March 27, 2008

Ms. Nicole Nason, Administrator
National Highway Traffic Safety Administration
1200 New Jersey Avenue, SE
Department of Transportation, West Building
Washington, DC 20590

Comments on Federal Motor Vehicle Safety Standard No. 216, Roof Crush Resistance, Supplemental Notice of Proposed Rulemaking, 73 FR 5484, January 30, 2008, Docket No. NHTSA-2008-0015

Dear Administrator Nason:

We are pleased to have the opportunity to submit these comments, following up on meetings held October 3, 2006, December 13, 2006, and February 23, 2007 with representatives from NHTSA. In these comments we address concerns arising from submissions to the docket by industry that were posted after the close of the formal comment period, as well disappointment with the supplemental notice of proposed rulemaking (SNPRM) issued earlier this year. We acknowledge the comments of Advocates for Highway and Auto Safety (Advocates) and support the perspectives contained therein.

We are disappointed that the agency's notice fails to provide enough information for meaningful public comment. NHTSA does not spell out explicit safety benefits of mandating a two-sided test, nor does it explain how using the one-sided test procedure would "establish performance criteria . . . relating to roof strength for driver and passenger sides," consistent with the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users of 2005 (SAFETEA-LU).[1]

We will address our concern that NHTSA has still not met its statutory obligation under the SAFETEA-LU in this SNPRM. The agency has also failed to propose a comprehensive, whole-vehicle approach to addressing rollover. Further, we will respond to the late submissions by industry, drawing from research that has been completed since the close of the formal comment period on the NPRM. We will express disappointment that in light of the meetings Public Citizen, the Center for Auto Safety, the Center for Injury Research, and Xprts, LLC, have had with NHTSA, including NHTSA's visit to Xprts, LLC's rollover test facility in Goleta, California on February 23, 2007, the agency makes no mention of dynamic rollover testing in the SNPRM.

The congressional mandate under SAFETEA-LU required that NHTSA revisit rollover mitigation in a comprehensive way. NHTSA has failed to address the rollover safety issue since it was directed by the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991 to establish a stability standard. This standard has never been issued and was abandoned after an advance notice of proposed rulemaking in 1992.[2] The rulemaking action was terminated in 1994, and American drivers are still waiting for a meaningful, comprehensive approach to rollover fatalities.[3]

I. NHTSA HAS FAILED TO MEET ITS STATUTORY MANDATE UNDER SAFETEA-LU.

NHTSA's inaction in the face of the mounting rollover death toll and its failure to protect the public in the aftermath of the Ford-Firestone deaths prompted an outraged Congress to demand more from the agency. In this rulemaking, however, NHTSA has failed again to live up to its responsibility. NHTSA's proposed roof crush rule fails to meet Congress's expectations in SAFETEA-LU in four ways: (1) it defies Congress's demand for a two-sided test; (2) it ignores Congress's clear intent that roof crush be addressed as part of a comprehensive response to rollover crashes; (3) it fails to satisfy Congress's expectation of a significant upgrade of the roof crush standard; and (4) it fails to consider dynamic testing.

A. NHTSA Has Ignored the Express Requirement of a Two-Sided Test.

Congress demanded nothing less than a two-sided test in SAFETEA-LU. The law now requires NHTSA to "upgrade Federal Motor Vehicle Safety Standard No. 216 relating to roof strength for driver *and* passenger *sides*"[4] (emphasis added). Congress could not have been any clearer.

NHTSA's response to this simple mandate is inadequate. In its appraisal of the necessity of two-sided testing, the agency conducted two-sided tests on several vehicles. In the NPRM, the agency says "[it] believes that some vehicles may have weakened or strengthened far side roof structures as a result of a near side impact." It continues, "However, based on the few vehicles tested, NHTSA does not have enough information to make a decision on the merits of testing both sides of the roof over the front seat area. The agency plans to conduct further research before it proposes rulemaking action in this area."[5] With this inadequate rationale, NHTSA simply ignored the law and proposed just another one-sided test.

The SNPRM has not sufficiently improved matters. Since the close of the 2005 NPRM comment period, the agency has conducted 26 two-sided tests and states in the SNPRM that "[NHTSA] believe[s] that, with the additional tests conducted by the agency, there is now sufficient available information for the agency to consider a two-sided requirement as an alternative to the single-sided procedure."[6] These tests provide necessary information on change in roof strength between the first and second side impacted. (In the context of real world rollover these are often referred to as the "near" and "far" or "leading and "trailing" sides, which refers to the order in which the two sides impact. Since these designations are directional, either side could be "near" or "far" depending on the circumstances of a given crash.) While it is encouraging to learn that the agency has conducted research about two-sided testing, the agency has still failed to go the distance: the SNPRM merely solicits comment on the costs of changing the standard to a two-sided test, as though a two-sided test were an option NHTSA is free to ignore.

Moreover, the agency's research on two-sided testing is incomplete. The agency found that "the strength of the roof on the second side of some vehicles may have been increased or decreased as a result of the deformation of the first side of the roof," but it does not provide an explanation for why some vehicles experience an increase instead of a decrease.[7] NHTSA provides a limited discussion of the relative benefit of two-sided testing, making only the simplistic assertion that "the adoption of a two-sided alternative would result in some increase in the portion of the fleet that would fail the roof crush requirements beyond the portion estimated in the NPRM. This would increase the benefits as well as the costs of this rulemaking."[8]

Even assuming arguendo that the agency could choose between a one-sided and two-sided test, the agency is simply ignoring the overwhelming evidence from its own testing that it must choose a two-sided test in order to meet the need for safety. The agency explains that the estimated failure rate for vehicles subjected to the two-sided test is nearly 100 percent for vehicles over 6,000 pounds gross vehicle

weight rating (GVWR) and 67 percent for vehicles under 6,000 pounds GVWR at a 2.5 strength-to-weight ratio (SWR). SAFETEA-LU mandated NHTSA to include vehicles up to 10,000 pounds in the rollover standards. Congress did this for a reason – to assure the safety of occupants in these vehicles, which are more prone to rollover. However, in the statutorily mandated two-sided test at 2.5 SWR, there is an amazing 100 percent failure rate. The agency must address this issue directly.

NHTSA makes no comment on what the relative impact to occupant protection would be if it were to adopt the two-sided test — just that a greater portion of the fleet would fail. Moreover, the agency makes no determination on whether one-sided testing is sufficiently predictive of the risk to occupants on both sides — which, of course, it cannot conclude, given that its own testing regime established that 57 percent of vehicles would fail the two-sided, 2.5 SWR test, suggesting that there is a difference in how occupants are affected on the "far" side. Based on its own testing, NHTSA must affirmatively repudiate the "option" of a one-sided test, because the agency's responsibility is to promulgate standards that meet the public's need for safety.

As the law makes very clear, NHTSA has not been given a choice in this matter. SAFETEA-LU assigns NHTSA a mandatory, nondiscretionary duty to upgrade the roof crush performance standard for both passenger and driver sides. Even in the absence of that clear mandate, the overwhelming evidence before the agency, including the agency's own research, which reveals that a two-sided test is necessary to meet the need for motor vehicle safety. NHTSA must require a two-sided test.

