the test device at a rate of not more than 13 millimeters per second until reaching the force level specified in S5. Guide the test device so that throughout the test it moves, without rotation, in a straight line with its lower surface oriented as specified in S7.4(a) and S7.4(b). Complete the test within 120 seconds.

* * * * *

Issued: July 15, 2005.

Stephen R. Kratzke,

Associate Administrator for Rulemaking.

[FR Doc. 05–16661 Filed 8–19–05; 8:45 am]

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DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

49 CFR Parts 571 and 572

[Docket No. NHTSA–2005–21698]

RIN 2127–AH73 and 2127–AI39

Federal Motor Vehicle Safety Standards; Occupant Crash Protection; Anthropomorphic Test Devices; Instrumented Lower Legs for 50th Percentile Male and 5th Percentile Female Hybrid III Dummies

AGENCY: National Highway Traffic Safety Administration (NHTSA), DOT.

ACTION: Withdrawal of rulemakings.

SUMMARY: On February 3, 2004, NHTSA published a notice in the **Federal Register** requesting comments on whether to propose adding a high speed frontal offset crash test to Federal Motor Vehicle Safety Standard (FMVSS) No. 208, ''Occupant crash protection.'' The notice informed the public about recent testing the agency conducted to assess the benefits and/or disbenefits of such an approach. Based on our analysis of those comments, and other information gathered by the agency, we have decided to withdraw the rulemaking proceeding to amend FMVSS No. 208 to include a high speed frontal offset crash test requirement. Additional research and data analyses are needed to make an informed decision on rulemaking in this area. Additionally, we have decided to withdraw the related rulemaking proceeding to amend part 572 to include lower leg instrumentation until further testing necessary for federalization is completed.

FOR FURTHER INFORMATION CONTACT: For non-legal issues: Lori Summers, Office of Crashworthiness Standards, NVS–112, National Highway Traffic Safety Administration, 400 Seventh Street, SW., Washington, DC 20590. Telephone (202) 366–1740. Fax: (202) 366–7002.

For legal issues: Dorothy Nakama, Office of the Chief Counsel, NCC–112, National Highway Traffic Safety Administration, 400 Seventh Street, SW., Washington, DC 20590. Telephone: (202) 366–2992. Fax: (202) 366–3820.

SUPPLEMENTARY INFORMATION:

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I. Background

Improving occupant protection in frontal crashes is a major goal of the National Highway Traffic Safety Administration (NHTSA). Frontal crashes are the most frequent cause of motor vehicle fatalities. In 1972, NHTSA promulgated FMVSS No. 208 to improve the frontal crash protection provided to motor vehicle occupants. The dynamic performance requirements of the standard include frontal rigid barrier crash tests, at angles between perpendicular and ±30 degrees with belted and unbelted dummies.[1] Occupant protection is evaluated based on data acquired from anthropomorphic test dummies positioned in the driver and right front passenger seats. Data collection instrumentation is mounted in the head, neck, chest, and femurs of the test dummies.

NHTSA initiated research in the early 1990s to develop performance tests not currently included in FMVSS No. 208, such as high severity frontal offset crashes that involve only partial engagement of a vehicle's front structure. Such performance tests result in large amounts of occupant compartment intrusion and increased potential for intrusion-related injury. The agency also instrumented the dummies in these tests with advanced lower leg instrumentation, not currently required in FMVSS No. 208, to assess the potential for lower extremity injury, specifically, to the knee, tibia, and ankle.

During the same time period, considerable international research focused on the development of a fixed offset deformable barrier crash test procedure. In December 1996, the European Union (EU) adopted the EU Directive 96/79 EC for frontal crash protection. This directive required vehicle compliance with a 56 km/h, 40 percent offset, fixed deformable barrier crash test. In 1998, Australia introduced a similar regulation for new passenger car model approvals. In addition to these regulations, several consumer information programs also began to utilize the EU Directive 96/79 EC crash test procedure, but raised the impact speed to 64 km/h. These programs included the European New Car Assessment Program (EuroNCAP), Australia NCAP (ANCAP), Japan NCAP and the Insurance Institute for Highway Safety (IIHS) Crashworthiness Evaluation program in the U.S.

Given the world-wide focus on the fixed offset deformable barrier crash test procedure, the conferees on the appropriations legislation for the Department of Transportation for FY 1997 directed NHTSA to work ''toward establishing a Federal motor vehicle safety standard for frontal offset crash testing'' in fiscal year 1997.[2] NHTSA was further directed to consider the harmonization potential with other countries and to work with interested parties, including the automotive industry, under standard rulemaking procedures. In 1997, NHTSA submitted a Report to Congress[3] on the status of the agency's efforts toward establishing a high speed frontal offset crash test requirement. The agency made a preliminary assessment that the adoption of the EU 96/79 EC frontal offset test procedure, in addition to the current requirements of FMVSS No. 208, could result in substantial benefits, since lower leg injuries were typically associated with long-term recovery and significant economic cost. However, the Report to Congress also made note of NHTSA's concerns relative to the potential for exacerbating small and large car incompatibility, as a result of adopting a frontal offset crash test procedure.

