

This notice comprises one part of NHTSA's comprehensive effort to assess the safety need to amend several of the motor vehicle safety standards relating to the crashworthiness and post-crash performance of buses in general and school buses in particular. These issues have received substantial public attention in recent months, following the tragic crash earlier this year of a compact pickup truck driver by a drunken motorist into a crowded church bus. Twenty-seven of the 67 occupants of the bus died as a result of smoke inhalation, and not from trauma or crash injuries resulting from the collision. Even though the Kentucky crash was a unique catastrophe and the safety record of school buses and buses is extremely positive overall, the agency believes it should consider whether there are improvements NHTSA could propose in its safety standards that might provide an even higher level of safety.

**DATE:** Comments on this notice must be received by the agency no later than January 3, 1989.

**ADDRESS:** Comments should refer to the docket number and notice number and be submitted in writing to: Docket Section, National Highway Traffic Safety Administration, Room 5109, 400 Seventh Street, SW., Washington, DC, 20590. Telephone: (202) 366-5267. Docket hours are 8:00 a.m. to 4:00 p.m. Monday through Friday.

**FOR FURTHER INFORMATION CONTACT:** Mr. Edward Jettner, NRM-12, Office of Vehicle Safety Standards, National Highway Traffic Safety Administration, 400 Seventh St., SW., Washington, DC, 20590. Telephone: (202) 366-4917.

**SUPPLEMENTARY INFORMATION:** On May 14 of this year, a church bus collided head-on with a compact pickup truck in Carrollton, Kentucky. It was an extremely severe crash; the combined velocity of the two vehicles at the moment of impact was in excess of 100 miles an hour. During or shortly after the crash, a fire apparently started near or at the front bus entrance and was sustained by fuel from the wreckage. Twenty-seven occupants of the bus died as a result of smoke inhalation, and not from trauma or crash injuries resulting from the collision. The church bus, a used school bus designed to carry 66 passengers, was filled to capacity with children, teenagers and adults. There was reportedly at least one passenger sleeping on the bus floor and at least one cooler in the aisle.

The bus was manufactured in 1977 shortly before the April 1, 1977, effective date of the school bus safety standards NHTSA issued pursuant to the

Schoolbus and Motor Vehicle Safety Amendments of 1974. It was used first as a school bus and later sold to a church. Thus, the bus was typical of the pre-1977 school bus body type which had been in use for many years, and presumably met Federal Motor Vehicle Safety Standard No. 302 for the flammability of interior materials (which took effect in 1972). The bus was not required to comply with the comprehensive school bus emergency exit requirements of Standard No. 217 which took effect on April 1, 1977, and apparently did not fully meet all aspects of that school bus standard.

In the aftermath of the Kentucky crash, NHTSA has initiated a series of efforts to assess the safety need to amend several of the motor vehicle safety standards relating to the crashworthiness of buses in general and that of school buses in particular. (Under NHTSA's regulations, a "bus" is a motor vehicle designed for carrying 11 or more persons (driver included). A "school bus" is a "bus" that is sold for purposes that include carrying students to and from school or related events (common carriers in urban transportation excluded). (49 CFR 571.3(b))

In taking these steps, NHTSA wishes to emphasize that the safety record of these vehicles has been remarkably good. The fatalities in the Kentucky crash were the first fatalities caused by fire in a school bus on the agency's record, since NHTSA began careful tracking of all traffic fatalities in 1975. Further, over the past 10 years, school bus occupants have sustained an average of 15 fatal injuries each year. While each of these fatalities is tragic, the number of school bus occupant fatalities is small compared to occupant fatalities in all other types of motor vehicles. In 1987, for example, there were 38,544 occupant deaths in motor vehicles other than school buses, which includes 5,663 deaths among children aged five to 18. These fatalities for 1987 are similar in number to those of recent years.

In view of the 3.3 billion miles travelled by school buses each year, the school bus is one of the safest means of travel. On a vehicle-mile basis, there are 0.5 school bus fatalities per hundred million vehicle miles travelled, compared to 1.9 occupant fatalities per hundred million vehicle miles in passenger cars—i.e., school buses are about four times safer than passenger cars on a per-vehicle mile basis. Moreover, since a school bus carries more occupants than a passenger car, the comparison on a per-passenger-mile