B. NHTSA Has Failed to Provide a Whole-Vehicle Approach to Injury Prevention.

The structure of SAFETEA-LU expresses Congress's intent that NHTSA address roof crush in the context of a comprehensive, whole-vehicle approach to rollover. The relevant section of SAFETEA-LU provides:

> **SEC. 10301. VEHICLE ROLLOVER PREVENTION AND CRASH MITIGATION.**
>
> (a) IN GENERAL.—Subchapter II of chapter 301 is amended by adding at the end the following:
>
> > **§ 30128. Vehicle rollover prevention and crash mitigation**
> >
> > (a) IN GENERAL.—The Secretary shall initiate rulemaking proceedings, for the purpose of establishing rules or standards that will reduce vehicle rollover crashes and mitigate deaths and injuries associated with such crashes for motor vehicles with a gross vehicle weight rating of not more than 10,000 pounds.
> >
> > (b) ROLLOVER PREVENTION.—One of the rulemaking proceedings initiated under subsection (a) shall be to establish performance criteria to reduce the occurrence of rollovers consistent with stability enhancing technologies. The Secretary shall issue a proposed rule in this proceeding by rule by October 1, 2006, and a final rule by April 1, 2009.
> >
> > (c) OCCUPANT EJECTION PREVENTION.—
> >
> > > (1) IN GENERAL.—The Secretary shall also initiate a rulemaking proceeding to establish performance standards to reduce complete and partial ejections of vehicle occupants from outboard seating positions. In formulating the standards the Secretary shall consider various ejection

> mitigation systems. The Secretary shall issue a final rule under this paragraph no later than October 1, 2009.
>
> (2) DOOR LOCKS AND DOOR RETENTION.—The Secretary shall complete the rulemaking proceeding initiated to upgrade Federal Motor Vehicle Safety Standard No. 206, relating to door locks and door retention, no later than 30 months after the date of enactment of this section.
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> (d) PROTECTION OF OCCUPANTS.—One of the rulemaking proceedings initiated under subsection (a) shall be to establish performance criteria to upgrade Federal Motor Vehicle Safety Standard No. 216 relating to roof strength for driver and passenger sides. The Secretary may consider industry and independent dynamic tests that realistically duplicate the actual forces transmitted during a rollover crash.[i] The Secretary shall issue a proposed rule by December 31, 2005, and a final rule by July 1, 2008.

Congress clearly expected roof crush to be one element, among several, of a comprehensive approach to rollover. The roof crush mandate of subsection (d) is phrased as "*[o]ne* of the rulemaking proceedings initiated under subsection (a)." It is therefore only one specific element of the overall mandate to "reduce vehicle rollover crashes and mitigate deaths and injuries associated with such crashes" — a mandate that includes several other elements. SAFETEA-LU does not authorize NHTSA to embark upon the roof crush standard in isolation from other responses to the problem of rollovers; instead, Congress expects roof crush to be considered as part of a comprehensive rollover safeguard.

Reframing this roof crush rulemaking into a comprehensive, whole-vehicle response to rollover would not only help NHTSA comply with Congress's intent but would also improve the quality of this rulemaking while setting the stage for quality compliance with the rest of SAFETEA-LU's mandates, such as the ejection mitigation mandate. When a vehicle rolls over, the roof becomes its backbone. When the roof collapses, all of the other safety features of the vehicle are also compromised, such as the belts, side curtain airbags, window glazing, and door retention. A strong roof helps maintain structural integrity, which protects occupants from injury caused by both the intruding roof and the ejection risks created when the deforming roof causes the windows to break and doors to open. Taking a segmented approach that neglects the cumulative effect of the sequence of events in a rollover crash fails to be comprehensive.

Additionally, NHTSA's piecemeal approach results in an unnecessarily limited view of the benefits to society of a strong roof crush standard. The agency's approach to establishing the "target population" fails to integrate the contribution of roof deformation into elements that are excluded. In the rollover cases studied to establish exposure to injury that would be prevented by upgrading the roof strength standard, the agency makes four stipulations: "(1) the roof was damaged in a rollover, (2) the damage was not caused by collision with a fixed object, (3) the fatally injured occupants were not ejected, and (4) those occupants were belted."[9] Insisting on these criteria forces the agency to close its eyes to the many cases of rolls onto roadway objects such as guard rails, full and partial ejections caused by roof deformation resulting in busted windows and opened doors, and fatalities that appear at the end of the rolls to be unbelted because the seatbelts were compromised during the roll.

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[i] When Congress said that the agency "may consider" industry and independent dynamic tests, it directed NHTSA to collect data and make a meaningful assessment of the potential value of dynamic testing in replicating forces during a rollover crash. NHTSA's failure to complete such an assessment is further evidence of the inadequacy of this proposal and the 2005 NPRM.

The SNPRM is only making this deficiency worse. In the new notice, NHTSA explains that it has reduced the roof crush target population again: "[d]ue to the complex nature of a rollover event and the particularized effect of each element of the comprehensive systematic approach taken by the agency to address these crashes, each element addresses a specific segment of the total rollover population."[10] The SNPRM attempts to justify the exclusion of the "segment" of rollover deaths and injuries caused by partial or complete ejection from the benefits estimates of the roof crush standard by blaming the White House: "The ejected occupants in rollover will be considered separately in this rulemaking. The Office of Management and Budget (OMB) does not permit 'double-counting' of safety benefits. Ejected occupants are more appropriately considered in the context of the ejection mitigation rulemaking."[11]

Aside from resulting in an approach to rollover regulation that leaves the public with insufficient protection, this "segmented" alternative to the comprehensive approach has led NHTSA to some inconsistent analytical choices that inappropriately undermine the case for a stringent roof crush standard. On the one hand, NHTSA has diminished the anticipated population which will avoid death and injury from the roof crush standard by claiming that many of those deaths and injuries will already be averted by the standard for electronic stability control (ESC), on the theory that the ESC standard will prevent many of the rollovers from ever occurring. On the other hand, NHTSA refuses to consider that the roof crush standard will prevent many instances of ejection from ever occurring, and that the anticipated population to benefit from the roof crush standard should — under the same theory as NHTSA applies in the case of ESC — include the ejection deaths and injuries that will be averted by a strong roof. NHTSA is not avoiding "double-counting"; it is avoiding facing up to the fact that the public will benefit dramatically from a stringent roof crush standard.

The rollover risks of roof crush, ejection, and seat belt failure are interrelated. If the roof does not deform significantly, it has been demonstrated in various tests as well as in evaluation of vehicles that have rolled over that tempered side window glazing is less likely to fail in a rollover. Since most rollover ejections are through failed side windows, one must conclude that a benefit of strong roofs is reduced ejection. Such protection could be substantially improved if manufacturers used laminated side glazing in their light vehicles. It should be noted, however, that even laminated glazing in side windows will not contain occupants if the window opening is substantially distorted by roof crush in a rollover. For these very reasons, Congress intended that NHTSA take a *comprehensive* approach to addressing rollover fatalities.

The agency could implement a comprehensive, whole-vehicle approach to rollover in a cost-effective way for itself and the industry by requiring a dynamic test, which would make it possible to execute performance tests for belts, doors, ejection, and the roof simultaneously and meet the public's need for safety from the interrelated hazards of rollover crashes. The agency utterly failed in this regard in the NPRM, in which it dodged the question of dynamic testing completely: "NHTSA is not proposing a dynamic test procedure at this time. As previously stated, the agency believes that the current test procedure is repeatable and capable of simulating real-world rollover deformation patterns. Further, the agency is unaware of any dynamic test procedures that provide a sufficiently repeatable test environment."[12] Given the substantial materials submitted to NHTSA about repeatable, dynamic tests, this response is inadequate, and the agency's failure to correct this mistake in the SNPRM is not only inexcusable but also deadly.

Instead of this half-hearted SNPRM, NHTSA should have gone back to the drawing board on the roof strength standard and considered new methodology that would better replicate potential harm to occupants in rollover crashes.

