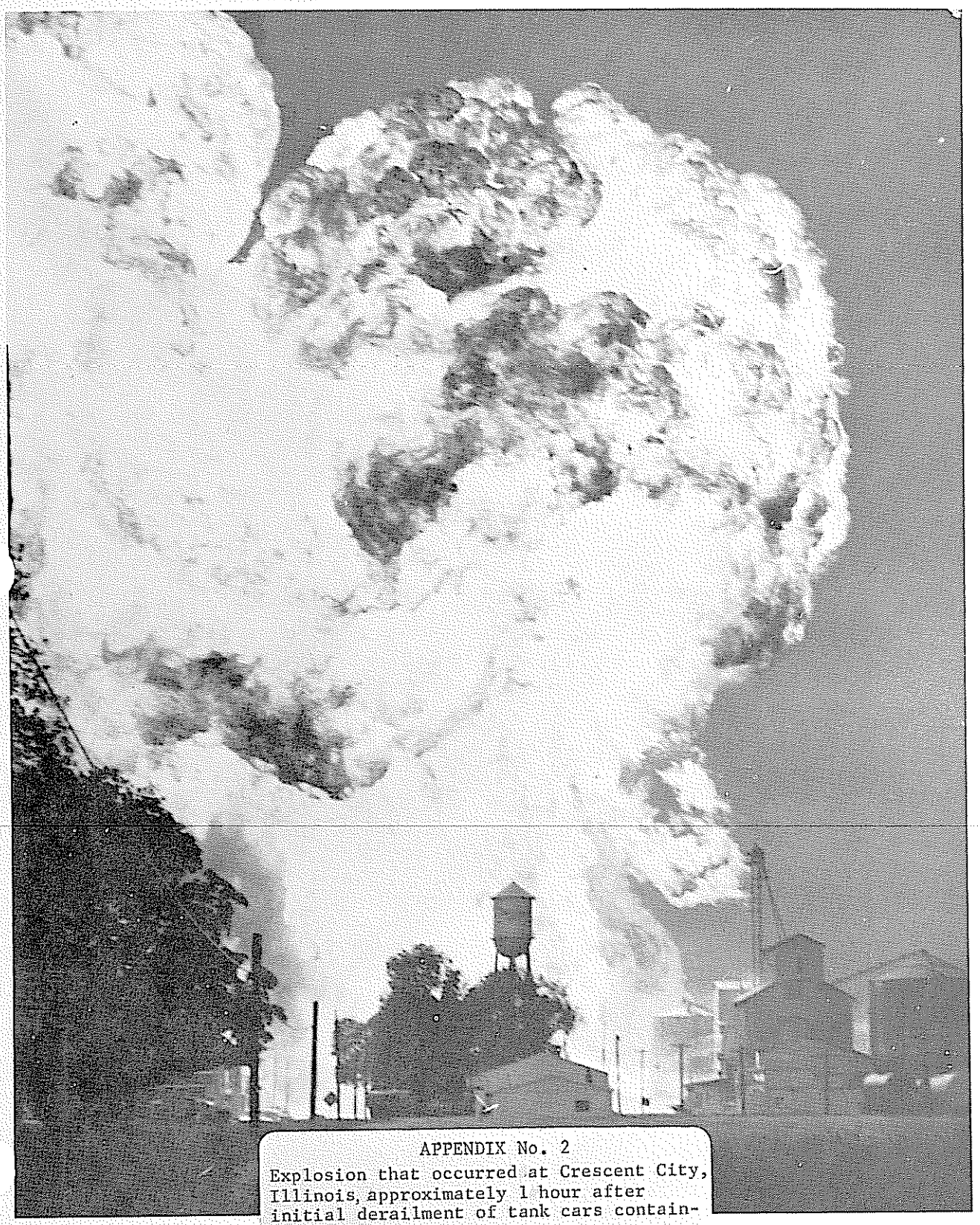
APPENDIX NO. 1

SYNOPSIS OF RAILROAD TANK CAR HAZARDOUS MATERIAL ACCIDENTS INVESTIGATED
by
The NATIONAL TRANSPORTATION SAFETY BOARD

Date of Accident	Location	Number of Cars in General Derailment	Number of Tank Cars Derailed	Time Between Initial Derailment and Subsequent Explosions	Contents of Tank Cars	No. of Fatalities	No. of Injuries	Types of Casualties	Distances Portions of Tank Cars "Rocketed"
Jan. 1, 1968	Dunreith, Indiana	14	6	45 Minutes	Acetone, cyanohydrin, methyl methacrylate vinyl chloride, ethylene oxide	0	5	Firemen and police	700 feet
Jan. 25, 1969	Laurel, Mississippi	15	15	Immediate	Liquefied petroleum gas	3	32	Residents	1,600 feet
Feb. 18, 1969	Crete, Nebraska	31	3	Immediate*	Anhydrous ammonia	9	53	Residents and transients	200 feet
Sept. 11, 1969	Glendora, Mississippi	15	10	5½ hours and 16 hours	Vinyl chloride and fuel additive	0	1	Power company serviceman	850 feet
June 21, 1970	Crescent City, Illinois	15	9	1 hour to 4½ hours	Propane	0	66	Firemen, reporters, photographers	1,700 feet
Oct. 19, 1971	Houston, Texas	16	12	45 Minutes	Vinyl chloride, fuel oil, acetone, butadiene, formaldehyde	1	37	Firemen, reporters, photographers, spectators	400 feet

*No fire. Brittle fracture of tank car in crash allowed instantaneous release of entire cargo of ammonia, producing poisoning. However, similar hazard in fire exists.



APPENDIX No. 2

Explosion that occurred at Crescent City, Illinois, approximately 1 hour after initial derailment of tank cars containing propane