#### 49 CFR Part 571

[Docket No. 88-22; Notice 01]  
RIN 2127-AA44

#### Flammability of Interior Materials; Advance Notice of Proposed Rulemaking

**AGENCY:** National Highway Traffic Safety Administration (NHTSA), Department of Transportation.

**ACTION:** Advance notice of proposed rulemaking.

**SUMMARY:** This advance notice announces that the National Highway Traffic Safety Administration is considering the issuance of a proposal to upgrade Federal Motor Vehicle Safety Standard No. 302, *Flammability of Interior Materials*, as it applies to large buses (including school buses) over 10,000 pounds gross vehicle weight rating, and requests comments and information to assist the agency in determining whether to issue such a proposal. More specifically, this notice requests comments on possible proposals relating to matters such as self-extinguishing seating materials (i.e., materials which, after being ignited, cease to burn when the source of ignition is removed), toxicity of fumes given off by burning or smoldering seating materials, smoke from burning or smoldering materials and upgraded test procedures. The purpose of such proposals would be to reduce the risk of fire to bus occupants.

basis would be even more favorable for school buses.

The safety record for other types of buses is also extremely good. Occupant fatalities in inter-city and transit buses have average 18 per year over the past 10 years. During 1977-1987, there was one occupant fatality in a bus (other than a school bus) in a crash in which fire was the most harmful event.

As safe as today's buses are, it is incumbent upon NHTSA to inquire whether the bus fleet might be made safer still. NHTSA is issuing this notice to obtain factual information on available technologies, real-world environmental conditions and other factors that might help the agency decide what further steps should be taken to improve school bus safety and the steps that can be reasonably taken to reduce the risk of another Kentucky tragedy. The agency believes it is important to find out more about the potential for fire-related injury and death on buses and school buses, and whether reasonable measures can be taken to reduce that potential.

The agency is in the process of determining whether to amend Safety Standard No. 302, *Flammability of Interior Materials*, as it applies to large buses (including large school buses) over 10,000 pounds gross vehicle weight rating (GVWR). This advance notice requests comments to assist the agency in developing viable approaches towards possibly increasing the flammability resistance of materials used in large buses and large school buses. The agency iterates, however, that this advance notice does not intend to signify that a flammability standard different from or more stringent than Standard No. 302 would necessarily have been beneficial in lessening the devastation in the particular circumstances of the Kentucky tragedy. The agency realizes that a more stringent flammability standard for the interior materials of that bus may in fact have had little if any effect on the outcome, given the intensity of the fuel fire and combination of other factors in the Kentucky crash which together made that crash catastrophic. For less intense fires, however, it is possible that strengthened flammability requirements could stop or slow the spread of fire to the point of reducing the risk of death or injury to occupants.

Among other issues, the agency is interested in obtaining information on the safety need to amend the current flammability requirements of Standard No. 302. To assess such a need, the agency will consider the magnitude and nature of the risk of fire-related death or injury to vehicle occupants. This risk is

related to a variety of factors, including the ability of an occupant to escape from a burning vehicle, the time needed to escape, and the presence and suitability of exits and their ease of use.

Some of these factors are, in turn, related to each other. For example, escape time and effect of emergency exits are related. The amount of time an occupant of a vehicle needs to escape from a burning vehicle depends on the source and magnitude of the fire, the amount of smoke produced, the toxicity of the fumes, the flammability resistance of the vehicle interior materials and the speed and ease with which egress is possible from the vehicle. Factors relating to the latter include the number of passengers carried in the vehicle, and the number and size of doors, windows and other apertures and the ease of opening them.

NHTSA is addressing issues relating specifically to the adequacy of Federal minimum school bus emergency exit requirements in an ANPRM on Standard No. 217 published in today's edition of the *Federal Register*. In addition, an ANPRM to examine possible revisions to the Federal Motor Vehicle Safety Standard for fuel system integrity (FMVSS No. 301) of buses (including school buses) is expected to be issued shortly.

Because every one of the Federal motor vehicle safety standards is premised on a safety need for it, any proposal by the agency to amend Standard No. 302 must be justified by such a need. The agency wishes to explore whether such a need might exist for amending the requirements of this standard as they apply to buses (including school buses) over 10,000 pounds GVWR, and has issued this advance notice to request information pertaining to these vehicles.

The agency has addressed these large buses and school buses in this ANPRM to reduce the likelihood that a tragedy similar to the Kentucky crash can recur. NHTSA notes that exit from those vehicles requires more time than that needed for occupants to exit smaller buses, passenger cars, multipurpose passenger vehicles (MPV's) and trucks, all of which are more likely to have openings (such as doors or windows) for possible egress nearer to every person reasonably foreseen to be within the vehicle than in the case of large buses. The agency has thus limited this advance notice to issues relating to the fire protection of large buses and large school buses only. However, comments are requested below on including buses with GVWR of 10,000 or less in the scope of this notice.