C. NHTSA Has Not Significantly Improved Occupant Protection Through a Meaningful Upgrade of FMVSS 216.

Congress handed NHTSA a stringent mandate for an upgraded roof strength standard. Congress did not pass SAFETEA-LU to end up with NHTSA merely fiddling around on the margins of the roof crush performance standard. Instead, Congress demanded an "upgrade" of the standard, and it pointed NHTSA in bolder directions by encouraging the agency to "consider industry and independent dynamic tests[ii] that realistically duplicate the forces transmitted during a rollover crash."[13] Unfortunately, the agency has failed to follow Congress's direction and, instead, has offered "improvements" so marginal they hardly qualify for the "upgrade" Congress required.

In order to deliver the upgrade demanded by Congress, the agency must develop a test that promotes the development of safer vehicles. In order for manufacturers to comply, they must have information about how a vehicle performs in rollover from a representative, two-sided dynamic test. As the agency knows well, from its own two-sided testing and from the material in the NPRM docket, a one-sided test for roof strength does not provide an adequate representation of real-world crashes. NHTSA's own tests revealed that the impact in rollover is not same on both sides. Moreover, the agency knows from the approximately 200 cases evaluated in depth by Donald Friedman[iii] and submitted to the docket that, in the vast majority of rollover cases, the injured party was typically seated on the "far" side — that is, the side of the second impact. No "upgrade" is possible without *requiring* a two-sided test, which the agency has still failed in the SNPRM to do.

The agency has instead backed away from the upgrade it knows is possible and necessary. In the 2003 plan to address rollover crash fatalities, NHTSA recommended initiatives that would have more significantly overhauled the roof strength standard than what it proposed in 2005 or 2008. The agency stated that it was "evaluating different angles of the loading plate for the FMVSS No. 216 test to determine whether they may make a difference in roof crush pattern."[14] This evaluation could have been extended to include differences on two sides or to establish whether the crush pattern on the "near" side warranted changing the platen angle for the "far" side. Instead, the agency has failed to conduct a complete overhaul of the roof strength standard. It has not meaningfully researched ways in which the roof strength standard could be implemented to be more representative of real world crashes or result in better occupant protection profiles. These failures are all the result of NHTSA's larger failure to provide the "upgrade" that Congress required in SAFETEA-LU.

The National Traffic and Motor Vehicle Safety Act of 1966 requires that the agency's rulemaking "meet the need for motor vehicle safety." Considering that rollover accounts for nearly 25 percent of motor vehicle fatalities, the agency's failure to adequately upgrade the roof strength standard does not meet the need for motor vehicle safety.

III. MANUFACTURERS' LATE SUBMISSIONS TO THE DOCKET EXPOSE FURTHER WEAKNESSES OF NHTSA'S PROPOSAL.

There were several submissions from auto manufacturers after the close of the formal comment period for the NPRM. Docket entry dates for these submissions were: July 25, 2006 (#232), August 3,

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[ii] As described later in these comments, Ford, with the controlled rollover impact system (CRIS), General Motors, Nissan, and the Center for Injury Research have all developed dynamic rollover tests, but NHTSA fails to mention this work and the innovative testing devices developed for such dynamic testing in this SNPRM.

[iii] These cases were gathered from litigation, which, as we have repeatedly advised the agency, is a rich source of information about vehicle performance, safety and injury, which the agency ignores to the public's detriment.

2006 (#233), August 11, 2006 (#234), September 7, 2006 (#236 and #237). These late submissions prompted a letter to Ronald Medford, dated August 3, 2006, in which Public Citizen, Advocates for Highway and Auto Safety (Advocates) and the Center for Auto Safety requested a meeting to discuss these submissions. Public Citizen would like to take this opportunity to respond to these submissions, as the agency does not appear in the SNPRM to have repudiated the claims made by the manufacturers.

These late submissions deal with industry objections to the proposed tie down procedure, a request for use of FMVSS 220 for long roofline vehicles, and concerns about low roofline vehicles. The manufacturer submissions represent several considerations that are significantly different than the proposed rule and, if incorporated into the final rule, would result in an even greater deviation from NHTSA's legal obligations. Some of these major changes would make compliance easier to achieve, because the standards to which a vehicle would comply could effectively be tailored to that vehicle, allowing more vehicles to pass — at a significant cost to public safety. Further, the late submissions of industry expose the failure of the platen test to adequately represent real-world crashes.

A. Industry Submissions Underscore Weakness in Proposed Tie-Down Procedure.

The Alliance of Automobile Manufacturers and DaimlerChrysler submitted comments expressing concern with the agency's proposal to support body-on-frame vehicles with only fore and aft supports. Their comments suggest that when the small platen is applied to each front corner, there is a greater amount of roof intrusion because of a bending motion of the vehicle. They want to limit this roof intrusion by recommending a greater number of vehicle supports, or a continuous support.

The concern about the misrepresentation of roof crush due to the placement of supports in body-on-frame vehicles demonstrates that the platen test does not provide a realistic representation of the forces on the roof in rollover. The bending of body-on-frame vehicles using this tie-down procedure is a result of the upward force of the supports on the vehicle. In a real-world rollover, there would be no upward force on the bottom of the vehicle, because the vehicle would be inverted. This problem would be masked but not eliminated by industry's tie-down proposal. It would disappear altogether, however, with a dynamic rollover test.

B. Industry Submissions About Long Roofline Vehicles Underscore Need for Dynamic Test.

Manufacturer submissions also express concerns about the amount of intrusion on long roofline vehicles, such as vans and SUVs, as a result of the small platen size proposed in the NPRM. The claim is that the loading of forces in long roofline vehicles is unrealistic and that long roofline vehicles should be able to use FMVSS 220, which applies to school bus rollover roof crush. FMVSS 220, which has not been amended since it was issued in 1976, would result in two different test protocols for (1) vehicles that exceed 10,000 pounds and (2) those that are under 10,000 pounds. Manufacturers claim that use of FMVSS 220 for long roofline vehicles should be allowed at their discretion. Doing so would allow industry to practically tailor the test used for compliance to the roof crush standard such that virtually no vehicle would fail. In their comments, manufacturers also claim that use of the small platen recommended in the proposal could actually puncture the roof of long roofline vehicles and that this is not representative of real-world crashes.

Once again, the manufacturers' late submissions show the inadequacy of the platen test at accurately representing real-world crashes. Their argument that the loading of the small platen is not realistic serves to show that the proposed NHTSA procedure as outlined fails to test the performance of the roof in a situation that mirrors real-world crashes. These concerns of the industry would once again be made irrelevant were the test procedure proposed by NHTSA realistic.

C. Industry Submissions About Low Roofline vs. Tall Roofline Vehicle Roof Strength Test Highlight Need for Agency to Focus on Injury Prevention.

Manufacturer submissions are concerned about the no-head-contact provision of the proposal with respect to low roofline vehicles. In its April 13, 2006 presentation to NHTSA, DaimlerChrysler argues that the no-head-contact criterion is appropriate for tall roofline vehicles, but that for low roofline vehicles it is not appropriate. It makes several arguments appealing variability in the tests due to potential variance in dummy positioning and the interior characteristics of different vehicles. Manufacturers further attempt to show that the no-head-contact provision is unnecessary because there is no correlation between roof crush and injury. As an alternative to the 50th percentile Hybrid III dummy used to test for no head contact, General Motors proposes the use of a headform on a rigid support, which would decrease the variability of the head position during the test.

The agency has a responsibility to promote standards which protect the occupant. The force-deflection criterion suggested by industry would result in a significant number of front seat occupants suffering head and neck injuries. Manufacturer comments on the no-head-contact provision show that industry is concerned only with meeting the standards NHTSA provides and is not concerned with promoting occupant safety. Therefore, the agency must require standards that protect the occupants, which includes issuance of standards that prevent the vehicle roof from intruding into the occupant's survival space.

