

Contributing to the severity of the accident was the puncture of the bus fuel tank and ensuing fire in the bus, the partial blockage by the rear bench seats of the area leading to the rear emergency door which impeded rapid passenger egress, and the flammability of the material in the bus seat cushions.<sup>2</sup>

The NTSB also determined that "some fire-retardant and flame blocking materials \* \* \* when tested, will reduce the rate of spread of fire from seat to seat over materials currently used."<sup>3</sup>

In 1988, in response to the New Carrollton crash, NHTSA initiated two rulemaking proceedings to consider upgrading standards addressing school bus safety.

## II. NHTSA Rulemaking Activity on School Bus Safety

### A. 1988 ANPRM on Standard No. 217

On November 4, 1988, the agency issued an Advance Notice of Proposed Rulemaking (ANPRM) on the adequacy of Standard No. 217's requirements for school bus emergency exits.<sup>4</sup> Standard No. 217, "Bus Emergency Exits and Window Retention and Release," establishes requirements for the retention of windows in buses and operating forces, opening dimensions, and markings for bus emergency exits. The purpose of the standard is to minimize the likelihood of occupants being thrown from a bus and to provide bus occupants a readily accessible means of emergency evacuation.

NHTSA ultimately revised Standard No. 217's requirements for school bus emergency exits and access to school bus emergency doors in a 1992 final rule.<sup>5</sup> That final rule set requirements for minimum emergency exit space based upon the seating capacity of each bus. Thus, the rule required larger school buses to have an increased number of emergency exits. The final rule also required school buses to provide improved access to side emergency doors and improved visibility of emergency exits.

### B. 1988 ANPRM on Standard No. 302

Also on November 4, 1988, NHTSA issued an ANPRM announcing the agency's plans to consider upgrading Standard No. 302's requirements for the flammability of interior materials in buses.<sup>6</sup> Standard No. 302,

"Flammability of Interior Materials," specifies that the horizontal burn rate of certain specified materials (e.g., seat cushions and seat backs) may not exceed four inches per minute. The purpose of the standard is to allow the driver time to stop the vehicle and, if necessary, evacuate the vehicle occupants before untenable conditions develop that could result in injuries or fatalities.

In the ANPRM, the agency requested comments on the safety need for a rulemaking to upgrade Standard No. 302, types of buses that should be covered, types of seating material available, toxicity of fumes emitted by burning seating materials, upgraded test procedures, and costs and benefits of such a rulemaking. The agency also noted that factors related to the risk of injuries from fire are often interrelated. Among these factors are a fire's source and magnitude, an occupant's ability to escape from a burning vehicle, the time needed to escape, the location and type of emergency exits, and the flammability resistance of the vehicle's interior materials.

In response to the ANPRM on Standard No. 302, NHTSA received 54 comments from bus manufacturers, seating and material manufacturers, State and local governments, trade associations, and individuals. The commenters generally agreed that measures could be taken to increase the flammability resistance of materials used in school buses. Commenters also addressed other issues raised in the ANPRM, including the rulemaking's scope, the availability of new flame-resistant materials, possible performance requirements to enhance flammability resistance, and the costs and benefits of the rulemaking. The comments were discussed in the agency's 1991 notice requesting comments on issues related to the flammability of interior materials in buses.<sup>7</sup> That notice is discussed below.

### C. 1990 NIST Research Report

In January 1989, NHTSA commissioned the Center for Fire Research of the National Institute of Standards and Technology (NIST) to conduct a research program about the flammability resistance of various school bus seat assemblies. The research focused on factors such as ignitability, flame spread, rate of heat release, smoke generation, and toxicity of combustion products. In July 1990, NIST published its findings in a final report entitled "Assessment of the Fire Performance of

School Bus Interior Components."<sup>8</sup> The major conclusions of the NIST report were:

1. No one simple small-scale test should be used to measure fire performance of a material.
2. A material's fire performance includes the examination of a combination of factors, such as ease of ignition, flame spread, rate of heat release, generation of gaseous species, smoke development, and toxicity of the combustion products. In addition, the heat exposure conditions and geometry of the school bus play a critical role.
3. A full-scale test procedure (testing a complete seat assembly) will provide the best basis for testing school bus seats.
4. While toxicity is a concern, it appears that heat and/or smoke generated by all likely school bus seating materials would cause incapacitation before toxicity became an issue.

### D. 1991 Notice Requesting Comments on Standard No. 302

On February 26, 1991, NHTSA published a notice requesting comment on the NIST report and other issues to help the agency determine what appropriate measures, if any, were needed to address the fire resistance of materials used in school bus interiors. (56 FR 7826) The questions included the following:

1. Can the agency develop test protocols for improving the fire resistance of school bus interiors? What protocols and test criteria should be adopted?
2. How can the agency best define objective measures of tenability, e.g., exposure to temperature, material ignitability, flame spread, rate of heat release, smoke generation, toxicity, etc.?
3. Does a small-scale (samples of seating materials) or full-scale (complete seat assemblies) test exist that would result in the use of seating materials that improve the fire resistance of school bus interiors? What tests are recommended?
4. Is it necessary to include toxicity in any test protocols designed to improve the fire resistance of school bus interiors? Are there alternative technical requirements that could be established that would result in negligible toxicity risks, such as establishing a temperature limit?
5. Are there any guidelines that could be adopted that would ensure that potentially carcinogenic materials are not utilized in the manufacture of fire retardant or fire resistant materials?

<sup>2</sup> Highway Accident Report—Pickup Truck/Church Activity Bus Head-on Collision and Fire Near Carrollton, Kentucky, May 14, 1988, Report No. NTSB/HAR/89/01 (March 28, 1989), at page 79.

<sup>3</sup> *Id.*, at page 69.

<sup>4</sup> 53 FR 44623, Docket No. 88–21, Notice 1.

<sup>5</sup> 57 FR 49413, November 2, 1992, Docket No. 88–21, Notice 3.

<sup>6</sup> 53 FR 44627, Docket No. 88–22, Notice 1.

<sup>7</sup> 56 FR 7826, February 26, 1991, Docket No. 88–22, Notice 3.

<sup>8</sup> A copy of this report was placed in Docket No. 88–22–GR.