This notice discusses a range of issues that NHTSA is considering in deciding whether to develop and issue a proposal relating to the flammability of materials in buses and makes a number of requests for opinions and data. For easy reference, the requests are numbered consecutively.

In providing a comment on a particular matter or in responding to a particular question, interested persons are requested to provide any relevant factual information to support their conclusions or opinions, including but not limited to statistical and cost data, and the source of such information.

This is an advance notice of proposed rulemaking, and no rule will be issued on this subject without further notice of proposed rulemaking and opportunity to comment.

#### Issues

##### *Purpose of the standard*

Standard No. 302, which became effective in September 1972, is intended "to reduce the deaths and injuries to motor vehicle occupants caused by vehicle fires, *especially those originating in the interior of the vehicle* from sources such as matches or cigarettes." 49 CFR Section 571.302, paragraph S2. (Emphasis added.) The standard seeks to allow the driver time to stop the vehicle, and if necessary for occupants to leave it, before injury occurs. The standard specifies a burn rate of not more than four inches per minute for materials used for certain specified components ("covered" components) in the occupant compartment, such as seat cushions, seat backs, seat belts, trim panels, compartment shelves, curtains, floor coverings and all interior materials that are designed to absorb energy on contact by occupants in the event of a crash. All portions of material from a specified "covered" component that are within one-half inch of the occupant compartment air space are subject to Standard No. 302's burn rate requirements.

To aid the agency in analyzing areas related to developing possible new approaches in addressing vehicle fires, the agency requests responses to the following questions:

1. Are there reasonable, practicable, cost-effective methods or technologies that the standard could incorporate which would make a vehicle interior fire-proof (i.e., non-ignitable) in the face of fuel-fed fires?
2. Do bus fires usually originate in the undercarriage or engine compartment, or

in the bus interior? Are bus fires usually consequences of a crash?

3. Should buses with a GVWR of 10,000 pounds or less be excluded from the scope of this advance notice?

4. Should buses other than school buses be treated differently than school buses for the purposes of this ANPRM?

#### *New technology*

The four-inch per minute burn rate requirement in Standard No. 302 for passenger cars, MPV's, trucks and buses was based in part on compromises between the goals of flame resistance and energy absorption and between the cost of meeting Standard No. 302 and of meeting the crashworthiness standards that had been issued for those motor vehicles but which were not yet in effect at the time Standard No. 302 was issued. (See, FR 289; January 8, 1971.) To aid the agency in analyzing issues relating to a possible change in that requirement, such as the availability of new technology for improved flammability resistance (ignitability; flame spread; smoke emissions; toxicity) and injury reduction (energy absorption; shock attenuation; strength and endurance), the agency requests information or comments on the following questions:

5. Are there new products which are used, or are available for use, or would be suitable for use in new bus interiors which would improve the flammability resistance of those interiors in school buses? Have these products been field tested, and if so, what has been the field experience? Have there been adverse experiences? If so, what was the situation, and what is the likelihood that such a situation would recur? What are the costs of these new products?

6. NHTSA believes the most critical area of flame spread in bus interiors would be the seat cushioning material, especially polyurethane foam padding. What is the number or percentage of school buses manufactured with polyurethane cushions? What is the number or percentage of buses other than school buses manufactured with polyurethane cushions? How much of a reduction in the burn rate of the cushions would result by use of available materials less flammable than the polyurethane used in those seats?

7. NHTSA believes that any strengthening or broadening of Standard No. 302's requirements must achieve a net safety benefit. The agency requests information on the degree to which fire protection requirements can be revised without compromising other aspects of bus safety. For instance, the agency is concerned about how the toxicity of burning and smoldering materials may be increased by use of flame-retardant

substances, and is requesting comments on this issue in the section entitled, "Chemical by-products." Similarly, the agency is concerned about what effect strengthened fire protection requirements could have on passenger crash protection features of school buses, which are mandated by Federal Motor Vehicle Safety Standard No. 222, *School Bus Passenger Seating and Crash Protection*. (Standard No. 222 incorporates a "compartmentalization" concept to provide passenger crash protection on school buses. The standard requires that large school buses protect school bus passengers by providing them with a protective "compartment" between well-padded seats that meet specified spacing and performance requirements.) A critical consideration in NHTSA's review of Standard No. 302 requirements is whether additional or strengthened fire protection requirements would reduce a manufacturer's ability to use materials currently enabling conformance with Standard No. 222, and thereby negatively affect the availability of buses that conform to the latter standard.

