

DEPARTMENT OF TRANSPORTATION**Research and Special Programs Administration****49 CFR Part 173**

[Docket No. HM-175A; Notice No. 90-8]

RIN 2137-AB89

Specifications for Tank Car Tanks

AGENCY: Research and Special Programs Administration (RSPA), Department of Transportation (DOT).

ACTION: Advance notice of proposed rulemaking.

SUMMARY: RSPA and the Federal Railroad Administration (FRA) are considering the development of regulations that would improve the level of safety of tank car tanks. The intended effect of such regulations would be a reduction in the risk of violent rupture and release of hazardous materials when tank car tanks are involved in accidents. This notice solicits comments on the costs and safety benefits that would be derived should the Hazardous Materials Regulations (HMR; 49 CFR parts 171-180) be amended to: (1) Require thermal protection or head protection, or both, on new and existing tank car tanks that are constructed of aluminum or nickel, or that are used to transport certain hazardous materials; (2) disallow the use of the half-head shield as an option to meet head protection requirements; (3) prohibit the use of tank car tanks that have a manway opening located below the liquid level of the material transported; (4) disallow the use of so-called "non-pressure" tank car tanks to transport materials poisonous by inhalation; (5) increase the start-to-discharge pressure setting on certain tank car tanks; (6) establish specifications for the securement and accident survivability of tank car tank closure fittings; and (7) phase out certain "grandfather" provisions. This notice also solicits comments on what operational changes or design modifications should be considered in place of the retrofitting of tank car tanks that do not conform to the safety requirements for new tank car tanks.

DATES: Comments must be received on or before August 21, 1990.

ADDRESSES: Address comments to the Dockets Unit, Research and Special Programs Administration, Department of Transportation, Washington, DC 20590-0001. Comments should identify the docket and notice number and be submitted in five copies. If confirmation of receipt of comments is desired,

include a self-addressed stamped postcard showing the docket number (i.e., Docket HM-175A). The Dockets Unit is located in Room 8417 of the Nassif Building, 400 7th Street SW., Washington, DC 20590-0001. Public dockets may be reviewed between the hours of 8:30 a.m. and 5 p.m., Monday through Friday, except holidays.

FOR FURTHER INFORMATION CONTACT: Philip Olekszyk, Deputy Associate Administrator for Safety, Federal Railroad Administration, RRS-2, Washington, DC 20590-0001, Telephone (202) 368-0897.

SUPPLEMENTARY INFORMATION:**Background**

In the 1960's and 1970's, there were a number of serious accidents involving the rail transportation of hazardous materials in tank car tanks. In response to these accidents, the Department of Transportation (DOT) commenced a review of the tank car tank specifications. As a result of this review, three rulemakings were promulgated. On September 15, 1977, a final rule in Docket HM-144 (42 FR 48306) was published which required that (1) new and existing class DOT 112 and 114 tank car tanks transporting flammable gases be equipped with thermal protection (large capacity safety relief valves and high temperature thermal insulation), head protection (puncture protection for the lower half of the tank car tank heads), and coupler vertical restraint systems (i.e., shelf couplers); (2) new and existing class DOT 112 and 114 tanks transporting anhydrous ammonia be equipped with head protection and shelf couplers; and (3) new and existing class DOT 112 and 114 tanks transporting other commodities be equipped with shelf couplers.

On January 29, 1981, a final rule in Docket HM-174 (46 FR 8005) was published which required that (1) new class DOT 105 tanks transporting flammable gases be equipped with thermal protection, head protection, and shelf couplers; (2) new class DOT 105 tanks transporting anhydrous ammonia be equipped with head protection and shelf couplers; and (3) new and existing DOT specification tank car tanks transporting other commodities be equipped with shelf couplers. The preamble of the latter final rule noted that DOT had considered, but rejected, requiring full tank head protection instead of allowing half-head shields. The majority of commenters to the HM-174 rulemaking opposed a full-head protection requirement on the basis that the Federal Railroad Administration (FRA) did not identify any accident

where a car equipped with shelf couplers and half-head shield had failed to protect the tank head. In response to these commenters, DOT agreed that there was not at that time any clearly identifiable additional margin of safety provided by a full tank head puncture resistance system that would warrant federally mandating the full tank head protection system. However, DOT noted with approval some evidence of an evolving industry practice to provide full tank head protection.

