

Federal Communications Commission.

Magalie Roman Salas,

Secretary.

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DEPARTMENT OF TRANSPORTATION

Research and Special Programs Administration

49 CFR Part 178

[Docket No. RSPA-99-5921(HM-213A)]

RIN 2137-AD34

Hazardous Materials: Cargo Tank Rollover Damage Protection Requirements

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

ACTION: Advance notice of proposed rulemaking (ANPRM).

SUMMARY: RSPA is requesting comments on a research study conducted by the University of Michigan Transportation Research Institute (UMTRI) titled "The Dynamics of Tank-Vehicle Rollover and the Implications for Rollover-Protection Devices." The intended effect of this action is to obtain information concerning the need, if any, for amending the Hazardous Materials Regulations (HMR) concerning cargo tank rollover damage protection devices, the costs and benefits associated with such amendments, and ways to minimize impacts on small businesses. This ANPRM addresses DOT specification cargo tanks used for the transportation of liquid hazardous materials.

DATES: Comments must be received by May 15, 2000.

ADDRESSES: Submit written comments to the Dockets Management System, U.S. Department of Transportation, Room PL 401, 400 Seventh Street, SW, Washington, DC 20590-0001. Comments should identify the docket number, RSPA-99-5921 (HM-213A) and submitted in two copies. If you wish to receive confirmation that RSPA has received your comments, include a self-addressed stamped postcard. Comments may also be submitted to the docket electronically by logging onto the Dockets Management System website at <http://dms.dot.gov>. Click on "Help & Information" to obtain instructions for filing the document electronically.

The Docket Management System is located on the Plaza Level of the Nassif Building at the Department of Transportation at the above address. You may review public dockets between

the hours of 10 a.m. and 5 p.m., Monday through Friday, excluding Federal holidays. Internet users may review all comments received by the U.S. Department of Transportation by accessing RSPA's Hazmat Safety website at <http://hazmat.dot.gov>.

FOR FURTHER INFORMATION CONTACT: Ms. Jennifer Karim, Office of Hazardous Materials Standards, Research and Special Programs Administration, telephone (202) 366-8553; Mr. Ronald Kirkpatrick, Office of Hazardous Materials Technology, Research and Special Programs Administration, telephone (202) 366-4545; or Mr. Danny Shelton, Office of Safety and Technology, Federal Highway Administration, telephone (202) 366-6121, U.S. Department of Transportation, 400 Seventh Street SW, Washington, DC.

SUPPLEMENTARY INFORMATION:

I. Background

Between January and May 1991, the National Transportation Safety Board (NTSB) investigated seven highway accidents involving MC 306, MC 307, and MC 312 specification cargo tank motor vehicles that had overturned and released hazardous materials. As a result of these investigations, NTSB published a Hazardous Materials Special Investigation Report on February 2, 1992. NTSB found that, in all cases, the rollover protection devices failed to protect the cargo tank manholes and fittings from damage. NTSB reported that in three of the accidents structural failure of the rollover protection devices caused impact damage to the fittings. In the other four accidents, the design and configuration of the devices were found to be inadequate for protecting and shielding the top fittings from external objects or from striking into the ground. The damaged closures or fittings on top of the cargo tank caused the release of hazardous materials during the accidents.

In each case, the rollover protection devices failed to protect the cargo tank manholes and fittings from damage sufficient to result in loss of lading. The report found that " * * * there is inadequate information about the forces that can be encountered in a rollover accident and the extent to which rollover-protection devices for cargo tanks can reasonably be designed to withstand these forces * * *" In safety recommendation H-92-10, NTSB recommended that RSPA and the Federal Highway Administration (FHWA) conduct a study to analyze the forces and energy involved in cargo tank

rollover crashes. In response to NTSB recommendations, FHWA contracted with the University of Michigan Transportation Research Institute (UMTRI) to conduct a study on cargo tank rollover protection.

II. UMTRI Study

The results of UMTRI's study are found in a November 1998 report titled "The Dynamics of Tank-Vehicle Rollover and the Implications for Rollover-Protection Devices." The study investigated the dynamics of mild, moderate and severe rollover crash events involving cargo tank motor vehicles. The crash situations and vehicle characteristics were influenced by the rollover accidents investigated in the NTSB report. These were all DOT specification cargo tank motor vehicles and, in each incident, the top damage protection structures were impacted. In the UMTRI study, not all simulations resulted in "rollover" to this degree. Vehicle rotations in which the top damage protection is not affected may be more accurately termed "overturn." UMTRI drew conclusions from the simulated rollover crashes based on the position and speed of each modeled tank at the point when it struck the ground. You may obtain copies of the study by calling the Records Center at (202) 366-5046, by mailing a request to the Records Center, RSPA, Room 8421, 400 Seventh Street, SW, Washington, DC 20590, or by downloading the study from the DMS electronic docket at <http://dms.dot.gov>.

III. Request for Comments

RSPA requests comments responding to the questions listed below to facilitate decisions on the potential need for additional changes to the HMR with regard to cargo tank rollover damage protection standards. Commenters are requested to include information pertaining to their experience with damages incurred in other rollover accidents. RSPA also invites comments on any aspect of the UMTRI study not specifically addressed by questions in this ANPRM. Information, including photographs, sketches and accident investigation reports, on rollover accidents in which cargo tank manholes and fittings were, or were not, damaged would be helpful to RSPA in determining whether to revise the current requirements. Similarly, information on release of lading through damaged heads or shell is solicited.