During 1998–2002, NHTSA completed over 25 frontal offset crash tests in an attempt to answer a number of research questions. Specifically, what are the merits of a fixed offset deformable barrier crash test procedure and what is the most appropriate dummy size, lower leg instrumentation and impact speed? Dummy injury measures from the fixed offset deformable barrier crash tests demonstrated the potential for injury reductions over and above the full frontal rigid barrier test configuration.[4]

[1] In March of 1997, NHTSA temporarily amended FMVSS No. 208 so that passenger cars and light trucks had the option of using a sled test for meeting the unrestrained dummy requirements. This option will be phased out in accordance with the advanced air bag rulemaking schedule.

[2] Conference Report 104–785, September 16, 1996. This report accompanied H.R. 3675.

[3] Report to Congress, ''Status Report on Establishing a Federal Motor Vehicle Safety Standard for Frontal Offset Crash Testing,'' April 1997.

[4] Docket No. NHTSA–1998–3332.

The results demonstrated that the 5th percentile female dummy generally produced higher normalized lower leg injury measurements than the 50th percentile male dummy under comparable frontal offset crash test conditions.[5] Crash tests comparing lower leg instrumentation showed that the Thor-Lx/HIIIr lower leg instrumentation predicted a higher incidence of foot and ankle injury than the Denton/Hybrid III lower leg.[6] Finally, fixed offset deformable barrier crash tests conducted at a range of impact speeds, including 56 km/h, 60 km/h, and 64 km/h, demonstrated notable differences in the pass/fail rates, with the 56 km/h impact speed being the most benign.

In the 2000 and 2001 Regulatory Plans published in the **Federal Register**, NHTSA indicated that it was considering a rulemaking to establish a high speed frontal offset test. In response, the Administrator of the Office of Information and Regulatory Affairs of the Office of Management and Budget, wrote a letter dated December 7, 2001, asking the U.S. Department of Transportation and NHTSA to consider giving greater priority to modifying its frontal occupant protection standard by establishing a high speed, frontal offset crash test requirement. The letter suggested that if the agency were to give this matter greater priority, the agency would need to refine its estimates of the specific safety benefits that a new offset test would generate. It said that this assessment would also need to include potential losses in existing safety benefits due to possible changes in vehicle structure and design. This reinforced the agency's intent to look at both the benefits and disbenefits from adoption of a high speed frontal offset crash test requirement.

In 2002, the agency initiated a vehicle-to-vehicle crash test program to assess the potential disbenefits of adopting a high speed frontal offset requirement.[7] NHTSA used the vehicle-to-vehicle crash test configuration from the agency's vehicle compatibility program [8] and test vehicles selected from vehicle models that had improved ratings in the IIHS frontal crashworthiness evaluation program.[9] The tests were configured to simulate both vehicles moving at 56.3 km/h, such that the subject vehicle impacted the left front corner of its collision partner at an offset of 50 percent and an impact angle of 30 degrees. Two vehicle-to-vehicle crash tests were conducted for each vehicle model under study, one using an older model and the other using a later redesign. Both vehicles struck a model year 1997 Honda Accord. The two sets of injury measurements for the driver dummy of the Honda Accord were compared to determine which version of the subject vehicle (*i.e.*, the older model or the redesign) imparted higher injury numbers.

The results of the testing suggested that, for some sport utility vehicles (SUVs), design changes that improved their performance in high speed frontal offset crash tests may also result in adverse effects to occupants of their collision partners. The results raised questions about whether or not these results are representative of the effects on collision partner protection in the current fleet, and the extent to which disbenefits to crash partners are associated with design changes made to improve performance in a high speed frontal offset crash test.

Because of our concern, the agency published a request for comments in the **Federal Register** (February 3, 2004, 69 FR 5108).[10, 11] The notice informed the public about the crash tests conducted to date, and sought comments on its findings and on alternative strategies that could be coupled with a frontal offset crash test requirement. The agency also planned to study the performance of four additional vehicle models, from different vehicle classes, that improved IIHS crashworthiness ratings as the result of a vehicle redesign.

Shortly after publication of the Request for Comments, the agency completed the four additional pairs of vehicle-to-vehicle crash tests.[12] The combined results showed that in five of the six vehicle pairs, the head injury criteria of the Honda Accord driver dummy increased when struck by the redesigned vehicle compared to when struck by the older model. Similarly, in four of the six vehicle pairs, the chest acceleration of the Honda Accord driver dummy increased when struck by the redesigned vehicle compared to when struck by the older model. Overall, the earlier trends observed in the SUV vehicle model testing were generally exhibited in the other vehicle classes tested, but to a lesser extent for passenger cars.

II. Summary of Request for Comments

A total of seventeen organizations and private individuals submitted comments in response to the February 3, 2004, request for comments notice on frontal offset crash testing. Comments were submitted by the Alliance of Automobile Manufacturers (Alliance), the Association of International Automobile Manufacturers, Inc. (AIAM), American Honda Motor Co., Inc. (Honda), General Motors Corporation (GM), DaimlerChrysler and Mercedes-Benz USA, LLC (DaimlerChrysler), Ford Motor Company (Ford), the Insurance Institute for Highway Safety (IIHS), the Property Casualty Insurers Association of America (PIA), the Advocates for Highway and Auto Safety (Advocates), and eight comments from private individuals.