On January 27, 1984, a final rule in Docket HM-175 (49 FR 3468) was published which required that (1) existing class DOT 105 and 111 tanks (with capacities exceeding 18,500 gallons) transporting flammable gases be equipped with thermal protection, head protection, and shelf couplers and (2) existing class DOT 105 tanks (with capacities exceeding 18,500 gallons) transporting anhydrous ammonia be equipped with head protection and shelf couplers. In the preamble to the latter final rule, it was noted that FRA and the Research and Special Programs Administration (RSPA) would continue to evaluate the need for new rules for tank car tanks used for hazardous materials.

The primary thrust of the rulemakings published under Dockets HM-144, HM-174, and HM-175 was directed at tank car tanks carrying anhydrous ammonia, flammable gases, and ethylene oxide. Those commodities had been released in railroad accidents resulting in deaths, injuries, and substantial property damage, and the safety features mandated in those rulemakings have been very effective in reducing the frequency and severity of accidents involving those commodities. Unfortunately, those rulemakings were not sufficient to prevent a tragic incident at Ridgefield, Washington, on January 14, 1980. In that incident, a train struck a mud-slide, causing the derailment of 23 cars. The top shelf of an anhydrous ammonia DOT Specification 112S340W tank car tank (equipped with shelf couplers and half-head shields) broke, allowing the coupler of an adjacent box car to vertically uncouple, rise up, and ram the head of the anhydrous ammonia tank above a half-head shield. More than 20,000 gallons of ammonia were released and two train crew members subsequently died from exposure to the ammonia.

The discharge of methyl isocyanate in Bhopal, India, in 1984 heightened the concerns of RSPA and FRA for the safe transportation of highly toxic materials. Although that incident was not transportation related, it did

demonstrate the tragic consequences that could occur if there were large releases of materials that are poisonous by inhalation. On October 8, 1985, a final rule in Docket HM-196 (50 FR 41092) was published which superseded the existing tank car tank authorizations for certain toxic materials. For those toxic materials, only tank cars authorized for Poison A materials or tank cars approved by RSPA are authorized.

On May 5, 1987, and November 6, 1987, notices of proposed rulemaking in Docket HM-181 were published proposing to require head protection and thermal protection on newly built tank car tanks that transport highly toxic materials or materials currently classed for domestic transportation as flammable liquids, but which are classed internationally as flammable gases. In response to those notices, several commenters have proposed that certain changes be made to the specifications for existing tank car tanks. The Chlorine Institute (CI) recommended that half-head shields be required on existing chlorine cars. The Union Pacific Railroad Company, on behalf of a coalition of three chemical companies and four rail carriers, recommended that existing tank car tanks be retrofitted with full tank head shields, except that existing tanks which already have half-head shields would not have to be retrofitted. The coalition further recommended that existing so-called "non-pressure" tank car tanks not be authorized to transport highly toxic materials, except in certain situations. The coalition further opposed grandfathering of a tank car tank based upon the small tank capacity. The National Transportation Safety Board (NTSB) has recommended, in NTSB Recommendation R-85-105 involving a February 23, 1985, derailment in Jackson, South Carolina, that railroad tank cars used to transport materials with a DOT Emergency Response Guidebook recommended evacuation distance of 1/2 mile or more be equipped with head shield protection and, as applicable, with thermal insulation. In its comments to Docket HM-181 dated March 1, 1988, the NTSB stated "The Safety Board believes that it is time to stop permitting tank cars that fail to meet current minimum safety requirements to be used to transport dangerous materials under grandfather clauses. As a minimum, the DOT should establish a specific date by which all tank cars would have to comply with the new requirements." Other commenters supported some or all of the recommendations advanced by the CI, the coalition, or the NTSB.

However, some other commenters opposed those recommendations.