D. Industry Submissions Disputing that Roof Crush Causes Injury Underscore Need for Injury Prevention Metrics for the Rollover Standard.

Ford submitted comments to the docket on October 20, 2006 challenging the results of the Austin study, which showed a connection between post-crash headroom and injury.[15] In these comments, Ford makes the claim that rollovers are violent events, and that the injury potential is an extension of the violence of such accidents.[16] The claim that rollovers are violent events and that roof crush is an extension of this is simply not true. In fact, a study about how advanced design can lead to rollover protection explains that "in virtually every rollover test and accident the authors and their colleagues have analyzed, the vertical velocity of the vehicle's center of gravity at roof touch down is less than about 2.5 meters/sec."[17] A review of studies on the correlation between post-crash head room and injury conducted by Donald Friedman shows: "For head, face and neck injuries AIS 2 or less, the average residual headroom is around plus 3cm (+1 in). For more serious injures, the average residual headroom is minus 13 cm (-5 in)."[18]

There have been several studies, including a recent study by Martha Bidez, a professor and trained biomechanical engineer, submitted to the docket on October 27, 2006, showing that "torso augmentation" or "diving" theory is not supported by the data. She argues, "For this diving/torso augmentation hypothesis to be accepted, the load in a locked seat belt must necessarily *increase* as the torso continues to move toward the head during the injurious neck loading event . . . .During the time interval of the catastrophic neck loads in the passenger dummies, the shoulder belt load, which should be *increasing* in magnitude as it resists torso augmentation, consistently *decreases* by 65-85% to only 10 lb, in some cases."

Aside from the apparent harm to the occupant from the intruding roof contacting the occupant's head, causing head, face, and neck injuries, there are secondary causes of injury due to roof crush. When the roof impacts the ground, and there is deformation, this reduces the vehicle's structural integrity. Often the window glass breaks, which can further weaken the structure of the roof, while creating openings for occupants to be partially or completely ejected. The seat belts, which are mounted to the frame of the vehicle, can go slack due to the roof deformation, making them ineffective against

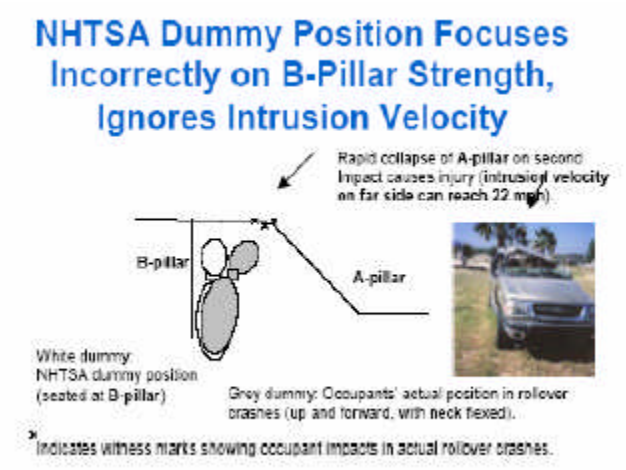
preventing occupant ejection and head contact with the roof. When a vehicle rolls, the roof fails and compromises the ability of other safety systems of the vehicle to protect occupants.

The current test does not adequately measure the injury potential to an occupant as a result of roof crush. The upgrade of this standard should include a dummy that can be used to effectively estimate potential injury to an occupant. Also, the standard should be written from an injury prevention metric, rather than inches of roof crush. In the NPRM, the agency proposes a "no head contact" provision as the measure of how much roof crush should be allowable. Recasting the "no head contact" provision from the perspective of injury prevention would avoid the problem of significant variation in allowable roof crush in vehicles with different amounts of headroom. Considering the standard from this perspective would also promote the development of vehicles that protect occupants in the event of rollover.

IV. VOLUNTARY ACTION BY INDUSTRY IS NOT A SUBSTITUTE FOR A STRONG FEDERAL STANDARD.

In recent years, the automotive industry has made announcements that it is improving rollover protection in advance of the agency mandate. Ford announced that it would increase the roof strength of 11 of its vehicles in excess of proposed increase in the FMVSS 216 NPRM.[19] General Motors also recently unveiled a new rollover test facility on December 5, 2006, in conjunction with an announcement that it will install side curtain airbags in all models by 2012.[20] We have heard these promises before, and they rarely result in safety improvements.

In a docket submission by Ford, the calculation of the maximum potential future roof strength is reflected by comparing the roof strength based on the maximum unloaded vehicle weight.[21] The strength-to-weight ratios in the next column are based on the ratio of the strength for the maximum unloaded vehicle weight strength for compliance at a 2.5 times strength-to-weight ratio compared to the minimum unloaded vehicle weight. This makes it look like the strength-to-weight ratio of these vehicles exceeds the NHTSA standard, but the NHTSA standard does not calculate strength-to-weight ratios in this manner. In the NPRM it states: "NHTSA is proposing to require that the roof over the front seat area withstand the force increase equal to 2.5 times the unloaded weight of the vehicle, not the heaviest vehicle of that type."[22]



Not only are the strength-to-weight ratios listed by Ford based on misleading calculations, but they are also irrelevant in terms of occupant protection. As described above, improving the strength-to-weight ratio is meaningless under the current static test. Industry can merely increase roof strength through the B-pillar, leaving a weak A-pillar, leaving occupants vulnerable to injury when the A-pillar deforms significantly in a real-world rollover.

Voluntary action by the industry too often fails to have a meaningful impact on safety. In 2001, auto manufacturers reneged on promises to improve average vehicle fuel economy, which were withdrawn after congressional action on fuel economy receded. In addition, concluded a Senate Committee Report in 1966, "The promotion of motor vehicle safety through voluntary standards has largely failed. The unconditional imposition of mandatory standards at the earliest practicable date is

only course commensurate with the highway death and injury toll."[23] There is no transparency of proceedings in the development of voluntary standards by industry, and because they are voluntary, there is no guarantee that safety improvements will not be discontinued with no warning and no justification. Voluntary standards also produce a disparity in the safety of higher-end versus lower-end vehicles, because higher-end vehicles may come equipped with additional safety equipment at an additional cost, leaving lower-income car buyers vulnerable to decisions by manufacturers.

The recent announcements by the automotive industry show little promise of improvement to safety of occupants in rollover crashes. General Motors has squandered the opportunity to develop a rollover test facility that provides it with information on how to improve the structural design of its vehicles. The misleading calculations of strength-to-weight ratio presented by Ford do not actually serve to make a meaningful improvement in safety. In fact, Ford's docket submission expresses little desire to achieve a meaningful improvement: "A-pillars are A-pillars and B-pillars are B-pillars regardless of vehicle type. In other words, the constraints on the roof system design are applicable to all affected vehicles. Simply because a particular vehicle can achieve a roof SWR of 3.5 because it has a lower UVW as compared to a full-size pickup truck, does not mean that 3.5 should be the regulatory standard."[24]

The 2005 NPRM states that the strength-to-weight ratio should be based on the unloaded vehicle weight of a particular vehicle.[25] Ford claims that comments that the strength-to-weight ratio should be 3.5 are not grounded in vehicle design and that NHTSA's proposed standard is very stringent because a roof system may apply to vehicles with varying weights, such that "[t]wo vehicles with the same SWR by different UVWs may have roof strength levels that are actually several thousand pounds apart."[26] This may be a peculiarity of roof design; however, if it is the case that A-pillars are A-pillars, regardless of the vehicle type, then this variation of roof strength would already be present in vehicles under the current standard. Increasing the strength-to-weight ratio would merely scale this disparity.