Vehicle manufacturers and vehicle manufacturer associations supported the overall goal of reducing lower extremity injuries in frontal crashes, but did not support the agency's pursuing a rulemaking at this time. They recommended that NHTSA conduct additional research on the sources of lower extremity injury, as well as determine the appropriate anthropomorphic test device and injury criteria. Vehicle manufacturers also generally shared NHTSA's concern that some design changes that improve a vehicle's performance in a high speed frontal offset crash test may also result in adverse effects on their collision partner occupants. Consequently, some strongly advocated linking a vehicle compatibility strategy to any frontal offset crash test.

Conversely, the IIHS, PIA, the Advocates, and the majority of the private citizen comments supported the immediate adoption of a frontal offset crash test requirement. The IIHS stated that such a requirement would ensure all vehicle types are designed with state-of-the-art frontal crash protection; however, it believes that NHTSA should not delay the implementation of an offset crash test requirement because of unsubstantiated fears of compatibility disbenefits. The IIHS also stated that such a requirement could not be effective without specifically addressing

[5] Park, Morgan, Hackney, Lee, Stucki, ''Frontal Offset Crash Test Study Using 50th Percentile Male and 5th Percentile Female Dummies,'' Proceedings of the 16th International Technical Conference on the Enhanced Safety of Vehicles, Paper No. 98–S1–O–01, 1998.

[6] Kuppa, Haffner, Eppinger, Saunders, ''Lower Extremity Response and Trauma Assessment Using the Thor-Lx/HIIIr and the Denton Leg in Frontal Offset Vehicle Crashes,'' Proceedings of the 17th International Technical Conference on the Enhanced Safety of Vehicles, Paper No. 456, 2001.

[7] *See* 69 FR 5110.

[8] Summers, Prasad, Hollowell, ''NHTSA's Vehicle Compatibility Research Program,'' Society of Automotive Engineers Paper No. 1999–01–0071, March 1999.

[9] In this program, vehicles are rated based on their performance in a 64 km/h fixed offset deformable barrier crash test.

[10] Docket No. NHTSA–2003–15715.

[11] Comment period subsequently extended to July 5, 2004 (69 FR 18015).

[12] Docket No. NHTSA–1998–3332.

occupant compartment integrity. PIA generally supported the IIHS's position and noted that frontal offset crash testing simulates a crash scenario that current Federal testing does not address. The Advocates further stated that it represents a majority of real world crashes and its adoption would complement full frontal crash tests.

III. Analysis of Comments

The main comments raised in response to the Request for Comments involved the projected benefits and potential disbenefits of a fixed offset deformable barrier crash test, the effect of industry's voluntary compatibility commitments, and consideration of alternative approaches. The following sections briefly analyze each issue.

A. *Underestimated the benefits of improved frontal offset crash protection:* The IIHS suggested that NHTSA greatly underestimated the benefits of improved frontal offset crash protection. It stated that NHTSA's analysis is inconsistent with real-world crash experience, which it said increasingly shows the benefits of improved frontal offset crash test performance for reducing serious and fatal injuries. The IIHS cited a study [13] indicating that drivers of vehicles with good frontal offset crash test ratings involved in fatal head-on crashes with poor-rated vehicles were 74 percent less likely to be the fatally injured driver. The IIHS also cited a Scandinavian study [14] that found that cars with better performance in EuroNCAP had much lower rates of serious injury than cars with worse performance.

The agency reviewed the two publications cited by the IIHS. The IIHS publication showed that drivers of good-rated vehicles involved in fatal head-on crashes with poor-rated vehicles were significantly less likely to be the fatally injured driver. However, since the inter-dependent relationship between frontal offset ratings and important factors such as vehicle age, vehicle weight, driver age, and driver gender were not examined, we question whether the fatality risk for better-rated vehicles might be overstated compared to the poor-rated vehicles. For example, the poor-rated vehicles might be consistently older than the good-rated vehicles, or the good-rated vehicles might tend to be heavier vehicles within a particular rating class. These inter-dependencies could decrease the fatality risk reduction estimated in the study.

We also note that the fatality reductions were only significant for head-on crashes of similar vehicles rated good and poor. Other estimated fatality risk reductions for acceptably and marginally-rated vehicles were inconclusive. In addition, we found that certain statistics were counter-intuitive. For example, for cars (the largest data set in the study), it showed that good-rated cars had higher frontal fatality rates than acceptably- and marginally-rated cars. Finally, the paper did not address the benefits of the frontal offset rating when two potentially incompatible vehicles collided (*i.e.,* car-to-SUV, car-to-pickup, etc.) Therefore, the magnitude of the overall benefit is not clear.

With respect to the Scandinavian field study cited by the IIHS, we are concerned that the comparison of EuroNCAP performance to real-world experience may not apply to the U.S., due to differences in mass distribution between the fleets and greater percentage of unbelted occupants in the U.S. We also observed a number of limitations in the study that raise questions as to whether it is appropriate to attribute life-saving benefits to a fixed offset deformable barrier test. First, the study stated there were insufficient data to separate the frontal impact rating from the side impact rating, so the analysis included both frontal and side impacts together. Consequently, it is unclear to what extent the front or side impact ratings were contributing to the correlation. Second, the paper used the Swedish injury classification of ''severe'' (or ''typically admitted to the hospital''). The resulting correlation to ''severe'' injury may have been driven by lower limb injuries (maximum AIS 3 injuries), rather than life-threatening head or chest injuries. Also, due to insufficient data, the study combined all vehicle categories with similar EuroNCAP ratings together, regardless of mass. This may be problematic in providing meaningful real world results since frontal NCAP ratings (both full and offset) are only comparable within a given weight class. Finally, we found it noteworthy that the paper itself suggested that the results should not be seen as proof that there is a predictive value in the EuroNCAP system, especially not for individual car model scores. Thus, based on our concerns regarding these two studies, we believe more definitive analyses are needed to attribute lifesaving benefits to a fixed frontal offset deformable barrier crash test procedure.

