H-84-387

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: February 23, 1984

Forwarded to:

Mr. V. J. Adduci, President
Motor Vehicle Manufacturers Association
1620 Eye Street, N.W., Suite 1000
Washington, D.C. 20006

SAFETY RECOMMENDATION(S)

H-84-03 and -04

Between 1:30 p.m. and 1:55 p.m., e.s.t., on February 28, 1983, a grass fire of an undetermined origin was ignited in the gore area between the southbound exit ramp from Interstate Route 75 (I-75) to U.S. Route 27 and the southbound lanes of I-75. The fire burned rapidly, and a strong wind from the south-southwest fanned dense smoke across the southbound lanes of I-75. About 2 p.m., the smoke reduced visibility for a 200- to 300-foot stretch of the roadway from near zero to about 40 to 60 feet. Approaching drivers had a clear view of the smoke cloud for over 2 miles before entering the smoke, but they responded with diverse assumptions and drove into and through the smoke at a wide range of speeds. At least 22 vehicles, including three combination vehicles, 1/ all traveling south on I-75, entered the cloud of smoke and were involved in multiple vehicle collisions. Vehicle fuel tanks were breached and gasoline fed fires erupted. Fourteen vehicles, including all three combination vehicles, were burned. In addition to extensive property damage, 5 vehicle occupants were killed and 36 were injured. At least three rescuers suffered thermal injuries 2/.

During the sequence of collisions which followed, 9 of the 22 involved vehicles were subjected to underride/override. Jammed doors increased the difficulty of and delayed escape from six of those nine vehicles. Three other vehicles, not subjected to underride/override also had jammed doors. Seven fuel tanks were breached as a result of collision forces. Fuel released from breached fuel systems ignited instantaneously and a massive fire ensued. Fire damage also caused seven fuel system failures. Thermal burns caused two fatalities, injury to one vehicle occupant, and injuries to at least three rescuers.

1/ Two or more vehicles being operated as a single unit. The three consisted of a truck tractor towing a semitrailer, a pickup truck towing a horse trailer, and a Ford Centurion towing a Ford Bronco.
2/ For more detailed information read Highway Accident Report—"Multiple Vehicle Collisions and Fires Under Limited Visibility Conditions, Interstate Route 75, at Ocala, Florida, February 28, 1983." (NTSB/HAR-83/4).

The Safety Board has promulgated a number of recommendations to improve motor vehicle fuel system integrity. In April 1971, the Safety Board recommended that the National Highway Traffic Safety Administration (NHTSA) and the Automobile Manufacturers Association (now the Motor Vehicle Manufacturers Association (MVMA)) initiate programs leading to the development of automotive fuel tank systems which would minimize the escape of fuel in collisions (Safety Recommendation H-71-20). In August 1972, the Safety Board recommended that the NHTSA extend its proposed rulemaking on FMVSS 301 to include standards for the fuel retention integrity of all components of the fuel system which are subject to damage and subsequent spillage of fuel (Safety Recommendation H-72-19.)

As a result of Safety Recommendations H-71-20 and H-72-19, test criteria prescribing maximum rates of fuel loss were included in FMVSS 301-75. In January 1983, the NHTSA released a technical report 3/ which estimated that FMVSS 301-75 resulted in annual savings, or benefits of: (1) 400 fewer fatalities, (2) 520 fewer serious injuries, (3) 110 fewer moderate injuries, and (4) 6,500 fewer passenger car crash fires. The report included a study of cost-benefit ratio which found that 47 fatalities, 61 serious injuries, 13 moderate injuries, and 762 crash fires were avoided for each $10 million expended to comply with the standard. It was further noted in the report that:

> Although significantly lower crash fire rates have been found for poststandard vehicles, there is some indication that the fire rate may be increasing slightly in newer vehicles. This is a preliminary finding and reasons for it are not clear. It does suggest, however, that the agency continue to monitor the phenomenon of motor vehicle crash fires.

The FARS data do not indicate a significant decrease in fatalities resulting from accidents involving fire. In 1980, there was fire in 1,720 (2.71 percent) of the 63,485 vehicles involved in fatal accidents; in 1981, there was a fire in 1,809 (2.89 percent) of the 62,666 vehicles involved in fatal accidents; and in 1982, there was fire in 1,521 (2.7 percent) of the 56,190 vehicles involved in fatal accidents.

The American Medical Association (AMA) also has expressed concern about fuel fires in motor vehicles. In June 1982 at the AMA's Annual Meeting, the House of Delegates adopted a new policy on the use of technology to prevent explosions in the following resolutions:

> RESOLVED, That the American Medical Association endorse the use of available technology to reduce the number of volatile liquid and gas container explosions which occur, and thereby reduce the amount of pain and suffering due to burns caused by these explosions; and be it further
>
> RESOLVED, That the AMA encourage manufacturers of automobiles, boats and other vehicles, as well as makers of containers of volatile liquids and gases, to incorporate appropriate safety technology into the development of their products.