V. NHTSA'S TREATMENT OF EACH PART OF THE ROLLOVER MITIGATION PROGRAM HAS BEEN SHAMEFULLY *DE MINIMIS.*

NHTSA says in the NPRM "each initiative in NHTSA's comprehensive program to address the different aspects of the rollover problem is . . . important."[27] This is true — each initiative is important. But it is just as important that the initiatives work together. NHTSA has instead apparently been making sure that all these initiatives will fail together.

A. The Agency's Approach to Rollover Prevention Is Inadequate.

NHTSA touted its electronic stability control (ESC) rule as the greatest achievement in auto safety improvement since seat belts or airbags.[28] Requiring ESC is certainly admirable and is a major step towards minimizing rollover occupant fatalities. The final rule mandates only the most minimal equipment that qualifies as ESC; however, the benefits estimated in the Preliminary Regulatory Impact Analysis (PRIA) are based on a cross-section of vehicles, all of which have ESC systems more extensive than what was mandated by NHTSA. Furthermore, all of the ESC systems on the market when the NPRM was published were more extensive than systems required by NHTSA.

NHTSA has manipulated the record for ESC in order to undermine the case for roof strength. NHTSA states in the roof strength SNPRM that "ESC will significantly reduce the number of rollover fatalities, and further reduce the roof crush target population."[29] The estimate it gave for rollover fatalities prevented by ESC is grossly overstated: it estimates 5,300 to 9,600 lives saved, without recognizing that these estimates are derived from data involving vehicles with substantially more

protective ESC systems than the bare minimum required in the rule. NHTSA's choice to require less for the ESC rule means that its benefits estimate should be accordingly reduced. Using this inflated estimate, however, allows NHTSA to take cover under OMB's prohibition of "no double-counting" benefits, thus affording a tidy means of understating the rollover fatality crisis.[30]

Moreover, ESC cannot carry the entire burden of rollover protection. Public Citizen supports ESC as part of a comprehensive response to rollover fatalities; however, using ESC as a reason not to improve the roof strength standard is akin to explaining that vehicles should not have crumple zones because they are also equipped with anti-lock brakes.[iv] Crash avoidance and crashworthiness technologies must *both* be employed to help avoid crashes while protecting occupants in vehicles that do crash.

Finally, as shown in the chart below, ESC is limited in its ability to prevent multi-vehicle rollovers, in which case, vehicles should also provide other countermeasures to injury. The agency has not explicitly provided its analysis of what the impact of ESC until the turnover of the light vehicle fleet is completed. NHTSA explains that it will include the estimated impact of ESC in its Final Regulatory Impact Analysis but has provided no upgraded Preliminary Regulatory Impact Analysis for this SNPRM. The only information public commenters have about the impact of ESC is that "the FRIA for the final rule upgrading FMVSS No. 216 will adjust the target population for this rulemaking to reflect the ESC mandate."[31]

Fatal Crash Prevention Potential[32]	Single Vehicle Rollover	Single Vehicle Crash	Multi-Vehicle Crash
Passenger Cars	69%	35%	19%
Light Trucks and Vans	88%	67%	38%

B. The Agency Appears Destined for Failure on Ejection Prevention.

SAFETEA-LU mandated that NHTSA complete a rulemaking on ejection prevention by October 2009. At this time, NHTSA has not issued a proposal; therefore, Public Citizen is unable to discuss what the potential benefit of an ejection prevention rule would be. However, since NHTSA does not address the benefit of a strong roof preventing ejection, we can presume that the roof strength will play no part in the ejection prevention proposal. This is scientifically wrong.

Improved roof strength could play a significant role in preventing ejection. Glazing retention and door retention could be improved by increasing roof strength. Focusing benefits analysis and vehicle design merely on the threat to occupants from roof intrusion oversimplifies the role a strong roof plays in preventing ejection.[33] A strong roof prevents ejection by preventing distortion that breaks the vehicle glazing, causes door locks to fail, and causes deformation to the B-pillar, which contributes to seat belt failure. Failing to sufficiently address roof strength, however, sets the agency up for failure on ejection prevention.

[iv] NHTSA's SNPRM states: "Since ESC is a highly effective countermeasure, preventing roughly half of all rollovers in passenger cars and LTVs, this adjustment will significantly reduce both the target population and the safety benefits associated with FMVSS No. 216" (73 FR 5488). The agency has chosen here to substitute crash avoidance technology for crashworthiness.

C. The Agency Has Not Even Begun to Improve Performance of Door Locks and Door Retention in Rollover Crashes.

In NHTSA's final rule on door locks and retention, the agency relies heavily on the global technical regulation developed for door locks and retention, which resulted in a long rulemaking that ultimately made only a small change in the door locks and retention requirement.

The new door locks and retention requirement specifically fails to have a meaningful impact on preventing occupants from being ejected due to door lock failure in rollover. The new standard does not require testing to determine whether locks will fail under rollover conditions. Testing of door locks and door retention would be yet another aspect of occupant protection that would be augmented by requiring a dynamic rollover test, as opposed to the quasi-static procedure currently used by the agency.

The agency was directed by SAFETEA-LU to complete the upgrade of door locks and door retention by March 2008, under the heading of "[v]ehicle rollover prevention and crash mitigation." NHTSA's final rule states that "[w]hile the agency is continuing to develop a repeatable and practicable test procedure that will address complex loading, today's final rule updates the existing requirements and test procedures to ensure the strength of individual latch components for load conditions that are less complex, such as those that occur in many non-rollover collisions."[34] In other words, NHTSA has ignored completely its obligation to improve door locks and retention *in rollover crashes*.

While the door locks and retention final rule did not address improving door retention under rollover conditions, NHTSA made a note of a door failure in its two-sided test regime: "Between the first and second side tests, the front door on the tested side was opened. Because of damage to the vehicle during the first side test, the door would not properly close. The door was clamped until the latch engaged, locking the door in place. This may have compromised the structural integrity of the roof and reduced the measured peak load on the second side."[35] Improving the performance of the roof will clearly prevent many instances of door failure in rollover crashes; however, by ignoring the interrelationship of roofs and doors in this rulemaking, NHTSA has continued to fail the public on the performance of doors in rollovers.

VI. SIGNIFICANTLY UPGRADING THE ROOF STRENGTH STANDARD IS PRACTICABLE AND FEASIBLE.

A. A Production Vehicle on the Road Today Embodies the Whole-Vehicle Approach to Safety.

A vehicle that promotes occupant safety can, and has been, developed. The design objectives of the Volvo XC90 outline the kind of whole-vehicle approach that the agency should promote as a comprehensive response to rollover.

The Volvo XC90 approaches occupant protection with both crash avoidance and crashworthiness in mind. It is equipped with an electronic stability control system that includes the most state-of-the-art rollover prevention equipment available, significantly beyond the minimal system described in recent proposed rulemaking to mandate the inclusion of electronic stability control systems in all vehicles. The XC90 was also designed to protect occupants in the event of a rollover. These occupant safety features include a strong roof, laminated glass in the windshield and side windows,[v] side curtain airbags, and seat

[v] In later model years, laminated glazing was removed from side windows in the XC90.

belt pretensioners. All of these features — both crash avoidance and occupant safety features — work together to make rollover crashes more survivable.

The Center for Injury Research has conducted both quasi-static (M216 two-sided tests at a 10º pitch angle) and dynamic tests (Jordan Rollover System, or JRS) of the roof crush performance of the Volvo XC90. The vehicle performed exceptionally well in all tests, demonstrating that it is practicable to build production vehicles with adequately strong roofs, in combination with other safety features to achieve superior rollover protection. The Center for Auto Safety has complete data and film from these tests available.