In response to the Request for Comments, the IIHS also stated that NHTSA inappropriately relied solely on injury measures recorded by test dummies and discounted important information about occupant compartment integrity in the agency's tests. The IIHS stated that if the compartment is significantly damaged, good dummy injury measures offer no assurance of effective protection for the range of occupants who sit in different positions and may have different crash kinematics. It also stated that NHTSA's analysis is inconsistent with real-world crash experience, which increasingly shows that improved frontal offset crash test performance reduces serious and fatal injuries.[15]

NHTSA has monitored toe pan and other intrusion measurements in its frontal offset crash tests. While the IIHS strongly advocated that intrusion measurement be included in a future requirement, we have not seen how to express this measurement as a performance requirement that could provide objective results and be used to compute benefits. Ideally, dummy instrumentation should provide an objective and direct assessment of injury risk to a human occupant. However, the IIHS noted that good dummy injury measures, from a test with a single-sized dummy in a single seating position, offer no assurance of effective protection for the range of occupants who sit in different positions and may have different crash kinematics. While we acknowledge that a minimum performance requirement cannot account for every intrusion scenario that occurs in the real world, there needs to be an objective method for converting post-crash intrusion measurements in a particular location, of a particular vehicle, to the number of injuries it might cause for the range of occupants who sit in different positions and have different crash kinematics. Until further analysis can provide guidance on an intrusion-based approach, the agency will continue to consider using two regulated dummy sizes in its frontal offset crash tests to capture the injury spectrum associated with the most vulnerable and average-sized occupants. However, we are exploring development of a performance requirement approach to compartment intrusion, and plan to

[13] Farmer, ''Relationship of Frontal Offset Crash Test Results to Real-World Driver Fatality Rates,'' Traffic Injury Prevention, 2004.

[14] Lie and Tingvall, ''How do EuroNCAP Results Correlate with Real-Life Injury Risks? A Paired-Comparison Study of Car-to-Car Crashes,'' Traffic Injury Prevention, 2002.

[15] The IIHS cited a Scandinavian study that found that cars with better performance in EuroNCAP had much lower rates of serious injury than cars with worse performance. The IIHS also cited their own study that showed that drivers of vehicles with good frontal offset crash test ratings involved in fatal head-on crashes with poor-rated vehicles were 74 percent less likely to be the fatally injured driver.

revisit its potential during the course of future research.

B. *Increased vehicle aggressivity from improved frontal offset crash protection:* Some commenters shared the agency's concern that vehicle design changes that improve performance in high speed frontal offset crash tests may also result in increased aggressivity toward the occupants of their collision partners. As previously discussed, the agency's vehicle-to-vehicle crash tests demonstrated a trend in increased vehicle aggressivity towards collision partners in five of the six redesigned vehicle models tested. The AIAM and the Alliance concurred that the results justify a cautious approach in considering a frontal offset crash test requirement. The AIAM noted that there were instances of injury measures increasing in the struck vehicle, for every type of striking vehicle tested (passenger car, minivan, SUV, and pickup), when comparing the older and newer designs of the striking vehicle. The AIAM stated that the results raise questions regarding possible safety disbenefits resulting from design measures that are intended to improve frontal offset crash performance.

Conversely, the IIHS disagreed with the results of the agency's crash tests and concluded that the agency should ignore these test results in deciding whether to move ahead with a frontal offset crash test. The IIHS stated that, in theory, such tests could isolate the effects on driver dummy injury risk with changes in vehicle stiffness associated with improved crash test performance. However, it stated that most tests confounded changes in vehicle stiffness with changes in other important vehicle characteristics, such as mass and ride height. The IIHS cited this finding because it considers NHTSA's 30-degree frontal oblique test to be more characteristic of a side impact test with respect to the timing of the Honda Accord driver peak injury measures. It stated that injury measures reported by the Hybrid III dummy are unlikely to capture the full injury threat to a human occupant from such an impact because the lateral loading conditions are inconsistent with dummy design and sensor orientation.

We agree that some of the vehicle-to-vehicle tests confounded changes in vehicle stiffness with changes in mass, ride height, and other factors. However, our study was not targeted at solely examining vehicle stiffness. Whether the changes were increases in mass, stiffness, ride height, or combinations of these or other factors, the fact remains that five out of six redesigned vehicles that demonstrated improved performance in a frontal offset crash test indicated increased aggressivity toward its collision partner. Consequently, we do not agree that the tests should be ignored. The vehicle-to-vehicle test configuration was identified by field data as representing frontal crashes with a high risk of serious injury or fatality.[16] Additionally, NHTSA's research has shown that the test configuration is able to show a good correlation between target vehicle driver injury measures and bullet vehicle aggressivity metrics.[17] We further believe the Hybrid III dummy is the most-appropriate surrogate to evaluate injury risk in this frontal crash test configuration, with an 11 o'clock principle direction of force. Since the same dummy type was used in each of the vehicle-to-vehicle crash tests, we believe the relative differences in results should be reasonable for comparative purposes.