A. Impact Scenarios

Under the heading "Implications of the Results for Minimum Performance Requirements for Rollover-Protection

Devices," the UMTRI report lays out three impact scenarios for rollover crashes based on different levels of severity. To restate and simplify the rollover events described in *B. Rollover Crashes* below, three scenarios affecting impact were formulated: (1) Mild overturn or rollover, (2) moderate rollover, and (3) more severe rollover. In each rollover event, it is important to characterize the surface impacted. For example, *type of surface*—was it asphalt, concrete highway paving, wet earth, sand, or rocky shoulder materials; *angle of surface*—was it horizontally oriented or did it have an up or down slope; or did the vehicle strike a *vertical object* such as a guardrail, curbing or a tree or pole?

A1. What description of actual accidents can you provide for better understanding about the nature of the rollover event?

A2. What is your judgement of the severity and application of the rollover? How can "severity" best be characterized?

A3. How did other accidents that you provided information on differ from the simulations performed in the UMTRI study?

B. Rollover Crashes

The UMTRI study examined the dynamic behavior of cargo tank motor vehicles by simulating two straight trucks and five tractor semitrailer combinations in rollover events. The study characterized the simulation program as follows: "Each (vehicle) was subjected to 126 simulated maneuvers intended to result in rollover. Test maneuvers included mild, low-speed turns that just barely produced rollover, more dynamic maneuvers on smooth surfaces, and high-speed impacts with curbs and guardrails that result in rapid rollover with substantial pitch and yaw." In mild overturns, the vehicle may fall onto its side and rotate no more than 135 degrees, or it may continue to roll on a flat ground surface to engage the rollover protection devices. In more severe events, the vehicle may land on its side and slide sideways into any of the many objects with vertical surfaces that are oriented along the roadway; such objects include guardrails, retaining walls and embankments. In somewhat more dynamic rollovers, the vehicle may become airborne and rotate rapidly enough to bring the rollover protection devices into direct contact with the ground. For example, this could happen when the vehicle rolls onto a sloping or depressed roadside surface or becomes airborne due to striking a curb. On actual rollover accidents that you are aware of:

B1. What was the approximate rollover rate, impact angle, impact object, and damage condition of the protection devices?

B2. Were the accident protection devices impacted during the rollover crash? What was the magnitude of the damage to the tank shell, fittings, manholes, etc.? What was the damage condition of the protective devices?

B3. Did the rollover protection devices function as designed? If not, did they fail because of a design flaw?

C. Rollover Protection Device Performance Goals

The UMTRI report recommends that performance goals for rollover protection devices should be expressed in terms of impact events rather than in terms of the strength of the devices. This must include mass, velocity and surface parameters. The forces acting on the protection devices are the result of an impact. The protection device should be designed in such a way as to effectively manage the energy encountered by the device during a rollover impact.

UMTRI suggests that the design of rollover protection devices should be able to provide protection when an impact onto a flat surface normal to the surface of the cargo tank occurs at velocities of at least 12 ft/sec, and further that this occurs at angular orientations of the tank with respect to the impact surface which are representative of actual incidents. They suggest that impact velocities of up to 24 ft/sec would be desirable.

C1. What approach should be used in defining the performance goals for rollover protection devices? Should a performance goal be based on impact energy absorption and distribution? Should performance testing be used to validate calculations?

C2. What minimum design goals should be required for rollover damage protection devices? Should design goals establish a finite space into which the protection device could be displaced without contacting the protected fittings? Conceptually, should this be done along the lines of rear-end protection devices as set forth in § 178.345–8(d)(1)?

C3. Should the design goals be based on impact velocity as suggested by UMTRI?

C4. If impact velocity is used, what is an advisable value that will cover the majority of accidents?

D. Feasibility of UMTRI Recommendations

If implemented, the UMTRI recommendations for designing rollover protection devices would require more

sophisticated analyses on the part of cargo tank designers and manufacturers to assure that rollover protection devices meet specified performance goals.

D1. What degree of economic burden, if any, would performance goals impose on small businesses such as manufacturers and engineering consultants? Would requirements for computerized analysis impose an economic burden on small businesses which may be more apt to rely on hand calculations?

D2. Would a standard design, validated to satisfy a given performance standard, be an acceptable alternative to a performance standard? Would this approach minimize economic impact on small business?

D3. What additional economic burdens might cargo tank designers and manufacturers incur if the UMTRI recommendations are adopted?

E. Application to Existing Cargo Tank Motor Vehicles

If we adopt new rollover protection device design requirements, we will need to decide whether and to what extent to apply the new requirements to cargo tank motor vehicles that are already in service.

E1. Should any new performance criteria for rollover damage protection devices be applied to cargo tank motor vehicles currently in hazardous materials transportation service?

E2. Should there be a provision proposing new standards for rollover damage protection devices which limits the amount of time a cargo tank motor vehicle currently in service may be used if it does not meet the new requirements?

E3. Should a retrofit or phase out provision be applicable to all cargo tank motor vehicles currently in service or just to cargo tanks manufactured under superseded specifications, such as MC 306, MC 307 and MC 312?

E4. What economic burden would cargo tank owners incur if they are required to retrofit or replace cargo tank motor vehicles that do not meet the new performance criteria?

Issued in Washington, DC on November 10, 1999, under authority delegated in 49 CFR part 106.

Alan I. Roberts,

Associate Administrator for Hazardous Materials Safety, Research and Special Programs Administration.

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