It is important to note that the M216 test is substantially more rigorous than the NHTSA's FMVSS 216 test in that it puts substantially more of the load on the roof over the A pillar. This is a more realistic test of roof crush resistance as demonstrated by the fact that many vehicles that have rolled over show contact with the front fender that can occur only if the vehicle is pitched approximately 10º as it is rolling over. At 10° pitch, the pressures on the A-pillar are substantial, but these conditions are not adequately tested in the agency's 216 SNPRM; therefore, the occupants will not be properly protected in real rollover crashes.

Note that although the Volvo can achieve a strength-to-weight (SWR) ratio of nearly 4 in the FMVSS 216 test, it achieved a SWR of only 2 in a JRS test. This difference strongly suggests that NHTSA's original proposal for FMVSS 216, that the roof resist a platen with a force of 1.5 times the vehicle's weight (SWR) fails to represent real-world crashes. Most contemporary vehicles that Xprts, LLC has tested can barely reach an SWR of 1 in the M216 test. This also shows that manufacturers can currently "game" the system, by developing vehicles with a strong B-pillar, which bears the majority of the force in the agency's proposed platen test, rather than developing vehicles that adequately protect vehicle occupants in rollover crashes with stronger A-pillars and other features we have discussed.

The XC90 is not simply proof of the concept that safer vehicles are possible; it is also proof that safety does not have to break the bank. The total cost for upgrading a Ford Explorer to have the roof strength performance of the XC90 is a mere $81, plus one penny, per vehicle.[36]

The Volvo XC90 documents submitted by Ford Motor Company in the Duncan case in Florida several years ago are in the agency's possession, but Ford has objected to their release in the public docket. However, the agency is well aware from this information how the XC90 performed in rollover tests and how Volvo went about designing a comprehensive approach to rollover occupant protection. NHTSA should use this knowledge in developing the final rule.

B. The Agency Must Take a Hard Look at Substantial Evidence that a Better Standard Is Possible.

1. NASS Data Reveal the Cost-Effectiveness of a Stronger Standard.

Dr. Carl E. Nash conducted a detailed study of all rollover cases from accident years 2002 through 2004 in which a light vehicle that was no more than ten years old rolled over and at least one occupant sustained an AIS 3 or greater injury.[37] Dr. Nash found that for cases of AIS 3+ injuries in vehicles no more than ten years old, the cost — using NHTSA's own injury cost estimates — is in excess of $36 billion. If AIS 1 and 2 injuries and all vehicles on the road were included, the cost would be substantially greater.

In earlier filings by the Center for Injury Research and the Center for Auto Safety, it was shown that the analyses NHTSA conducted on its own National Accident Sampling System (NASS) were not

reflective of real-world events. Fifteen of the 31 cases presented were not representative. Of the cases listed:

- One involved unbelted occupants in contradiction of the selection criteria
- One case was a Chevrolet Camaro with a T-top that would be classified as a convertible, also in contradiction of the selection criteria
- Twelve suffered primary damage in impacts that preceded rollover, so that roof damage is not related to rollover roof crush
- One fatality was a 91-year-old woman who suffered minor injuries that probably would not have killed a younger person

These researchers found that three simple, inexpensive countermeasures — a strong roof, side glazing that does not fail to provide a barrier to occupant ejection during a rollover, and an effective safety belt use reminder — would cost less than $4 billion per year and would save at least $18 billion from reduced injuries. They found that these countermeasures would be cost-beneficial even for passenger cars and even if electronic stability systems reduce rollover incidence by half. Note that this cost estimate is for all light vehicles, while the findings on injuries are based only on an assessment of AIS 3+ injuries in vehicles no more than ten years old, so they are *conservative* as to the overall potential savings. Not included in these estimates were savings from belt pretensioners which would add more cost-effectiveness.

NHTSA's analysis, by contrast, is based on a distorted picture of the injury potential from roof crush. The agency ignores occupants who are ejected as a result of the distortion to the roof. Also, the sample that NHTSA chose for its cost-benefit analysis is not a representative sample of the cases in NASS. The agency has failed to make use of the available crash data in NASS, as Carl Nash's NASS study illustrates. The Nash study shows that it is cost-effective to improve roof strength and occupant safety. Test results from tests of the Volvo XC90 show that a vehicle can be developed with these strategies in mind. These results show that the correct approach to the roof crush problem have the potential to greatly impact the number of rollover fatalities.

2. A Whole-Vehicle Approach to Rollover Occupant Protection Could Be Achieved With Dynamic Testing.

The agency has failed to take a hard look at the availability of dynamic testing apparatuses which could cost-effectively upgrade the roof strength and other rollover standards so that they meet the need for safety.

The Jordan Rollover System shows that a cost-effective dynamic test is possible.

The Jordan Rollover System is a flexible, efficient, dynamic test that can be used to test for roof crush, but can also be used to test ejection and injury potential. The way the test device is designed provides adequate flexibility for the agency to use the device in a number of different ways. The test is efficient, because multiple safety systems could be tested in a single test, which would reduce the burden on the agency to conduct compliance testing. The most important element of the test device is its ability to better approximate real-world roll dynamics in a controlled manner, unlike other dynamic tests.

The JRS can be used to test roof crush resistance under a variety of metrics. Donald Friedman has conducted tests using the Jordan Rollover System for research purposes using a protocol that measures intrusion velocity and dynamic roof crush. The test apparatus can be used in a number of different configurations to suit whatever metric the agency chooses for a compliance standard. The

agency need only change the test protocol, but the basic mechanism only serves to rotate the vehicle in such a way to realistically replicate rollover crashes.

The JRS can be used to test other rollover performance needs. The agency, under SAFETEA-LU, is required to initiate rulemaking on performance standards to reduce complete and partial ejection of occupants. This should include performance standards for safety belts, including performance of belt pretensioners, side curtain airbag performance, and window glazing retention. In addition, an upgrade of the FMVSS 206 standard, pertaining to door locks and retention, is also required. All of these elements can be tested using the Jordan Rollover System, making use of this system efficient, as many different performance standards can be tested on the same apparatus – and, theoretically, even in the same test.

As we have stated above, the agency has a responsibility to consider a dynamic test that mirrors real-world crashes, and this test has the potential to give the agency valuable information for the development of performance standards, as well as efficient compliance testing for rollover occupant protection.

The JRS can provide valuable information for the design of safer vehicles. The Jordan Rollover System can be configured to collect information about roll dynamics, which can then be used by manufacturers to improve vehicle design to enhance safety. As with frontal, side and rear impact crashes, the use of dynamic testing has provided industry with information that allows for the improvement of vehicle design to withstand crashes of that type. As a result, there has been a reduction in fatalities, particularly in frontal and side impact crash modes.[38]

A similar approach must be taken with respect to rollover crashes. Occupant protection, through reduced roof crush as well as ejection mitigation, would effectively reduce rollover fatalities. Vehicle design decisions must be made with the use of representative data about rollover dynamics. Improvements in vehicle design to improve performance on a test that is not representative will not serve to improve occupant safety. A dynamic test, like the Jordan Rollover System, can provide manufacturers with the information needed to improve occupant protection.

The information gathered from dynamic testing such as the Jordan Rollover System can be used to write meaningful performance standards for ejection mitigation equipment. Rollover performance of belts, side curtain airbags, window glazing, and door locks will all require a dynamic test. These performance standards must be developed in accordance with SAFETEA-LU requirements to develop performance standards for ejection mitigation equipment.

The industry is rapidly moving to adopt dynamic testing as well.