Furthermore, our concerns were reinforced by vehicle manufacturers' comments that suggested vehicles might become more aggressive as a result of a frontal offset crash test requirement. GM provided examples of crash test data from vehicle models designed with countermeasures to enable them to perform well in a high speed frontal offset crash test. According to GM, the data shows that vehicle structure has gotten stiffer in order to perform well in offset testing. Honda referenced its 1998 study [18] where it predicted the occurrence of a potential increased stiffness trend, based on vehicle weight, if a high speed offset crash test were added to other frontal crash tests. Ford similarly stated that countermeasures intended to reduce lower extremity injury risk could potentially increase the injury risk for occupants, including collision partner occupants, in other crash scenarios, such as front-to-front and/or front-to-side impacts. The Alliance stated that design approaches that lead to increases in vehicle front-end stiffness could degrade full frontal crash protection, rear seat occupant protection, particularly child safety performance, and might increase the frequency of acceleration-based injuries.

Conversely, the IIHS stated that the assumption that manufacturers simply make vehicle front ends stiffer to perform well in the offset test is incorrect. It cited a 2001 study where stiffness, as determined by U.S. New Car Assessment Program (NCAP) tests, was unrelated to the IIHS's structural ratings.[19] Although it acknowledged that some vehicles with improved frontal offset test ratings were ''stiffer'' than their predecessors, it said that stiffness typically was evident only after about 50 cm of vehicle deformation, when the crash deformation had neared the occupant compartment. According to the IIHS, this increased stiffness is necessary if the overall safety of the vehicle fleet is to improve. To further this point, the IIHS conducted a second field data analysis [20] to determine whether their good-rated vehicles contribute to increased vehicle aggressivity toward their collision partners. Although the relationships across all rating levels were not uniform, it reported that a consistent pattern emerged. Driver fatality rates were higher in both the rated vehicle and its collision partner when the rated vehicle had a poor rating than when it had a good rating. It concluded that this pattern contradicts NHTSA's concern that improved frontal offset test performance might lead to increased vehicle aggressivity.

The agency reviewed the IIHS's study and observed that the opposing vehicles' fatality risks appear to have been derived without controlling for factors such as vehicle make/models, vehicle weights, and model years. In our analyses, we have found that these factors could dramatically affect the fatality rate estimates. For example, if opposing vehicles for one rated group had a different vehicle profile (*i.e.*, make-up of make, model and weight) from another rated group, we believe that vehicle design may not completely explain the discrepancy in opposing vehicle fatality risks. Furthermore, if the weight profile of the opposing vehicles for a particular rated group were different from that of their rated collision partners, the risk adjustment formula for rated vehicles might not be applicable to their opposing vehicles. Therefore, we believe it may be misleading to judge aggressiveness by directly comparing fatality rates of opposing vehicles without controlling for these factors.

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[16] Stucki, Hollowell, and Fessahaie, ''Determination of Frontal Offset Test Conditions Based on Crash Data,'' Proceedings of the 16th International Technical Conference on the Enhanced Safety of Vehicles, 1998.

[17] Summers, Prasad, Hollowell, ''NHTSA's Vehicle Compatibility Research Program,'' SAE Paper 1999–01–0071, SAE International Congress and Exposition, Detroit, MI, 1999.

[18] Sugimoto, Kadotani, and Ohmura, ''The Offset Crash Test—A Comparative Analysis of Test Methods,'' Proceedings of the 16th International Technical Conference on the Enhanced Safety of Vehicles, 1998.

[19] Nolan and Lund, ''Frontal Offset Deformable Barrier Crash Testing and its Effect on Vehicle Stiffness,'' Proceedings of the 17th International Technical Conference on the Enhanced Safety of Vehicles, 2001.

[20] Docket No. NHTSA–15715–20, Appendix.

While we do not dispute the suggestion by IIHS and other commenters that there are countermeasures other than stiffening a vehicle's front-end for achieving good performance in a frontal offset crash test, we are cognizant that some potential countermeasures could have adverse implications on vehicle weight, aerodynamics, braking effectiveness, and fuel economy, making it difficult for vehicle manufacturers to pursue them. GM noted that the vehicles with the most constraints are full size trucks, due to the breadth of product line, and small/economy size vehicles, due to their reduced compartment space/crush room. GM stated that additional crush space could only be achieved by adding extra length to the front of heavier vehicles; however, it stated that such complete engine compartment and front suspension repackaging are impracticable. While Honda commented that a forthcoming vehicle model employed its new Advanced Compatibility Engineering front structure,[21] Honda stated that it considers this type of structural countermeasure when its vehicles undergo a complete redesign. Therefore, additional lead-time may be needed to accommodate such strategies.