What are the flammability resistance characteristics of the interior padding of school bus seat backs and restraining barriers meeting compartmentalization (FMVSS No. 222) requirements? Should the burn rate of this material be reduced, and if so, what should those limits be?

8. Are there materials available for school bus seat padding and seat covers that perform well in terms of both flammability resistance and injury reduction, and which are cost and weight effective? Is there any performance or cost advantage in concentrating on either seat covers or cushion material, but not both?

#### *Performance requirements*

As already noted, Standard No. 302 specifies a burn rate of not more than four inches per minute for materials used for certain components in the interior passenger compartment. NHTSA determines compliance with the standard through a laboratory procedure, under which a specimen of material is mounted on a test frame, placed in a metal cabinet and exposed to flame from a bunsen burner.

To aid the agency in analyzing issues related to developing possible requirements for improved flammability resistance, the agency requests information or comments on the following questions:

9. It is desirable and feasible to develop new performance requirements, and test procedures to reflect the

advances in flame resistant materials and flammability testing equipment since FMVSS No. 302 was first issued?

10. NHTSA believes Standard No. 302's compliance test should replicate real-world crash conditions as closely as reasonably possible. Should Standard No. 302 incorporate a systems approach in compliance testing, under which a complete bus, entire bus seat or a group of seats is tested instead of just specimens of the materials alone or sub-components of the seat alone?

11. Is the use of a horizontal burn rate appropriate, or should other alternatives, such as a vertical burn rate be considered? Should new tests be developed which might better simulate catastrophic fuel-fires? A substantial portion of the school bus materials subject to Standard No. 302 are installed closer to the vertical than the horizontal. Does state-of-the-art in math modelling permit predictions to be made of the burning behavior of various materials under simulated crash conditions?

12. In its consideration of the possible methods of increasing the flammability resistance of interior materials used in buses, NHTSA has examined the guidelines and regulations of other Federal agencies. Currently, the Federal Aviation Administration (FAA) incorporates a "fire blocking layer" concept in its flammability requirements. This concept developed out of the FAA's concern that severe thermal radiation produced in a full-scale aircraft cabin fire can break down a fire-retardant outer upholstery covering and penetrate into the foam (typically polyurethane) cushion material. The flammability of foam cushion material is of concern to FAA because of its determination that such material significantly contributes to the spread of aircraft cabin fire. In response, FAA developed a means of retarding flame spread through the use of "a thin layer of highly fire-resistant material to completely encapsulate and protect the larger mass of foam core seat cushion material from involvement in the cabin fire. This layer of fire-resistant material delays the onset of ignition and retards the involvement of the core in the fire." 49 FR 43188; October 26, 1984. FAA estimates that the use of fire-blocked aircraft seats could provide aircraft passengers with an additional 20 to 60 seconds to exit burning aircraft in impact survivable crashes.

FAA's fire-blocking requirements are performance-oriented, in that installation of fire-blocking materials in aircraft is *not* required by the standard. Instead, the standard specifies two sets of performance criteria for aircraft

related to that of burn rate. In an early preamble for the standard, NHTSA said:

*Released of toxic gases is one of the injury-producing aspects of motor vehicle fires, and many of the common ways of treating materials to reduce their burn rates involve chemicals that produce highly poisonous gases such as hydrogen chloride and hydrogen cyanide . . . . Until enough is known in this area to form the basis for a standard, and to establish the proper interaction between burn rate and toxicity, this uncertainty constitutes an additional reason for not requiring self-extinguishing materials.* 36 FR 289; January 8, 1971.

What materials are currently available that might lessen the flammability of buses and that might also lessen the smoke and toxicity of gases emitted during vehicle fires? How readily available are these materials and what are their costs?

19. If requirements on toxicity were to be proposed, what requirements would be reasonable? What are the carcinogenic and mutagenic properties of fire retardant materials?

20. NHTSA is concerned whether there should be limits placed on the optical density of smoke and fumes from a fire, and if so, what those limits should be. Comments are requested on the ability of occupants of a bus or school bus to see their way to an exit or read instructions for opening an emergency exit in the event of a fire. What is the relationship, if any, between the density of the emissions and their toxicity?

*General cost issues:* The agency requests that cost estimates be provided on an incremental, per-seat basis. That is, what is the cost to build a bus seat using the new material versus the cost per seat using present materials. In addition to information and data on costs specifically relating to the materials and test procedures discussed in the preceding questions, the agency requests information on the following questions:

21. How would increased cost of new buses affect purchasing decisions? What is the threshold increase in cost above which the owners and operators of older buses (or older school buses) would be induced to retain those buses instead of acquiring new ones? What number or percentage of older buses would be retained, and by whom?