3/ Evaluation of Federal Motor Vehicle Safety Standard 301-75, Fuel System Integrity: Passenger Cars, U.S. Department of Transportation, National Highway Traffic Safety Administration, DOT HS-806-335, January 1983.

Seven of the twelve vehicles on which fuel systems were breached during impact in the February 28, 1983, accident ranged from 1975 through 1982 year models (1975 Ford Elite, 1978 Ford LTD, 1979 Chevrolet Caprice, 1980 Chevrolet Malibu, 1981 AMC Spirit, 1981 Oldsmobile Omega, and 1982 Chevrolet C-30 crew cab pickup truck), all were manufactured after the effective date of FMVSS 301-75. Four of these seven vehicles had been struck from the rear by vehicles traveling in excess of 30 mph (30, 50, 50, 45, 25, 25, and 45 mph). These four were overridden by the striking vehicles. Postcrash examination of the vehicles suffering severe fire damage revealed that twelve had empty fuel tanks; that fuel filler pipe caps were missing; and that whatever fuel had been in the tanks before the accident had either leaked out or had evaporated because of the heat from the fire. The test requirements of FMVSS 301-75, which require that vehicles be crashed either forward or rearward into a flat barrier at 30 mph, does not reflect the real world crash experiences which occured in this accident.

Based on its accident investigation experience, the Safety Board believes that requiring a vehicle fuel system's ability to withstand 30-mph collisions with minimal fuel spillage provides only a limited margin of safety, especially since many collision speed differentials in the "real-world" exceed 30 mph. In this accident, the speeds of the vehicles entering the dense smoke area ranged from 5 to 55 mph, and in many of the collisions in addition to those specifically indentified above, speed differentials probably exceeded the 30-mph performance requirement specified in FMVSS 301-75.

The Safety Board acknowledges that benefits have been derived from FMVSS 301-75, but it believes that further improvements might be achieved by upgrading the performance requirements of FMVSS 301-75. Therefore, the Safety Board will continue to address this safety issue in future accidents. In the interim, the Safety Board believes that the MVMA should encourage motor vehicle manufacturers to develop and apply more effective technology in the design, engineering, placement in the vehicle, and protection of fuel system components to prevent, to the extent practical, their being damaged during collisions involving higher speed differentials and thereby prevent substantial fuel spillage.

The Safety Board has, in the past, addressed recommendations to the MVMA and has been pleased with the MVMA's positive responses to those recommendations. The Board believes that application of existing technology to prevent fuel loss, fires or explosions can be accomplished most expeditiously by the voluntary efforts of the various MVMA members. Also, collision testing should be done with vehicles in braking configurations to more closely simulate real-world collisions. In responding to the Board's Safety Recommendation H-79-44 on this topic, the NHTSA stated that such testing was not practical due to the difficulty in repeating the tests. The Safety Board requested that NHTSA provide any statistical information to substantiate its conclusions. Safety Recommendation H-79-44 is being held open pending receipt of further information from the NHSTA.

The Safety Board recognizes that funding is limited and that the NHTSA has assigned a higher priority to several projects other than fuel system integrity. However, the catastrophic nature of the vehicle fire phenomenon demands more immediate attention. The MVMA and its membership can provide this immediate attention. The Safety Board will continue to monitor the incidence and results of vehicle fires in future investigations and through the evaluation of available statistics. If no reduction is noted, the Safety Board will seek regulations to reduce the incidence of

vehicle fires. However, the cooperation of the MVMA and its constituent organizations should pursue the voluntary application of existing technology as a more rapid and less onerous approach to eliminating the vehicle fire phenomenon.

Therefore, the National Transportation Safety Board recommends that the Motor Vehicle Manufacturers Association:

> Review current state-of-the-art technology related to motor vehicle fuel systems and determine which elements of that technology might be used in the design, engineering, placement in the vehicle, and protection of fuel system components to reduce breaches of the fuel system and to minimize fuel spillage if the fuel system is breached. Consider high-speed impacts and underride/overide impact dynamics in selecting effective countermeasures. (Class II, Priority Action) (H-84-03)
>
> After selecting the technology to enhance fuel system integrity, strongly encourage all Association members to employ that technology in the manufacture of motor vehicles. (Class II, Priority Action) (H-84-04)

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility ". . . to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (P.L. 93-633). The Safety Board is vitally interested in any actions taken as a result of its safety recommendations, and would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter.

BURNETT, Chairman, and BURSLEY and McADAMS, Members, concurred in these recommendations. GOLDMAN, Vice Chairman, and ENGEN, Member, did not participate.

By: Jim Burnett
Chairman