C. *Effect of voluntary compatibility commitments on disbenefits concerns:* When discussing the agency's compatibility concerns, several commenters referred to the Technical Working Group on Front-to-Front Compatibility.[22] The IIHS, a participant in the working group, reported that improved structural interaction is the immediate focus of the working group for improving vehicle incompatibility. To achieve this, vehicle manufacturers have committed to having all light trucks' primary energy-absorbing structures overlap the bumper zone of passenger cars by September 2009, or, alternatively, have all light trucks incorporate a secondary energy absorbing structure.[23] The AIAM noted that further commitments include assessing dynamic test protocols for enhanced structural interaction, and evaluating methods for determining an appropriate balance between small vehicle interior compartment strength and large vehicle energy absorption characteristics. The AIAM stated that over time these efforts could be expected to reduce aggressivity concerns and achieve significant reductions in lower extremity injuries in frontal crashes.

The Alliance and GM recommended that both NHTSA's and the industry's compatibility efforts attain a level of maturity before regulatory requirements are proposed. GM stated that each would contribute considerable insight toward improved lower leg protection, and improved occupant crash protection in vehicles and their collision partners. Other commenters stated that addressing vehicle aggressivity should be treated separately from the frontal offset crash test requirement. The IIHS stated that there is nothing to suggest that the incorporation of a frontal offset crash test into a standard depends on addressing vehicle aggressivity; however, it acknowledged that the incompatibility of vehicle structures is an important issue on its own.

The agency is monitoring the research efforts of the Technical Working Group on Front-to-Front Compatibility. We have been informed of their objectives, plans and timing for implementation. The potential for these efforts to reduce vehicle incompatibility in the fleet, and lower extremity injuries in frontal crashes, is dependent upon their effective implementation. We also believe that vehicle compatibility initiatives and any future frontal offset crash test proposal should be closely coordinated and not treated independently, as suggested by the IIHS. Our field data studies on vehicle aggressivity and vehicle crash test findings have persuaded us to proceed in conjunction with compatibility efforts when considering the adoption of a frontal offset crash test requirement, particularly for heavier vehicles. Since mass, stiffness, and geometric alignment have been identified as vehicle parameters that influence partner protection outcomes in our field data studies, our frontal offset strategy needs to be cognizant of the implications of these factors, so as to not promote countermeasures that may adversely affect safety.

However, we do not necessarily agree with commenters who suggested that the compatibility research efforts need to be completed before implementing a high speed frontal offset crash test requirement. While the industry has been working to develop a set of commitments to reduce vehicle aggressivity, the implementation of its first phase of efforts (*i.e.*, increased geometric alignment) will not be complete until September 1, 2009. The remaining commitments (assessing dynamic test protocols for enhanced structural interaction, and test procedures for measuring and controlling front-end stiffness characteristics) are only commitments for research at this point. In the long term, it is unclear what type of lower extremity injury benefits will be promoted by the research efforts. In the interim, NHTSA believes that numerous lower extremity injuries will continue to occur, and can be addressed through a restricted offset test.

D. *Alternative approaches:* The Request for Comments sought comments on alternative strategies that the agency should consider in conjunction with a fixed offset deformable barrier crash test requirement. Several vehicle manufacturers suggested strategies aimed at improving frontal offset crash protection, while controlling for vehicle aggressivity. Honda recommended simultaneously introducing a 64 km/h frontal offset deformable barrier crash test and a full-width deformable barrier crash test into NCAP[24] to evaluate a vehicle's partner protection. Honda stated that this strategy would help match the vehicle's principle force and stiffness at the specific interaction area where NHTSA, and other countries, require bumpers be located. Alternatively, for the long term, Honda and GM supported a moving deformable barrier (MDB) frontal offset crash test procedure for managing energy and stiffness, while DaimlerChrysler supported a fixed offset deformable barrier crash test with a mass-dependent impact speed.[25,26] While the IIHS acknowledged that many metrics were under consideration by the research community to assess vehicle aggressivity and limit incompatibility, it stated that presently there are not sufficient data available on which to base a decision.

In consideration of these proposals, we believe both the MDB and fixed offset deformable barrier crash test with a mass-dependent impact speed

[21] Docket Number NHTSA–03–15715–15, Attachment 13.

[22] Participants include: BMW, DaimlerChrysler, Ford, General Motors, Honda, Hyundai, IIHS, Isuzu, Kia, Mazda, Mitsubishi, Nissan, Subaru, Suzuki, Toyota, TRL, and Volkswagen. The vehicle manufacturers participating in this program represent over 99 percent of light vehicle sales in the U.S. and Canada.

[23] See *http://www.autoallliance.org/archives/commitstatement.pdf*.

[24] Honda alternatively proposed to introduce the full-width deformable barrier crash test into FMVSS No. 208.

[25] A constant energy level would be determined by using an average-sized (or representative) passenger vehicle in a fixed offset deformable barrier crash test at a prescribed vehicle speed. That constant energy level would then be applied when testing the remainder of the fleet, such that lighter vehicles would be tested at higher speeds, and heavier vehicles would be conducted at lower speeds.

[26] GM also commented that the intent of making the impact speed proportional to the mass is directionally sound, but impracticable since the approach will drive slightly different test conditions for any vehicle tested and a significant amount of confusion could result.

approach require extensive research to determine the appropriate energy balance (mass and velocity) for which to balance the self and partner protection of the fleet. The strategy of combining an offset deformable barrier crash test with a full-width deformable barrier has merit for consideration; however, we also agree with Honda's belief that its approach is not mature enough and/or the fleet-wide effects are not understood well enough to include them in a standard at this time.