The auto industry has been developing dynamic testing for purposes other than assessing roof strength. General Motors unveiled its new rollover test facility in December of 2006. The rollover tests chosen by General Motors are deliberately designed to avoid measuring roof crush. In one test, the vehicle is driven on a ramp, and then tips onto its side.[39] This test can be used to evaluate the deployment of side curtain airbags, which General Motors has publicly announced it will be installing in all its vehicles by 2012, but fails to provide any information about roof crush. The vehicle never fully inverts, and so the test fails to realistically represent a rollover crash. Nissan also recently announced publicly that it has developed an apparatus that is capable of fully inverting a car.[40] The stated purpose of this apparatus is to test seat belt performance.

Neither GM crash test results nor Nissan car flip results are available to the public, so Public Citizen is unable to comment on whether or how these automakers could reconfigure existing test apparatus to test for roof strength. NHTSA could investigate these test methods and assess whether they

could be used for other purposes, or request test results for research purposes in developing a test that would work for roof strength testing.

NHTSA should at least conduct research on dynamic testing.

NHTSA claims that there is not a sufficiently repeatable dynamic test to test the roof crush resistance standard, but does not outline in its NPRM any plans to research any dynamic tests. The agency says that it does not plan on requiring a dynamic test because a suitable test does not exist; however, it has a responsibility to then propose a study to identify a suitable test, which it has failed to do in this NPRM.

The only such relevant research is utterly and completely inadequate. The roof drop tests that were used by NHTSA to correlate dynamic testing to static testing are criticized in the NPRM: "the inverted drop test does not produce results as repeatable as the quasi-static method. Specifically, NHTSA believes that the drop test would not apply a consistent directional force among tested vehicles because of the vehicle roll that is introduced after the initial roof impact."[41] However, in a real-world crash there would not be a consistent directional force, because of the dynamics of the rolling vehicle would cause the direction of the force to change as the position of the vehicle changed.

The agency must initiate research on dynamic testing for the purpose of identifying or developing a suitable dynamic test. In many of the existing dynamic tests, controllability of the vehicle once the test has been initiated is a problem. The initial conditions can be controlled, but once the vehicle is released, it rolls out of control. This is not the case in the Jordan Rollover System. For this reason, the agency should conduct research on use of either the JRS or a test device that operates under a similar principle — that is, that the vehicle motion can be controlled throughout the test.

The agency raised a variety of concerns with the JRS in particular; however, it has not provided a satisfactory response on the issue of dynamic testing in general. It is the agency's responsibility to consider and weigh available options and make choices in the best interest of safety. Doing so would actually benefit the industry: dynamic testing could be used to test multiple safety components in a single test, which would be more cost efficient than conducting independent tests. Presumably, the ejection potential, which is omitted from the roof strength rulemaking, could be tested using a dynamic apparatus that more realistically portrayed the dynamics of a rollover crash.

VII. THE PROPOSED ADJUSTMENT TO THE PLATEN TEST DOES NOT ACCURATELY ASSESS RISK TO OCCUPANTS IN ROLLOVER CRASHES.

In the 2005 NPRM, NHTSA estimates a target population of only 476 lives that would potentially be saved by changing the roof strength requirement from 1.5 to 2.5 times gross vehicle weight rating (GVWR).[42] The paltriness of this estimate alone illustrates the assertion of Donald Friedman and Carl Nash in the 2001 Enhanced Safety of Vehicle Conference that FMVSS 216 "provides poor emulation of the conditions of actual rollovers that result in serious injury."[43] Friedman and Nash further explain:

> If the force of FMVSS 216 were applied at a greater roll angle, a typical roof would be as much as 30% weaker. However, a greater roll angle more accurately simulates what occurs in a real rollover.

> Dynamic roof loading in rollover almost always fractures or separates the windshield from its frame when the roof first contacts the ground.[vi] Without the strength provided by its windshield, the roof is much more likely to deform and buckle upon its subsequent impact with the ground.[44]

The agency has subsequently learned the same lesson: it found in its two-sided testing program that roof deformation on the first side results in cracked or broken glazing, and says that "the first side test generally produces a weakening of the structure."[45]

Even if the agency chose to ignore the need for dynamic testing, it must at a minimum re-envision the platen test to focus primarily on occupant protection, and a key change that would need to be made is in the no-head-contact requirement. The agency proposes replacing the limit of five inches of platen travel in the existing standard to a requirement that at 2.5 times SWR the roof not make contact with a 50th percentile Hybrid III male dummy. The use of a 50th percentile male dummy ignores injury potential to tall occupants, and the biofidelity of the Hybrid III dummy head for rollover has been questioned: "The human head traveled farther downward and over a longer period of time, while the Hybrid III head rebounded faster after translating downward a smaller distance."[46]

The standard should be written from an injury prevention perspective, rather than limiting inches of roof crush. The "no head contact" provision should be recast from the perspective of injury prevention, which would avoid the problem of significant variation in allowable roof crush in vehicles with different amounts of headroom. Considering the standard from this perspective would also promote the development of vehicles that protected occupants in the event of rollover.

If the agency retains inches of platen travel as a measure of injury potential, then it should lower the allowable intrusion to three inches of platen travel. This course of action is preferable because the agency found "positive post-crash headroom (residual space over the occupant's head after the rollover) reduced the likelihood of suffering a roof contact injury to the head, neck, or face. This real world data shows quantifiable benefits of limiting headroom reduction."[47]

If the agency retains the quasi-static platen test, it should revisit the pitch and roll angle and conduct an assessment of the role vehicle roof geometry in real-world load angles, so that the force is applied to the A-pillar. We agree with recommendations of Advocates that the final rule require:

- an SWR ratio of 4.0;
- a vertical intrusion limit of no more than two inches with maintenance of force level instead of simply achieving peak force;
- and a residual headroom requirement of no less than two inches from the top of the head of a 50th percentile male ATD.

CONCLUSIONS

NHTSA has not produced an adequate proposal to meet its mandate under SAFETEA-LU. As part of a comprehensive approach to reducing rollover fatalities, NHTSA should offer a meaningful upgrade to its roof strength standard. NHTSA must develop a dynamic test that reproduces forces that occupants could reasonably be exposed to in a real-world rollover crash. Changing the static strength to weight ratio gives virtually no information on real-world roof deformation in a rollover crash, but instead

[vi] This is consistent with what NHTSA researchers found in the two-sided roof crush tests conducted for the SNPRM "We note that in all 26 tests, the windshield cracked before completion of the first side test." (73 FR 5487.)

tells us only about the vehicle's ability to withstand an impact like the FMVSS 216 platen test that the agency has described. Public Citizen appreciates that real-world rollover crashes are complex events, and that some degree of simplification is required for rigorous analysis to be conducted. However, the injury potential to occupants in rollover crashes is also largely a dynamic biomechanical event, and therefore the agency cannot adequately estimate the potential for occupant protection without considering roll dynamics.

Roof strength is only part of developing comprehensive vehicle design approaches to protecting occupants in rollover crashes, which kill more than 10,000 people every year. The objective of FMVSS 216 is to prevent occupant injury by maintaining the structural integrity of the vehicle when it rolls over. Significant progress has been made in reducing injury from frontal, rear and side impact crashes. This standard should govern occupant protection from one more direction — the top. Adoption of a dynamic test would give valuable information about how occupants are injured in rollover crashes, which would in turn give the industry information to design safer vehicles. A dynamic test can be used to test other elements of occupant protection, such as side curtain air bags, seat belt performance and belt pretensioners.