On April 3, 1983, at Denver, Colorado, a DOT specification 111A60ALW1 tank car tank, constructed of aluminum and loaded with nitric acid, impacted an empty boxcar. Upon impact, the end sill of the empty boxcar rode over the coupler of the nitric acid tank car tank and punctured the tank head. Nitric acid spilled from the tank and formed a vapor cloud which dispersed over the area. The NTSB concluded that had the nitric acid tank car tank been equipped with head shields, the tank probably would not have been punctured and the release of the material probably would not have occurred. The NTSB recommended (Recommendations R-85-61, R-85-63, and R-85-64) that RSPA, FRA, and the Association of American Railroads (AAR) "conduct a full testing and evaluation program to develop a head shield to protect DOT specification aluminum tank car ends from puncture and mandate installation of the head shield at an early date." FRA has sponsored such a program and the tentative research results indicate that aluminum tank car tanks may be punctured in impacts at low speeds. RSPA and FRA are not aware of any puncture tests of nickel tank car tanks, but based upon the physical properties of nickel, believe that nickel tank car tanks might also be punctured at low speeds. RSPA and FRA are also concerned about the behavior of aluminum tank car tanks in fires. The structural integrity of aluminum alloy plate is very adversely affected by high temperature, with melting occurring at about 1200 degrees Fahrenheit.

On September 6, 1987, in New Orleans, Louisiana, butadiene leaked from a DOT 114J340W tank car tank and on September 9, 1987, the vapors ignited, resulting in the engulfment of both bridge spans of a nearby section of Interstate 10. The tank car tank incorporated a bottom manway in its design. In its investigation of this incident (Recommendation R-88-59), the NTSB concluded that "it is unlikely that a hazardous materials leak through a bottom manway during transportation could be stopped" and the Board urged that FRA "act immediately to prohibit the use for transportation of hazardous materials tank cars that have a manway opening located below the liquid level of the material transported." It is the understanding of RSPA and FRA that there are no longer any United States tank car tanks equipped with bottom manway openings, but that there are still Canadian and Mexican tank car tanks equipped with bottom manway

openings that might be used for transporting hazardous materials in the United States.

For class DOT 105, 109, 111A100, 112, and 114 tank car tanks, the Hazardous Materials Regulations (HMR) generally require that the start-to-discharge pressure setting of safety relief valves be between 72 percent to 78 percent of the tank test pressure (for certain commodities the pressure setting may, as an alternate, be between 80 percent to 85 percent of the tank test pressure). However, for class DOT 103, 104, 111A60, and 115 tank car tanks, the HMR generally require that the start-to-discharge pressure setting of safety relief valves be between 53.3 percent to 83.3 percent of the tank test pressure (for certain commodities the pressure setting may, as an alternate, be between 70 percent to 80 percent of the tank test pressure; for certain tank car tanks built before January 1, 1959, the pressure setting may, as an alternate, be between 36.7 percent to 46.7 percent of the tank test pressure; and for certain tank car tanks built before August 31, 1956, the pressure setting may, as an alternate, be between 70 percent to 80 percent of the tank test pressure). The start-to-discharge pressure settings for AAR specification 206W tank car tanks are the same as for class DOT 115 tank car tanks. RSPA and FRA are concerned that the low start-to-discharge pressure settings on the safety relief valves of class DOT 103, 104, 111A60, and 115 tank car tanks and on AAR specification 206W tank car tanks may cause the unnecessary discharge of lading in yard impacts and in accidents not resulting in tank fire engulfment. It should be noted that on June 12, 1989, RSPA published in the Federal Register (54 FR 24982) a final rule in Docket HM-183 that requires that the start-to-discharge pressure settings on the safety relief valves of certain cargo tanks be increased.

On July 30, 1989, in Altoona, Iowa, two locomotives collided and denatured alcohol from two derailed tank car tanks was released through the safety relief valves and the manway domes and a fire ensued. As a result of its investigation, NTSB recommended (Recommendations R-89-48, R-89-49, R-89-53, and R-89-54) that RSPA and FRA amend the HMR to require that "closure fittings on hazardous materials rail tanks be designed to maintain their integrity in accidents that are typically survivable by the rail tank" and "specifications for securing closure fittings, such as minimum torque values for sealing bolted closures and gasket specifications, be determined and

provided by tank car designers and manufacturers."