22. Should NHTSA require bus manufacturers to equip their vehicles with one or more fire extinguishers? Or is that subject more appropriately addressed by Federal or State government agencies with responsibility for operational safety and inspections?

If it is believed NHTSA should be required to require the fire extinguishers, comments are requested to suggest the number

type, and location(s) of the extinguishers NHTSA should consider requiring for buses. What percentage of existing buses and school buses have fire extinguishers? Where and how are such extinguishers mounted? How often have they been used? Are there any problems with vandalism? What are the costs, including maintenance and replacement?

23. Should automatic fire extinguishing systems be required for buses? If so, what type of system(s)?

24. Instead of an overall revision of Standard No. 302's requirements for buses and school buses, should the agency consider proposing new flammability requirements only for specific areas or components of the vehicles interior? For example, should bus seat cushions and seat backs be subject to more stringent requirements than other components of the vehicle, such as compartment shelves? If a targeted approach deserves further consideration by NHTSA, which areas or components should have the highest flammability resistance? How effective would each of these targeted approaches be as a countermeasure to vehicle fires? How would a targeted approach affect the costs associated with a possible upgrade to Standard No. 302?

25. The agency believes that diesel fuel may be less flammable than gasoline in certain types of crash situations. Should the agency consider different performance criteria for fire protection for gasoline-versus diesel-fueled buses based on the differences in the flammability of their fuels?

#### *Potential Regulatory Impacts*

NHTSA has considered the potential burdens and benefits associated with requirements addressing the areas discussed above. This advance notice of proposed rulemaking is not subject to Executive Order 12291, since that order applies to notices of proposed rulemaking and final rules only. However, NHTSA believes that this advance notice is a "significant" rulemaking action under the Department of Transportation regulatory policies and procedures. The advance notice concerns a matter in which there is substantial public interest. The agency has prepared a Preliminary Regulatory Evaluation (PRE) which addresses preliminary estimates of the costs and benefits of potential countermeasures that the agency is considering in this action. The evaluation is available in the docket.

This action has analyzed in accordance with the principles and criteria contained in Executive Order

12612, and it has been determined that it does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

NHTSA has considered the environmental implications of this action, in accordance with the National Environmental Policy Act. In the event a proposal is issued upgrading the flammability resistance of materials in buses and school buses, an Environmental Assessment or draft Environmental Impact Statement, as appropriate, will be prepared and placed in the public docket.

#### *Comment*

NHTSA solicits public comments on this notice. It is requested but not required that 10 copies be submitted.

All comments must not exceed 15 pages in length. (49 CFR 553.21). Necessary attachments may be appended to these submissions without regard to the 15-page limit. This limitation is intended to encourage commenters to detail their primary arguments in a concise fashion.

If a commenter wishes to submit certain information under a claim of confidentiality, three copies of the complete submission, including purportedly confidential business information, should be submitted to the Chief Counsel, NHTSA, at the street address given above, and seven copies from which the purportedly confidential information has been deleted should be submitted to the Docket Section. A request for confidentiality should be accompanied by a cover letter setting forth the information specified in the agency's confidential business information regulation. 49 CFR Part 512.

All comments received before the close of business on the comment closing date indicated above for the advance proposal will be considered, and will be available for examination in the docket at the above address both before and after that date. To the extent possible, comments filed after the closing date will also be considered. Comments on the advance proposal will be available for inspection in the docket. The NHTSA will continue to file relevant information as it becomes available in the docket after the closing date, and it is recommended that interested persons continue to examine the docket for new material.

Those persons desiring to be notified upon receipt of their comments in the docket should enclose a self-addressed, stamped postcard in the envelope with their comments. Upon receiving the comments, the docket supervisor will return the postcard by mail.

A regulatory information number (RIN) is assigned to each regulatory action listed in the Unified Agenda of Federal Regulations. The Regulatory Information Service Center publishes the Unified Agenda in April and October of each year. The RIN contained in the heading of this document can be used to cross reference this action with the Unified Agenda.

**List of subjects in 49 CFR Part 571**

Imports, Motor vehicle safety, Motor vehicles.

(15 U.S.C. 1392, 1401, 1407; delegation of authority at 49 CFR 1.50)

Issued: November 1, 1988.

**Barry Feirice,**

*Associate Administrator for Rulemaking.*

[FR Doc. 88-2555 Filed 11-1-88; 12:14 p.m.]

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