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October 1, 2012

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

Request for Comment on Technical Report; *Evaluation of the Enhancing Vehicle-to-Vehicle Crash Compatibility Agreement: Effectiveness of the Primary and Secondary Energy-Absorbing Structures on Pickup Trucks and SUVs* (DOT HS 811 621, Greenwell); Docket No. NHTSA-2012-0070

Dear Administrator Strickland:

The Insurance Institute for Highway Safety (IIHS), Alliance of Automobile Manufacturers (AAM), and Association of Global Automakers are pleased to provide comments on the technical report on the evaluation of the Enhancing Vehicle Compatibility (EVC) group's voluntary commitments to improve vehicle safety. All the major automakers who participated in the EVC efforts are represented in this response.

We applaud the National Highway Traffic Safety Administration (NHTSA) for undertaking this important evaluation. We are proud to have developed the EVC voluntary commitments to enhance light truck compatibility with cars in crashes that has resulted in their rapid implementation in the fleet.

Background

In the late 1990s, research indicated the potential for increased injury risk posed to car occupants in crashes with light trucks. Research and testing at the time indicated that the geometric mismatch (front structure height difference) between light trucks and cars was a contributor to the incompatibility observed in crashes between light trucks and cars. Other factors related to crash compatibility between cars and light trucks include differences in mass and front-end stiffness. In frontal crashes, there was observed override of the frames of the light trucks over the primary energy-absorbing structures on cars, thereby underutilizing the car's energy-absorbing capabilities. In side impacts, the higher light truck front structures were found to often override car door sills leading to increased deformation, and in some cases the higher light truck hood heights resulted in direct head trauma to the car occupants on the struck side. (Gabler and Hollowell, 1998; Lund et al., 2000, Nolan et al., 1999; Summers et al., 1999)

In light of the 1990s research, NHTSA (in 2003) challenged the automobile industry to develop a voluntary agreement to enhance the compatibility between light trucks and cars in crashes. The EVC was created, whose members consisted of nearly every major automaker represented in the U.S. market. The EVC divided its task by crash mode; one working group focused on front-to-side impacts, especially cars struck on the side by light trucks, and the other focused on light truck geometric changes for front-to-front crashes between light trucks and cars. The EVC front-to-side commitment utilized side impact crash testing that resulted in all applicable passenger vehicles being equipped with head-protection side airbags by September 1, 2009. The EVC also committed to address the interaction in front-to-front crashes by requiring the primary front-end energy-absorbing structure of light trucks to be lowered or augmented to potentially better interact with car structures (Alliance of Automobile Manufacturers and Association of International Automobile Manufacturers, 2003; Barbat, 2009).

Crash Data Analyses

In a 2003 study, IIHS conducted an analysis of real-world two-vehicle frontal collisions between passenger vehicles (cars, SUVs, pickups) and estimated that death rates could be 8-28 percent lower in frontal crashes between SUVs and cars if the SUVs became 'car-like' in their interaction with other cars in

crashes (O'Neill and Kyrychenko, 2003). This estimate provides an upper bound estimate for the benefits that could be expected in enhancing light truck interaction with cars.

In a 2008 study, IIHS analyzed partner vehicle fatality rates for light trucks already meeting the EVC criteria versus light trucks that did not yet meet the criteria (Baker et al., 2008). The study showed that meeting EVC criteria led to a statistically significant reduction of partner car death rates in frontal and side impact crashes by 19 percent when controlling for vehicle mass. This result is within the range estimated by O'Neill and Kyrychenko in 2003.

The 2012 NHTSA study by Greenwell is similar to the IIHS 2008 study but compared vehicles before and after their conformance with the EVC criteria changed. One aspect of the study found an 8 percent estimated reduction in partner vehicle fatality rates for all crashes. This figure rises to 11 percent when restricting to frontal crashes and is 17 percent when further restricting to SUVs in frontal crashes with cars. The latter result is very similar to the Baker et al. finding and is also within the range predicted by O'Neill and Kyrychenko in 2003.