Several vehicle manufacturers alternatively suggested the use of existing FMVSS No. 208 tests to reduce lower extremity injuries. GM suggested adding the Denton/HIII lower leg instrumentation to the 0–40 km/h offset deformable barrier crash test in FMVSS No. 208. However, based on our testing experience in this crash configuration,[27] we are not persuaded that this proposal would drive the design of effective countermeasures that would reduce lower leg injuries. DaimlerChrysler also suggested adding lower leg instrumentation to the unbelted full frontal barrier crash tests of FMVSS No. 208. NHTSA has conducted 16 unbelted rigid barrier crash tests at 40 km/h with Hybrid III dummies having instrumented lower legs. Seven out of 16 vehicles exceeded the provisional injury criteria for the lower leg instrumentation. While DaimlerChrysler's suggestion may have more potential for reducing lower extremity injuries, further testing would be needed to evaluate the benefits of this approach, as well as investigate the lower leg performance in other crash tests prescribed by FMVSS No. 208.

In the Request for Comments, the agency also discussed limiting the vehicle classes or gross vehicle weight rating (GVWR) of the vehicles to which a frontal offset crash test requirement would apply as one strategy to reduce the potential disbenefits. The example provided was to limit the applicability of the frontal offset test requirement to passenger cars. NHTSA estimated that approximately 77 percent of the benefits of a high speed frontal offset requirement would accrue to passenger car occupants since their vehicles would be required to maintain compartment integrity and provide improved lower leg protection. It was noted that passenger car occupants may also benefit from the exclusion of LTVs, since the LTVs striking them may not be designed to be as stiff.

[27] NHTSA has conducted over 30 crash tests in the configuration proposed by GM. In each test, the driver dummy lower leg injury measures were far below the provisional injury criteria recommended by GM.

Several commenters on the Request for Comments were conceptually supportive of this alternative approach. Ford supported the European frontal offset crash test procedure for compact and subcompact passenger cars, because it said doing so would harmonize U.S. standards with those of the rest of the world. Ford stated that for larger, heavier vehicles, a deformable element that can absorb added kinetic energy must be developed to provide realistic test results, and vehicle design changes that would improve safety. GM and DaimlerChrysler[28] also supported the concept of an offset deformable barrier crash test with a mass limitation. GM and DaimlerChrysler suggested that up to some mass level, an offset deformable barrier crash test could be beneficial to a vehicle without increasing its aggressivity to a partner vehicle. Furthermore, the Alliance suggested that the potential disbenefits of a high speed frontal offset crash test might be reduced if the configuration were harmonized with the Economic Commission for Europe (ECE R94) 56 km/h frontal offset crash test, since higher test speeds were more prone to partner protection issues in heavier vehicles, such as LTVs. Other commenters, however, were against creating a distinction between passenger cars and LTVs. The Advocates strongly believed that since LTVs are predominantly designed and marketed as family vehicles, safety standards should apply to all passenger vehicle types, so that benefits to LTV occupants would not be discarded.

NHTSA believes that a mass exclusion approach addressing lighter vehicles would be an intermediate step to address lower extremity injury protection, while solutions to aggressivity issues related to heavier vehicles are being sought. We agree with Ford's observation that applying a frontal offset crash test requirement to compact and subcompact classes of passenger cars would be comparable to approaches taken in other countries. The results from our 56 km/h offset deformable barrier crash test results are also in agreement with the Alliance's suggestion that the potential disbenefits may be reduced at a lower impact speed. In response to the Advocates, we believe that occupant protection for heavier vehicles would still be provided. FMVSS No. 208 requires full frontal barrier requirements up to 56 km/h, and a fixed offset deformable barrier test up to 40 km/h for vehicles up to a loaded GVWR of 3,856 kg. Therefore, we believe concerns regarding crash protection to LTV occupants may be partially addressed through existing requirements until such time that the agency is ready to move forward with a more comprehensive approach.

[28] DaimlerChrysler supported this approach as intermediate step towards a mass-dependent impact speed strategy (discussed further in the notice).

IV. Rationale for Withdrawal

Although the agency testing and analyses completed thus far have provided a good understanding of the issues associated with frontal offset crashes, lower extremity injuries, and dummy instrumentation, further studies are needed to allow NHTSA to develop a proposed upgrade to FMVSS No. 208 that would effectively provide occupant protection in frontal offset crashes without adversely affecting the occupant protection of its collision partners. In the agency's Request for Comments, NHTSA used data from the 1995–2001 National Automotive Sampling System Crashworthiness Data System (NASS–CDS) in estimating that approximately 84,811 front seat vehicle occupants annually experience AIS 2+ skeletal and joint injuries to the lower extremities and hip in frontal offset crashes. Based on the agency's fixed offset deformable barrier crash tests conducted to date, and those from the IIHS, the agency preliminarily determined that such a test requirement would have the potential of annually reducing 1,300 to 8,000 MAIS 2+ lower extremity injuries.