Information Desired by RSPA and FRA

RSPA and FRA have decided to sever from Docket HM-181 and place in this docket, those issues relating to (1) full-head protection versus half-head protection, (2) the phasing out of various "grandfather" provisions in the HMR, (3) the extension of head protection and thermal protection requirements to additional commodities, (4) the use of so-called "non-pressure" tank car tanks to transport materials poisonous by inhalation, (5) the start-to-discharge pressure setting of safety relief valves on tank car tanks, and (6) the securement and integrity of tank car tank closures. Before proceeding to develop specific regulations, RSPA and FRA believe that they need additional information and are therefore requesting comments on various topics. Some of the questions posed in this notice were raised earlier in an advanced notice of proposed rulemaking in Docket HM-175 (45 FR 48668; July 21, 1980). However, RSPA and FRA believe that some of the information obtained during that rulemaking may be obsolete.

Specific written comments are requested for questions 1 through 10 below. Following these questions are some supplementary remarks which are intended to clarify the information needed by RSPA and FRA.

1. What would be the costs and benefits of requiring thermal protection or head protection or both thermal protection and head protection on new and existing tank car tanks that are not now required to be equipped with such protection and that are used to transport flammable gases, nonflammable gases, ethylene oxide, materials poisonous by inhalation, and reactive materials (i.e., materials that may cause tank car tank rupture from violent decomposition or polymerization when the materials are exposed to air, moisture, or elevated temperatures)? Commenters are also requested to identify any specific groups of cars for which retrofit would be technologically or economically difficult and to discuss and document any such difficulties. Commenters are further requested to identify any specific group of cars which have design improvements which, although not conforming to the requirements of part 179 of the HMR for thermal protection and head protection, may provide some thermal protection or head protection. Comments are also requested on appropriate retrofit schedules and priorities. Commenters who believe that thermal protection and/or head protection should be required on tanks carrying commodities

other than those discussed above, are requested to identify those commodities and to discuss why they believe additional protection may be needed for those commodities.

2. What would be the costs and benefits of requiring thermal protection or head protection or both thermal protection and head protection on new and existing tank car tanks that are constructed of aluminum or nickel? Commenters are also requested to identify any specific groups of cars for which retrofit would be technologically or economically difficult and to discuss and document any such difficulties. Commenters are further requested to identify any specific group of cars which have design improvements which, although not conforming to the requirements of part 179 of the HMR for thermal protection and head protection, may provide some thermal protection or head protection. Comments are also requested on appropriate retrofit schedules and priorities.

3. What would be the costs and benefits of disallowing the half-head shield as an option to meet head protection requirements? In discussing this question, commenters are requested to consider a ban on the half-head shield option for both new and existing tank cars. Commenters are also requested to identify any accidents (not included in Reports No. RA-02-5-51 and RA-02-6-55 of the Railway Progress Institute and AAR or Report No. FRA-RP-72-01 of the FRA) in which the upper half of a tank head was punctured.

4. What would be the costs and benefits of prohibiting from hazardous materials service the use of tank car tanks that have a manway opening located below the level of the liquid being transported? Commenters are requested to consider a ban on such openings for both new and existing tank car tanks.

5. What would be the costs and benefits of increasing the start-to-discharge pressure setting of safety relief valves on class DOT 103, DOT 104, DOT 111A60, and DOT 115 tank car tanks and on AAR specification 206W tank car tanks so that the safety relief valves will not open in normal transportation service or when the tank car tank is involved in an accident involving a rollover without any fire engulfment? Commenters are requested to consider such a requirement on both new and existing tank car tanks. Commenters are also requested to identify any commodities for which an increase in the safety relief valve start-to-discharge pressure setting might

result in a decrease in the level of safety.

6. What, if any, specifications should be established so that tank car tank closure fittings will maintain their integrity in accidents that are typically survivable by the tank car tank? Commenters proposing specifications are requested to discuss the costs and benefits of the standards.

7. What, if any, specifications (such as gasket specifications, gasket sealant specifications, and minimum torque values for sealing bolted closures) should be established for securing closure fittings? Commenters proposing specifications are requested to discuss the costs and benefits of the standards.