Comparison of Greenwell and Baker et al. Studies

Although similar in intent, the two studies differ in important ways. Greenwell studied 'within vehicle,' comparing the same models before and after a vehicle design was changed to conform to the EVC criteria. This methodology largely controls for driver demographics, assuming buyers of a certain model do not change dramatically over time. However, this method also introduces an age effect — the non-conforming vehicles are necessarily older. This method also does not account for vehicle mass or other changes that may have been commensurate with changes made to meet the EVC criteria. Lastly, the metrics calculated by Greenwell differed slightly from those used by Baker et al. The 8 percent reduction in death rates was for all crashes, not just front-to-front or front-to-side; belt use was uncontrolled, and he counted all occupant deaths in partner cars, not just the driver.

The Baker et al. study compared across vehicles of the same age, which has the benefit of keeping the vehicle age consistent but can introduce driver demographic differences between models. Also important is that Baker et al. accounted for vehicle mass in the analyses. Baker et al. estimated partner vehicle driver death rates in front-to-front or front-to-side crashes by partner vehicle belt use status.

Despite the differing study methodologies, vehicle groups, and study time periods, the estimated reductions in partner car fatality rates are quite similar where they can be compared directly. Table 1 summarizes the results of the Baker et al. and Greenwell studies.

Pickup Trucks

Greenwell estimated an overall negative effect of EVC conformance for pickup trucks in all crashes, although it was not statistically significant. The partner vehicle fatality rates for crashes where the EVC geometric changes could play a role (front-to-front and pickup front-to-side) show a non-significant 2 percent and 0 percent reduction. A similar trend of lesser EVC estimated benefits for pickups also is evident in the 2008 Baker et al. study and the earlier 2003 study by O'Neill and Kyrychenko.

However, partner vehicle fatality rates have fallen for all passenger vehicle categories, including pickups during the last 20 years (Teoh and Nolan, in press). Therefore, it is unclear why pickups appear to be an anomaly in the studies discussed. For example, in 2003 O'Neill and Kyrychenko found a relationship between SUV curb weight and partner car fatality rate, however the same relationship did not hold true for pickups trucks. Given that pickup trucks defied this long-standing relationship, O'Neill and Kyrychenko surmised that there may be other factors associated with the use of pickups that skew the findings.

Table 1
Summary of Baker et al. (2008) and Greenwell (2012) Studies

Crash type	Vehicle type	IIHS 2008 estimate	NHTSA 2012 estimate
Front-front	SUV – belted car	16	
	SUV – unbelted car	26	
	SUV – belted & unbelted	20*	17
	Pickup – belted car	20	
	Pickup – unbelted car	-15	
	Pickup – belted & unbelted	4*	2
	SUV or pickup - belted	19**	
	SUV or pickup - unbelted	5	
	SUV or pickup – belted & unbelted	13*	11
Front-side	SUV – belted & unbelted	30**	24**
	Pickup – belted & unbelted	10	0
	SUV or pickup – belted & unbelted	19**	13**
All crashes	SUV – belted & unbelted	n/a	17**
	Pickup – belted & unbelted	n/a	-5
	SUV or pickup – belted & unbelted	n/a	8**

* Not calculated in original study; estimated based on proportions of belted/unbelted drivers in Baker et al. study
** Statistically significant

Pickup trucks tend to be driven on rural roads and therefore may be involved in more head-on crashes and crashes at higher speeds. Pickups also are intended to carry loads and can tow trailers, which would make them significantly heavier than their curb weights would suggest. Other potential factors include the fact that pickups are heavily customizable for off-road use and can be fitted with lift kits, bullbars, plow attachments, etc., all of which may affect their interaction with other vehicles in crashes.

Summary

The recent NHTSA study is consistent with the findings of previous studies that show the EVC commitments may be saving lives in partner vehicles. The fact that two separate studies using different vehicles, study methodologies, and time periods produce similar results for SUVs is encouraging. More real-world crash data, a better understanding of on-road pickup truck use, and further study of pickup truck design characteristics are needed to better understand why the EVC commitments appear to be conferring lesser benefit to pickups than to SUVs. EVC members remain committed to furthering the knowledge and understanding of ways to further enhance the compatibility of light duty vehicles and are willing to support NHTSA as it explores the issues and questions identified in its report.

Sincerely,

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