Some aspects of these preliminary benefit projections were based on a very limited number of crash tests, as noted by some commenters to the request for comments notice. The testing of some crash configurations had been limited, to some extent, by the number of different research alternatives that the agency had explored (*i.e.*, lower leg instrumentation, dummy size, impact speed, *etc.*). The agency also did not have the opportunity to test any advanced air bag vehicles, as noted by other commenters. To accumulate the necessary data to refine and complete our benefits analysis, we believe that additional testing is needed, particularly of newer vehicles reflective of those in the current fleet.

We also remain concerned about increasing vehicle aggressivity and fleet incompatibility as a result of adopting a high-speed frontal offset crash test, particularly for heavier LTVs. In making our decision to withdraw this rulemaking, the agency had also considered other alternative approaches suggested by commenters. Energy management approaches (MDB and fixed offset deformable barrier tests with a mass-dependent impact speed), force application limits, NCAP strategies, and lower leg applications in existing FMVSS No. 208 tests were among those considered. However, we believe each of these alternative approaches needs some degree of research and testing prior to consideration for rulemaking.

Despite this, we are concerned with the large number of lower extremity injuries associated with offset frontal crashes, since they are the second most costly long-term injuries, after brain injuries. Based upon our initial benefit analyses, we have tentatively determined that the most effective way to address these injuries while balancing the concerns with increased aggressivity is to pursue development of requirements in a two-step approach. The first step would be to develop offset frontal requirements for a limited segment of the vehicle fleet. Our initial cost/benefit estimates indicate that we would be able to maximize lower extremity benefits without creating disbenefits due to incompatibility by limiting applicability to a segment of the vehicle fleet. The second, longer-term step would be to develop requirements for those vehicles that are prone to increased aggressivity, perhaps in conjunction with compatibility requirements.

Based upon testing the agency has completed thus far, we believe that a fixed offset deformable barrier crash test in the range of 56–60 km/h using advanced dummy instrumented legs would provide the best opportunity to reduce lower extremity injuries without exacerbating vehicle incompatibility. However, focused testing under these conditions is needed to provide a sufficient basis to develop an offset frontal rulemaking proposal. We will examine the number of tests needed, including using two dummy sizes and requiring left/right side impacts. We also plan to explore new approaches to developing a performance metric for compartment intrusion, and its correlation to injury during the course of this testing and development.

The agency will also continue its efforts toward federalization [29] of retrofit instrumented lower legs for both the 5th and 50th percentile Hybrid III dummies. On May 3, 2002, the agency published an Advance Notice of Proposed Rulemaking (ANPRM) (67 FR 22381) on the adoption of the two potential types of lower leg instrumentation for assessing lower leg injury in full and offset-frontal crashes. In support of the notice, the agency published a technical report [30] describing the leg assemblies and documenting the lab, sled, and vehicle test experiences with the two pairs of lower leg instrumentation. Based on the ANPRM and subsequent testing, we have tentatively decided that the Thor-Lx/HIIIr and Thor-Flx/HIIIr lower leg instrumentation appear to have the greatest potential to assess lower extremity injuries. The agency is currently moving forward with the federalization of these two sets of lower leg instrumentation.

The agency also needs to conduct additional frontal high-speed offset crash tests to gather sufficient data for fleet representation and refined benefit estimates. These crash tests will be conducted with vehicle models certified to the advanced air bag requirements of FMVSS No. 208. Both 5th percentile female and 50th percentile male Hybrid III dummies will be instrumented with Thor-Lx/HIIIr and Thor-Flx/HIIIr lower leg instrumentation in the driver and right front passenger seating positions. Dummy and intrusion measurements from the tests will be compared to the field data experience. With this information, better estimates for the injury reduction rates associated with the proposed offset frontal requirement will be developed.

Finally, the agency will conduct an optimization study to determine the appropriate applicability limit for which the frontal offset crash test requirement should apply in order to maximize self protection, while minimizing the amount of risk associated with partner protection.

In sum, we believe that a fixed offset deformable barrier crash test, with applicability limited to a segment of the vehicle fleet and in the range of 56–60 km/h using advanced dummy instrumented legs, would provide the best opportunity to reduce lower extremity injuries without exacerbating vehicle incompatibility. However, focused testing under these conditions is needed to develop a sufficient basis for an offset frontal rulemaking proposal. Since this additional testing will not be completed within a year, we have decided to withdraw rulemaking for offset frontal requirements until completion of the testing and analysis, and then re-initiate rulemaking when it is completed.

V. Conclusion

Based on our evaluation of available information, we have concluded that further study is needed to have sufficient data to establish the appropriate number of tests and dummies, and to refine cost/benefit estimates for a definitive rulemaking proposal. Accordingly, we have decided that we should remove the frontal offset and lower leg instrumentation rulemakings from the Semi-Annual Regulatory Agenda (Unified Agenda) because rulemaking action is not anticipated in the immediate future. However, during the next year, we will continue the testing and analyses necessary to develop a proposal for occupant lower extremity protection in offset frontal crashes, and again place it in the Unified Agenda when a proposal is imminent.

Authority: 49 U.S.C. 322, 30111, 30115, 30117, and 30166; delegation of authority at 49 CFR 1.50.

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H. Keith Brewer,

Director, Office of Crash Avoidance Standards for Rulemaking.

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[29] Specifying by regulation at 49 CFR Part 572 *Anthropomorphic Test Devices.*

[30] Docket No. NHTSA–2002–11838.