

which consist of (1) passenger cars and (2) multipurpose passenger vehicles and trucks under 4,536 kilograms (10,000 pounds) gross vehicle weight rating.¹

According to the 2001 Fatality Analysis Reporting System (FARS), 10,138 people were killed as occupants in light vehicle rollover crashes, which represent 32 percent of the occupants killed that year in crashes. Of those, 8,407 were killed in single-vehicle rollover crashes. Seventy-eight percent of the people who died in single-vehicle rollover crashes were not using a seat belt, and 64 percent were partially or completely ejected from the vehicle (including 53 percent who were completely ejected). FARS shows that 54 percent of light vehicle occupant fatalities in single-vehicle crashes involved a rollover event.

Using data from the 1997–2001 National Automotive Sampling System (NASS) Crashworthiness Data System (CDS), we estimate that 281,000 light vehicles were towed from a police-reported rollover crash each year (on average), and that 30,000 occupants of these vehicles were seriously injured or killed (defined as any fatality or an injury with an Abbreviated Injury Scale (AIS) rating of at least AIS 3).² Of these 281,000 light vehicle rollover crashes, 225,000 were single-vehicle crashes. (The NCAP rollover resistance ratings estimate the risk of rollover if a vehicle is involved in a single-vehicle crash.) Sixty-one percent of those people who suffered a serious injury in single-vehicle towaway rollover crashes were not using a seat belt, and 49 percent were partially or completely ejected (including 40 percent who were completely ejected). Estimates from NASS CDS indicate that 80 percent of towaway rollovers were single-vehicle crashes, and that 83 percent (168,000) of the single-vehicle rollover crashes occurred after the vehicle left the roadway. An audit of 1992–96 NASS CDS data showed that about 95 percent of rollovers in single-vehicle crashes were tripped by mechanisms such as curbs, soft soil, pot holes, guard rails, and wheel rims digging into the pavement, rather than by tire/road interface friction as in the case of untripped rollover events.

According to the 1997–2001 NASS General Estimates System (GES) data, 62,000 occupants annually received

injuries rated as *K* or *A* on the police KABCO injury scale in rollover crashes. (The police KABCO scale calls *A* injuries “incapacitating,” but their actual severity depends on local reporting practice. An “incapacitating” injury may mean that the injury was visible to the reporting officer or that the officer called for medical assistance. A *K* injury is fatal.) The data indicate that 215,000 single-vehicle rollover crashes resulted in 49,000 *K* or *A* injuries. Fifty percent of those with *K* or *A* injury in single-vehicle rollover crashes were not using a seat belt, and 24 percent were partially or completely ejected from the vehicle (including 21 percent who were completely ejected). Estimates from NASS GES indicate that 13 percent of light vehicles in police-reported single-vehicle crashes rolled over. The estimated risk of rollover differs by light vehicle type: 10 percent of cars and 10 percent of vans in police-reported single-vehicle crashes rolled over, compared to 18 percent of pickup trucks and 27 percent of SUVs. The percentages of all police-reported crashes for each vehicle type that resulted in rollover were 1.7 percent for cars, 2.0 percent for vans, 3.8 percent for pickup trucks and 5.5 percent for SUVs as estimated by NASS GES.

III. Background

A. Existing NCAP Program and the TREAD Act

NHTSA’s NCAP program has been publishing comparative consumer information on frontal crashworthiness of new vehicles since 1979, on side crashworthiness since 1997, and on rollover resistance since January 2001 (66 FR 3388). This notice does not establish a new consumer information program on rollover resistance ratings. Rather, it refines our existing rollover resistance rating program in accordance with the requirements of the TREAD Act and the recommendations of the National Academy of Sciences.

The present NCAP rollover resistance ratings are based on the Static Stability Factor (SSF) of a vehicle, which is the ratio of one half its track width to its center of gravity (c.g.) height (see <http://www.nhtsa.dot.gov/hot/rollover/> for ratings and explanatory information). After an evaluation of some driving maneuver tests in 1997 and 1998, we chose to use SSF instead of any driving maneuvers to characterize rollover resistance. As we explained in our notices establishing rollover NCAP, we chose SSF as the basis of our ratings because it represents the first order factors that determine vehicle rollover resistance in the vast

majority of rollovers which are tripped by impacts with curbs, soft soil, pot holes, guard rails, etc. or by wheel rims digging into the pavement. In contrast, untripped rollovers are those in which tire/road interface friction is the only external force acting on a vehicle that rolls over. Driving maneuver tests directly represent on-road untripped rollover crashes, but such crashes represent less than five percent of rollover crashes.³

At the time, we believed it was necessary to choose between SSF and driving maneuver tests as the basis for rollover resistance ratings. SSF was chosen because it had a number of advantages: it is highly correlated with actual crash statistics; it can be measured accurately and inexpensively and explained to consumers; and changes in vehicle design to improve SSF are unlikely to degrade other safety attributes. We also considered the fact that an improvement in SSF represents an increase in rollover resistance in both tripped and untripped circumstances while maneuver test performance can be improved by reduced tire traction and certain implementations of electronic stability control that we believe are unlikely to improve resistance to tripped rollovers.

Congress funded NHTSA’s rollover NCAP program, but directed the agency to enhance the program. Section 12 of the “Transportation Recall, Enhancement, Accountability and Documentation (TREAD) Act of November 2000” directs the Secretary to “develop a dynamic test on rollovers by motor vehicles for a consumer information program; and carry out a program conducting such tests. As the Secretary develops a [rollover] test, the Secretary shall conduct a rulemaking to determine how best to disseminate test results to the public.” The rulemaking was to be carried out by November 1, 2002.

On July 3, 2001, NHTSA published a Request for Comments notice (66 FR 35179) regarding our research plans to assess a number of possible dynamic rollover tests. The notice discussed the possible advantages and disadvantages of various approaches that had been suggested by manufacturers, consumer groups, and NHTSA’s prior research. The driving maneuver tests to be evaluated fit into two broad categories: closed-loop maneuvers in which all test vehicles attempt to follow the same path; and open-loop maneuvers in which all test vehicles are given equivalent steering inputs. The

¹For brevity, we use the term “light trucks” in this document to refer to vans, minivans, sport utility vehicles (SUVs), and pickup trucks under 4,536 kilograms (10,000 pounds) gross vehicle weight rating. NHTSA has also used the term “LTVs” to refer to the same vehicles.

²A broken hip with splintering of the bone is an example of an AIS 3 injury.

³NHTSA Research Note, “Passenger Vehicles in Untripped Rollovers,” September 1999.