The agency has utterly and completely failed to meet the public's need for safety in this rulemaking, much less comply with the clear commands of SAFETEA-LU. Instead of providing the "upgrade" Congress demanded, NHTSA has offered up an inadequate tweak that does not even come close to the current state of the art in rollover testing. Instead of proposing a two-sided test, as required by the law, NHTSA has sketched out a series of *options* that *might* include two-sided testing, but it has not given the public a full proposal to assess, much less a regulatory impact assessment or any evidence to explain the agency's reasons for sketching the possibility of two-sided tests at a range of possible strength-to-weight ratios. Instead of meeting the public's need for safety, as documented in submission after submission to the docket, NHTSA has ignored the substantial evidence in the record before it that its proposal is inadequate: among other things, that the proposal fails to address the injuries caused by the ejection portals created by the crushing roof and by the belt failures that likewise are caused by the deforming roof; that a one-sided test is inadequate; that roof racks and other roof structures, which are exempted from the agency's proposed testing regime, increase the risk to vehicle occupants; that the agency is ignoring risks to people taller than a 50th percentile male dummy; and that the angles used in the platen test fail to reflect real-world rollover crash conditions.

In short, the agency has failed to do its job substantively (meeting the public's need for safety as well as the requirements of SAFETEA-LU) and procedurally (providing a full record to allow the public to evaluate whether the agency is acting with good reason or, instead, arbitrarily and capriciously, much less providing a concrete proposal from which a final rule would be a logical outgrowth). This SNPRM cannot, therefore, be the last word from the agency before issuing a final rule. The agency has no choice but to go back to the drawing board and issue a new notice of proposed rulemaking.

The agency cannot ignore this duty by hiding behind the deadline in SAFETEA-LU for a final rule on roof crush. Although Congress set deadlines in SAFETEA-LU to spur NHTSA into completing rulemakings in a timely manner, this proposal does not sufficiently meet the mandate of Congress. The agency clearly needs more time to complete meaningful research in developing a new test procedure and an occupant injury metric for roof-crush related injuries, and it has latitude to do so under the law: "If the Secretary [of Transportation] determines that the deadline for a final rule cannot be met, the Secretary shall — (1) notify the Senate Committee on Commerce, Science, and Transportation and the House of Representatives Committee on Energy and Commerce and explain why that deadline cannot be met; and (2) establish a new deadline."[48]

Public Citizen would like to see the most expedient possible conclusion to the roof strength standard upgrade practicable; however, we also support an upgrade to the standard that is significantly more protective than the existing standard. NHTSA must exercise its authority to set an extended deadline for this rulemaking. NHTSA should go back to its 2003 plan and complete research programs into developing a more representative test for occupant protection in rollover crashes, and that research must include research on state-of-the-art dynamic testing. NHTSA cannot produce a final rule until it has first returned to the drawing board and produced a notice of proposed rulemaking that outlines a two-sided testing regime that, at a minimum,

- Is accompanied by research for each regulatory option and an assessment of the relative life-saving, injury-averting benefits to the public from each option;

- Assesses dynamic testing, including the possibility of using a dynamic test to assess roof performance in addition to the performance of seat belts, door locks and latches, and windows;

- Proposes to protect the public, including persons not represented by a 50% male dummy, using a performance standard that does its utmost to mimic real-world crash conditions while using an injury prevention metric; and

- Considers the significant benefit of combining all rollover occupant protection measures under a single comprehensive standard resembling FMVSS 208.

[1] P.L. 109-59 § 10301(d). August 10, 2005.
[2] P.L. 102-240. December 18, 1991.
[3] *See* 57 FR 242 (January 3, 1992) and 59 FR 33254 (June 28, 1994).
[4] 49 USC § 30128(d).
[5] 70 RF 49223,49248 (August 23, 2005) at 49239.
[6] 73 FR 5484, 5493 (January 30, 2008) at 5486.
[7] *Id*. at 5487.
[8] *Id* at 5489.
[9] *Id* at 5485.
[10] *Id* at 5484.
[11] Alexander Strashny, "The Role of Vertical Roof Intrusion and Post-Crash Headroom in Predicting Roof Contact Injuries to the Head, Neck, or Face During FMVSS No. 216 Rollovers; An Updated Analysis," National Highway Traffic Safety Administration, DOT HS 810 847 (October 2007).
[12] 70 FR 49240.
[13] 49 USC § 30128(d).
[14] "Initiatives to Address the Mitigation of Vehicle Rollover," National Highway Traffic Safety Administration, June 2003, pp. 16.
[15] Ford Motor Company Comments to Docket No. NHTSA 2005-22143, October 20, 2006 at 241, and Austin et al, "The Role of Post-Crash Headroom in Predicting Roof Contact Injuries to the Head, Neck, or Face During FMVSS No. 216 Rollovers," August 30, 2005, Docket No. NHTSA-2005-22143, at 52.
[16] *Ibid.*
[17] Donald Friedman & Carl Nash, "Advanced Design for Rollover Protection," 17th Paper No. 01-S12-W-94.
[18] Donald Friedman, "Upper Interior Head, Face and Neck Injury Experiments," Paper No. 98-S8-P-11.
[19] David Shepardson, "Ford to Bolster Roofs in Some Models" *Detroit News*, (December 5, 2006).
[20] David Shepardson, "GM to Put Rollover Bags in All Models" *Detroit News*, (December 5, 2006).
[21] James Vondale, Submission to Docket No. NHTSA-2005-22143, November 20, 2006 at 243.
[22] 70 FR 49235.
[23] Committee Report on S. 3005, The Traffic Safety Act of 1966, June 23, 1966.
[24] James Vondale, Submission to Docket No. NHTSA-2005-22143, November 20, 2006 at 243.
[25] 70 FR 49235.
[26] James Vondale, Submission to Docket No. NHTSA-2005-22143, November 20, 2006 at 243.
[27] 73 FR 5485.
[28]"DOT Proposes Anti-Rollover Technology for New Vehicles," Press Release, National Highway Traffic Safety Administration. September 14, 2006.
[29] 73 FR 5484.
[30] 72 FR 17235, 17322, (April 6, 2007) at 17236.
[31] 73 FR 5488.
[32] *Final Regulatory Impact Analysis, FMVSS No. 126, Electronic Stability Control Systems*. Office of Regulatory Analysis and Evaluation, National Center for Statistics and Analysis, National Highway Traffic Safety Administration. March 2007, III-14.
[33] Carl Nash, "What NASS Rollover Cases Tell Us," 20th Conference on the Enhanced Safety of Vehicles, 2007, Paper No. 07-0141.
[34] 72 FR 5385, 5413. (February 6, 2007), at 5386.
[35] 73 FR 5487.
[36] *See* Erin E. Hutter, "Improving Roof Crush Performance of a Sport Utility Vehicle" (Ohio State U., 2007), NHTSA-2008-015-0005, at 63.
[37] Nash, Carl E., "What NASS Rollover Cases Tell Us."
[38] *Priorities for EU Motor Vehicle Safety Design*. European Transport Safety Council. 2001.
[39] David Shephardson, "GM to Put Rollover Bags in All Models" *Detroit News*, (December 5, 2006).
[40] Hans Greimel, "The upside of upside down: Better belts." *Automotive News.* (February 25, 2008).
[41] 70 FR 49240.
[42] 73 FR 5485.

[43] Donald Friedman & Carl Nash. "Advanced Roof Design for Rollover Protection," 17th Conference on the Enhanced Safety of Vehicles, 2001, Paper No. 01-S12-W-94.
[44] *Id*.
[45]73 FR 5487.
[46] Herbst, Brian, Stephen Forrest, David Chng, Anthony Sances, Jr., "Fidelity of Anthropomorphic Test Dummy Necks in Rollover Accidents," 16th Conference on the Enhanced Safety of Vehicles, 1998, Paper No. 98-S9-W-20.
[47] 70 FR 49237.
[48] P.L. 109-59 § 10301(e).