DEPARTMENT OF TRANSPORTATION
HAZARDOUS MATERIALS REGULATIONS BOARD
WASHINGTON, D.C. 20590

[49 CFR Parts 173, 179]

[Docket No. HM-125; Notice No. 75-4]

PROHIBITION OF NEW CONSTRUCTION OF SPECIFICATION DOT-112A AND 114A UNINSULATED PRESSURE TANK CAR TANKS

Transportation of Hazardous Materials

The Hazardous Materials Regulations Board is considering amending §§ 173.314 and 179.101 of the Department's Hazardous Materials Regulations to prohibit new construction of Specification DOT-112A and 114A uninsulated pressure tank car tanks for use in the transportation of hazardous materials.

Since 1958 there have been a series of disastrous railroad accidents involving these uninsulated pressure tank cars transporting liquefied flammable compressed gases. During these accidents tank cars were readily punctured, enormous quantities of gas were released and ignited. The flames in turn overheated adjacent, similarly laden, tank cars causing them to rupture, burn and "rocket" for considerable distances. One such disastrous accident occurred at [illegible]rel, Mississippi, on January 25, 1969, [illegible]13 of 15 LP Gas laden 112A tank [illegible]olently ruptured and rocketed causing the death of three townspeople, and injuries to over 30 others, and property damage totalling millions of dollars. On June 21, 1970, at Crescent City, Illinois, rupturing tank cars of the 112A Specification resulted in injuries to approximately 10 persons; and again on October 1971, in Houston, Texas, ruptured tank cars of a flammable compressed gas caused the death of one fireman and injured approximately 35 firemen and newsmen on the scene. Many other accidents have occurred which have presented severe hazardous conditions for the public and emergency response personnel. On February 11, 1974, near Oneonta, New York, ruptured and overheated 112A specification tank cars caused injuries to over 50 persons, primarily firefighters who were endeavoring to control the fires.

At Decatur, Illinois, on July 19, 1974, a DOT 114A tank car was punctured in a switching accident resulting in a gas-air blast that injured 130 people and killed seven. Again at Houston, Texas, on September 21, 1974, a switching accident resulted in a similar explosion that killed one person and injured 150 persons.

A summary of the accidents reported to DOT, covering accidents involving DOT Specification 112A and 114A uninsulated tank cars from January 1, 1969, to date, reveals that there were 192 acci[illegible]nvolving 434 DOT 112A or 114A [illegible]which resulted in 68 head punc[illegible], 13 shell punctures, 59 tank ruptures and a total of 156 had loss of lading. Twenty-three persons were killed and 936 injured as a result.

Prior to the introduction of 112A and 114A uninsulated tank cars liquefied compressed gases were transported exclusively in Specification 105A insulated tank cars. It is estimated that approximately 22,000 112A and 114A uninsulated pressure tank cars are in service today, compared to the approximately 33,000 Specification 105A insulated tank cars in hazardous materials service. Although there are less 112A/114A than 105A tank cars in service, the RPI-AAR Tank Car Safety Research and Test Project reports (for 1965-1970) indicate that more than twice as many 112A/114A tank cars were damaged, as compared to 105A tank cars, and that five times as many 112A/114A tank cars ruptured.

The relative utilization for both the 112A/114A tank cars and the 105A tank cars has been considered. The utilization factor was considered in order to determine whether the higher utilization of 112A/114A tank cars, as compared to 105A tank cars, would serve to explain the higher rate of accidents being experienced by the 112A/114A tank cars. Data, submitted in connection with the audited carload waybill sampling project of the FRA, was reviewed to provided information concerning the relative utilization of both types of cars. The information obtained from this data did not support the concept that the higher utilization of 112A/114A tank cars would serve to explain the higher rate of accidents being experienced by the 112A/114A tank cars.

FRA accident data accumulated during the period of January 1, 1969, through December 31, 1974 indicates that:

	112A/114A	105A
Number of accidents reported to FRA	193	101
Number of cars derailed and/or damaged	434	213
Number of cars sustaining a head puncture	68	12
Number of cars sustaining a shell puncture without a head puncture	13	5
Number of cars ruptured without puncture	59	8
Number of tanks sustaining partial or total loss of hazardous lading	156	39
Number of persons killed as a result of tanks being punctured or ruptured	23	0
Number of persons injured	936	151

Available data has shown 105A tank cars to be substantially superior to 112A/114A tank cars from a safety standpoint. (Many of the 105A tank car ruptures occurred as a result of chemical detonation of the lading rather than by a weakening of the shell due to overheating, or puncture.) In fact, extremely hazardous commodities such as Motor Fuel Anti-Knock Compound and Ethylene Oxide, which may detonate if exposed to high temperatures, are required to be carried in insulated tank cars.

As a result of unintentional release of liquefied petroleum gas from 112A/114A tank cars during train accidents, the Railway Progress Institute and the Association of American Railroads have undertaken a multi-million dollar joint research program to evaluate the conditions leading up to tank car puncture and rupture (tank "rocketing"), and to develop improvements to eliminate this safety problem.