8. What would be the costs and benefits of disallowing the use of so-called "non-pressure" tank car tanks to transport materials poisonous by inhalation? In discussing this question, commenters are requested to consider both a ban on new tank car tanks and a ban on existing tank car tanks. Commenters are also requested to identify any group of non-pressure tank car tanks that have special design features that make the conversion of those tanks to less hazardous service either technologically or economically difficult and to discuss and document any such difficulties. Commenters are further requested to discuss appropriate schedules for phasing out the use of non-pressure tank car tanks for materials poisonous by inhalation.

9. What would be the costs and benefits of phasing out the various grandfather clauses that permit hazardous materials to be transported in tank car tanks that do not meet the safety requirements for newly built tank car tanks? Commenters are also requested to discuss the scheduling of the phasing out of these clauses. RSPA and FRA are particularly interested in comments concerning the grandfathering of tank car tanks constructed of materials no longer authorized for new construction.

10. What operational changes or design modifications should be considered in lieu of the retrofitting or banning of tank car tanks that do not meet the safety requirements for new tank car tanks? RSPA and FRA are particularly interested in comments relating to operational changes or design modifications that might be considered for tank car tanks constructed of materials no longer authorized for new construction. What would their costs and benefits be?

Commenters are requested to provide the following information, as

appropriate, when replying to questions one through ten:

A. For each retrofit action being considered, the number of cars that would be required to be retrofitted. Numbers should be grouped by type of retrofit required (e.g., head shields, thermal protection), car capacity, car miles, car age, and projected productive life remaining in the subject service. Information is also requested on car utilization by car type and commodity service (e.g., the average number of trips per year, average number of days at consignors and consignees, average number of days at carrier terminal(s) and intermediate yard(s) in a loaded and unloaded condition).

B. For each retrofit action being considered, the number of cars that would be transferred from one commodity service to another commodity service to avoid the costs associated with a proposed retrofit and the economic/financial accounting basis on which this decision would be based. Numbers should be grouped by type of retrofit required (e.g., head shields, thermal protection), car capacity, and car miles in a loaded and unloaded condition, car age, commodity service, and projected productive life remaining in new commodity service.

C. The number of new cars, and their projected capacities and costs, which

would be purchased to replace the diverted cars referred to in (B) above.

D. The number of new cars not in hazardous materials service, and their projected capacities and costs, which would be purchased absent the transferral of cars to avoid the costs associated with a proposed retrofit.

E. For each retrofit action being considered, the itemized cost of the retrofit, in terms of full-head protection versus half-head protection, and thermal protection. Commenters are requested to break down costs into material costs and labor costs, and average work hours needed to accomplish the retrofit. Commenters are also requested to discuss out-of-service time, if any, necessitated for retrofit, the average amount of time involved in the routine annual repair/maintenance of rail tank car tanks, the average number of times per year a car is cleaned, the costs involved in cleaning a car, any scheduling problems that might occur in taking cars out of service for retrofit, the total time that it would take to complete a retrofit program without causing a major disruption in operations, and any other associated costs with retrofit.

F. For new construction, the incremental cost of (a) half-head protection versus no-head protection, (b) full-head protection versus no-head protection, (c) full-head protection versus half-head protection, and (d)

thermal protection versus no thermal protection.

Administrative Notices

Costs and safety benefits associated with the contemplated rulemaking action are essentially unknown at present. However, based on the limited information available, RSPA and FRA believe that this rulemaking (1) is not "major" under executive Order 12291; (2) is not "significant" under DOT's regulatory policies and procedures (44 FR 11034); (3) will not affect not-for-profit enterprises or small governmental jurisdictions; (4) does not require an environmental impact statement under the National Environmental Policy Act (42 U.S.C. 4321 *et seq.*); (5) does not have sufficient Federalism implications to warrant preparation of a Federalism assessment; and, (6) will not have a significant economic impact on a substantial number of small entities. A preliminary regulatory evaluation will be prepared based on comments to this advance notice of proposed rulemaking.

Issued in Washington, DC, on May 9, 1990, under authority delegated in 49 CFR part 106, Appendix A.

John J. O'Connell, Jr.,

Acting Director, Office of Hazardous Materials Transportation.

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