December 10, 2010

The Honorable David L. Strickland
Administrator
National Highway Traffic Safety Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

Federal Motor Vehicle Safety Standards; Rear Impact Guards; Rear Impact Protection; Technical Report on the Effectiveness of Underride Guards for Heavy Trailers; Docket No. NHTSA-2010-0150

Dear Administrator Strickland:

The National Highway Traffic Safety Administration (NHTSA) has requested comments on the report referenced above. According to the Fatality Analysis Reporting System (FARS), about 10 percent of passenger vehicle occupant fatalities occur in crashes involving large trucks. Federal Motor Vehicle Safety Standards (FMVSS) 223 and 224 require rear underride guards on some tractor-trailers and are the only regulatory efforts to address crash incompatibility between passenger vehicles and large trucks. The Insurance Institute for Highway Safety (IIHS) is pleased NHTSA recognizes the need to evaluate the effectiveness of these standards.

A recent IIHS study of cases from the Large Truck Crash Causation Study (LTCCS) found that many underride guards built to comply with one or both of the safety standards fail in real-world crashes and allow excessive passenger vehicle underride (Brumbelow and Blanar, 2010). The most common failures were due to weakness in the attachment between the guard and trailer, deformation of the trailer chassis itself, or excessive bending of one outboard end of the guard in partial overlap crashes. Many cases of severe underride involved trucks and trailers that were exempt from FMVSS 223 and 224.

Due to the small sample and LTCCS inclusion criteria restricting cases to injury-producing crashes, the IIHS study could not compare the risk of underride or injury by guard type, as NHTSA attempted to do in its technical report. In fact, the requirements issued by the Interstate Commerce Commission in 1953 were so minimal that any improvement relative to that regulation should not be regarded as the definition of an adequate standard. Still, it would be helpful to know what progress has been made since FMVSS 223 and 224 were introduced in 1998. Unfortunately, none of the three sets of analyses in NHTSA’s report provides a meaningful assessment of underride guards on heavy trailers.

The first set of analyses was based on 1985-2008 FARS data. The report acknowledges that because FARS contains information on only the tractor unit for tractor-trailers, it is impossible to determine whether FMVSS 223 and 224 were in effect when the trailer was manufactured or whether the type of trailer even would be subject to the regulation. Nonetheless, the agency sought to determine whether the assumed increase in the percentage of the large truck fleet equipped with FMVSS-compliant guards each year was resulting in fewer fatalities. No decreases were identified, and the report stated “many other factors that affect trends in the distributions of crashes…could mask the effect, if any, of the new underride guards.” IIHS agrees and believes that if fatality reductions had been identified, it would be incorrect to attribute them to the safety standards being evaluated in the report.

The second data source NHTSA analyzed was 1993-2007 police-reported crashes in Florida, because the state includes a code for trailer model year. NHTSA reported driver fatality odds ratios for passenger vehicles striking 1998 model year or later trailers relative to vehicles striking 1980-93 model year trailers. FMVSS 223 and 224 became effective in January 1998, and the Truck Trailer Manufacturers Association issued a recommended practice in 1994 that included some components of the safety standards. The odds ratios were adjusted for differences in fatality rates for crashes not considered to involve the rear of a trailer. NHTSA reported an overall adjusted odds ratio of 0.73, but this was not statistically significant. Even if the estimate had been significant, there still would be uncertainty surrounding its interpretation due to inconsistencies in the data over time. NHTSA attempted to control for these differences by
separating data into three calendar year groups: 1993-2001, 2002-05, and 2006-07. The numbers of crashes involving a tractor-trailer and passenger vehicle varied dramatically among these groups, as did the rates of driver injury. NHTSA reported adjusted fatality odds ratios of 0.21, 0.68, and 2.45 for the three groups, respectively. Without understanding the reason for the large difference among the results, ranging from a 79 percent reduction in fatality rates to a 145 percent increase, it is difficult to accept the meaningfulness of the combined overall odds ratio. In addition, because it was unknown how many trailers were exempt from either the old or new regulation, it would not be possible to attribute a specific improvement to a certain type of guard.

The third dataset NHTSA analyzed was a 2005-07 special data collection project conducted with the North Carolina State Highway Patrol. The project was limited by a small crash sample, with a total of 11 drivers who sustained fatal or incapacitating injuries in crashes with the rear of a trailer. Even with the small sample size, the odds ratio suggesting an 83 percent reduction in fatalities for 1998 and newer trailers was close to being statistically significant. But it is unclear whether any effect was due to differences in the underride guards or something else because NHTSA chose to categorize trailers only by model year, despite having collected guard type information as part of the project. The police-coded data on guard type were ignored due to “questionable accuracy,” with many of the newer trailers coded as having no guard or a guard that did not meet the dimensional requirements of FMVSS 224. NHTSA’s assumption that ignoring the coded guard type would only underestimate the effectiveness of compliant guards may be incorrect because some of the reasons a trailer may be exempt from the standard also could make the trailer less likely to produce underride (e.g., wheels-back or low-chassis trailers).

Ignoring police-reported data on guard type is problematic for other reasons. It is unclear why other data from the police-reported supplemental form (e.g., underride severity, impact angle, impact location) were used in analyses if data on guard type were unreliable. In fact, the possibility that 29 percent of the 1998 and newer trailers did not have FMVSS-compliant underride guards, as indicated by police in North Carolina, seems reasonable. In the LTCCS cases studied by IIHS, 45 percent of trailers built after the effective date of FMVSS 223 and 224 were exempt from the standards. Also, without knowing which trailers had guards and which guards extended to within 100 mm of the trailer’s outboard ends as required by FMVSS 224, the North Carolina crash data should not be used to conclude that “the center portion of the underride guard resists passenger compartment intrusion better than do the edge portions of the underride guard.” Although the design of typical FMVSS-compliant guards does make them vulnerable to failure in partial-overlap loading (several such real-world cases were found in the IIHS study), grouping outcomes for trailers that are likely to have different guard types is not a valid assessment of the problem.

In conclusion, IIHS believes rear underride of large trucks remains a substantial problem. We are continuing our research in this area and encourage NHTSA to do the same. The agency’s technical report does not provide a valid comparison of guards built according to FMVSS 223 and 224 with those built to previous regulations. Furthermore, it is more important to evaluate the standards against a reasonable expectation of real-world performance than the 1953 rule with its nominal dimensional requirements.

Sincerely,

Matthew Brumbelow  
Senior Research Engineer

Reference  