The Federal Railroad Administration and the Hazardous Materials Regulations Board have already taken regulatory action to improve tank car safety by requiring protective head shields on DOT Specification 112A and 114A uninsulated tank car heads to reduce the incidence of head punctures on tank cars carrying liquefied compressed gases (HM-109). In addition, FRA is closely monitoring tank car operations. The Administrator issued FRA Emergency Order No. 2 (37 FR 28311) prohibiting further use of certain uninsulated pressure tank cars found to have a structural inadequacy which results in tank shell cracking and possible leakage of hazardous lading. These cars were not permitted to be returned to service until this structural inadequacy has been corrected by modification of these cars (39 FR 2124).

In an effort to improve tank car safety by way of regulatory operating practices, the FRA issued Emergency Order No. 5 on October 25, 1974, prohibiting the free switching of all 112A and 114A tank cars transporting flammable compressed gas. By requiring controlled coupling of such tank cars, the FRA has moved to decrease the danger of head punctures in train yard operations.

The Federal Railroad Administration is also undertaking research efforts in this area to improve tank car safety. The FRA program is a multi-faceted research program aimed at determining the failure modes of these type tank cars and solutions to eliminating these safety problems. Theoretical and experimental studies of one-fifth scale and full size tank cars to determine and evaluate their performance in fires are underway. Torching as well as enveloping fires are being studied and various insulating materials are being evaluated to develop specifications for "thermal shielding" to prevent tank overheating and "rocketing." Fire tests have shown that the application of a "thermal shield" (insulation) will extend the survival time of a propane laden tank car subject to a pool fire from twenty-five minutes to ninety minutes. This extra time will give firefighters a better chance to cool the tank car surface and prevent impingement of the tank and an explosion. In addition, the "thermal shield" reduces the severity of those tank explosions which do occur.

Likewise, metallurgical analysis is also being conducted by the FRA on the materials used in the construction of tank cars. The objective of this study is to develop new specifications for tank shell steel and better design attachments to the tank shell. Theoretical structural stress analysis is being performed to obtain a better understanding of a tank car as a structure.

Also, the relief capacity of spring loaded safety relief devices is being measured in both the vapor and in the liquid stages to determine the actual flow capacity of existing tank car relief devices. The existing equations for sizing relief valve flow may be inadequate for uninsulated pressure tank cars. This testing will lead to new design criteria for sizing of the relief valves used for these cars. Additionally, a new FRA-AAR/RPI test facility will afford industry a place to test and certify new safety relief devices.

While the Board is aware of these research efforts and agrees that significant results will be developed from them, the Board is concerned that existing uninsulated pressure tank cars built to DOT specifications present a great public danger of propane tank car fires and subsequent explosions. The Board recognizes that removing all 112A and 114A tank cars from this service would intensify the national energy crisis and severely restrict the rail movement of fuels, fertilizers, chemicals, and liquefied compressed gases. The Board also realizes that improved operating practices, headshields and thermal shielding will greatly reduce the hazards inherent in 112A and 114A tank cars as currently constructed. However, the Board feels that new construction of 112A and 114A tank cars should be prohibited until a new design or type of car is developed. Accordingly, the Board proposes to prohibit new construction of Specification DOT 112A and 114A tank cars for the transportation of hazardous materials after December 31, 1975.

Pursuant to the provisions of section 102(2)(c) of the National Environmental Policy (42 U.S.C. 4321 et seq.), the Board has considered the requirements of that Act concerning Environmental Impact Statements and has determined that the amendments proposed in this notice would not have a significant impact upon the environment. Accordingly, an Environmental Impact Statement is not necessary and will not be issued with respect to the proposed amendments.

In consideration of the foregoing, it is proposed to amend 49 CFR Parts 173 and 179 as follows:

PART 173—SHIPPERS

I. In § 173.314 paragraph (c), Note 24 would be added following the Table and reference thereto would be added each time Spec. DOT 112A and 114A tank cars appear in the column headed "Required tank car, see § 173.31(a) (2) and (3)":

§ 173.314 Requirements for compressed gases in tank cars.

* * * * *

(c) * * *

NOTE 24: Use of existing tank cars authorized, but new construction after December 31, 1975, not authorized.

PART 179—SPECIFICATIONS FOR TANK CARS

II. In § 179.101-1 paragraph (a), footnote 12 would be added following the Table and reference thereto would be added in the following column headings:

§ 179.101 Individual specification requirement applicable to pressure tank car tanks.

§ 179.101-1 Individual specification requirements.

(a) * * *

112A500W [12]	112A500W [12]
112A340W [12]	114A340W [12]
112A400F [11, 12]	114A400W [12]
112A400W [12]	

[12] Now construction not authorized after December 31, 1975.

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Interested persons are invited to give their views on this proposal. Communications should identify the docket number and be submitted in duplicate to the Secretary, Hazardous Materials Regulations Board, Department of Transportation, Washington, D.C. 20590. Communications received before May 30, 1975, will be considered before final action is taken on the proposal. All comments received will be available for examination by interested persons at the Office of the Secretary, Hazardous Materials Regulations Board, Room 6215, Trans Point Building, Second and V Streets, SW., Washington, D.C. both before and after closing date for comments.

(Transportation of Explosives Act, 18 U.S.C. 831-835, sec. 6, Department of Transportation Act, 49 U.S.C. 1655.)

Issued in Washington, D.C. on April 16, 1975.

R. H. WRIGHT,
Acting Associate Administrator for Safety, Federal Railroad Administration, and Member, Hazardous Materials Regulations Board.

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