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Federal Motor Vehicle Safety Standards; Child Restraint Systems; Proposed Rule

DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

49 CFR Part 571

[Docket No. NHTSA–02–11707]

RIN 2127–AI34

Federal Motor Vehicle Safety Standards; Child Restraint Systems

AGENCY: National Highway Traffic Safety Administration (NHTSA), Department of Transportation.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: This document proposes a number of revisions to the Federal safety standard for child restraint systems, including proposals for incorporating improved test dummies and updated procedures used to test child restraints, new or revised injury criteria to assess the dynamic performance of child restraints, and extension of the standard to apply it to child restraints recommended for use by children up to 65 pounds. This action is intended to make child restraints even more effective in protecting children from the risk of death or serious injury in motor vehicle crashes. This proposal is being issued in response to the Transportation Recall Enhancement, Accountability and Documentation Act of 2000, which directed NHTSA to initiate a rulemaking proceeding for the purpose of improving the safety of child restraints.

DATES: You should submit your comments early enough to ensure that Docket Management receives them not later than July 1, 2002.

ADDRESSES: You may submit your comments in writing to: Docket Management, Room PL–401, 400 Seventh Street, SW., Washington, DC, 20590. Alternatively, you may submit your comments electronically by logging onto the Docket Management System Web site at *http://dms.dot.gov.* Click on ''Help & Information'' or ''Help/Info'' to view instructions for filing your comments electronically. Regardless of how you submit your comments, you should mention the docket number of this document. You may call Docket Management at 202–366–9324. You may visit the Docket from 10:00 a.m. to 5:00 p.m., Monday through Friday.

FOR FURTHER INFORMATION CONTACT: For non-legal issues, you may call Mike Huntley of the NHTSA Office of Crashworthiness Standards, at 202–366–0029.

For legal issues, you may call Deirdre Fujita of the NHTSA Office of Chief Counsel, at 202–366–2992.

You may send mail to both of these officials at the National Highway Traffic Safety Administration, 400 Seventh St., SW, Washington, DC, 20590.

SUPPLEMENTARY INFORMATION:

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I. Executive Summary

This document proposes a number of revisions to Federal Motor Vehicle Safety Standard No. 213, ''Child Restraint Systems'' (49 CFR 571.213). The proposed revisions would incorporate five elements into the standard: (a) An updated bench seat used to dynamically test add-on child restraint systems; (b) a sled pulse that provides a wider test corridor; (c) improved child test dummies; (d) expanded applicability to child restraint systems recommended for use by children weighing up to 65 pounds; and (e) new or revised injury criteria to assess the dynamic performance of child restraints. This proposal follows up on the agency's announcement in its November 2000 Draft Child Restraint Systems Safety Plan (Docket NHTSA–7938) that the agency will be undertaking rulemaking on these and other elements of Standard No. 213 (65 FR 70687; November 27, 2000). The proposal is also issued in response to the mandate in the Transportation Recall Enhancement, Accountability and Documentation Act (the TREAD Act) (November 1, 2000, Pub. L. 106–414, 114 Stat. 1800) to initiate a rulemaking for the purpose of improving the safety of child restraints.

Section 14(a) of the TREAD Act mandates that the agency ''initiate a rulemaking for the purpose of improving the safety of child restraints, including minimizing head injuries from side impact collisions.'' Section 14(b) identifies specific elements that the agency must consider in its rulemaking. The Act gives the agency substantial discretion over the decision whether to issue a final rule on the specific elements. Section 14(c) specifies that if the agency does not incorporate any element described in section 14(b) in a final rule, the agency shall explain in a report to Congress the reasons for not incorporating the element in a final rule.

In response to section 14, the agency comprehensively examined possible ways of revising and updating its child restraint standard. Today's proposal is substantially based on a combination of pre- and post-TREAD Act agency activities, including extensive testing of child restraints and dummies by NHTSA's Vehicle Research & Test Center and by the agency in its New Car

Assessment Program, and on evaluations of vehicle seat assemblies and pulses. The proposal is also based on data analysis, as well as agency review of existing global research papers and international standards. We have also taken into consideration submissions by the public in response to the agency's Safety Plan and sought an exchange of ideas with child restraint manufacturers as to the research being conducted in response to the TREAD Act, meeting with them in February 2001. There are a number of technical reports in the docket to which this NPRM will refer to from time to time in support of the proposals.

In an advance notice of proposed rulemaking published concurrently with today's document, we are seeking public comments on the agency's work on developing a possible side impact protection standard for child restraint systems and on possible refinements to the approach we have taken thus far. In its review of the child restraint standard, NHTSA placed particular emphasis on improving the ability of child restraints to provide protection in side impact crashes. Although we have conducted extensive testing and analysis over the past year aimed at providing additional side impact protection for children in child restraints, there are many unknowns. We seek comment on the suitability of the test procedures we are considering, on appropriate injury criteria for children in side impacts, on cost beneficial countermeasures, and on other issues. The agency anticipates that comments to the advance notice will help us assess the benefits and costs of a side impact rulemaking, which will help us decide whether to issue a notice of proposed rulemaking in the near future and/or identify the work that needs to be done.

The proposed updates to the seat assembly are based on studies that NHTSA contracted to have done in response to the TREAD Act. This NPRM proposes the following changes: the seat bottom cushion angle would be increased from 8 degrees off horizontal to 15 degrees; the seat back cushion angle would be increased from 15 degrees off the vertical to 22 degrees; the spacing between the anchors of the lap belt would be increased from 222 millimeters (mm) to 392 mm in the center seating position and from 356 mm to 472 mm in the outboard seating positions; and the seat back of the seat assembly would be changed, from a flexible seat back to one that is fixed, to represent a typical rear seat in a passenger car.

The proposed changes to the sled pulse are based on studies conducted in response to the TREAD Act. We propose to widen the test corridor to make it easier for more test facilities to reproduce. The wider corridor extends the pulse from 80 milliseconds (ms) to approximately 90 ms in duration. The expanded corridor would not reduce the stringency of the test, and would also make it easier to conduct compliance tests at speeds closer to 30 mph.

This document proposes two initiatives toward enhancing the use of test dummies in the evaluation of child restraints under Standard No. 213. NHTSA proposes to replace some of the existing dummies with the new 12-month-old Child Restraint Air Bag Interaction (CRABI) dummy, and the state-of-the art Hybrid III 3- and 6-year-old dummies. NHTSA also proposes testing child restraints for older children with a weighted 6-year-old dummy (*i.e.,* a Hybrid III 6-year-old dummy to which weights have been added). The total weight of the dummy would be 62 lb. The weighted dummy would be used to test child restraints that are recommended for children weighing 50 to 65 lb, and is viewed as an interim measure until such time as the Hybrid III 10-year-old dummy becomes available.

The proposal to extend Standard No. 213 to child restraint systems for children who weigh 65 lb or less is based on the proposal to test restraints recommended for children weighing over 50 lb with the weighted 6-year-old dummy. The availability of that dummy makes it possible to extend the standard and evaluate the performance of the added restraints.

The proposal to use the new and scaled injury criteria of Standard No. 208 is based on research that the agency did in the advanced air bag rulemaking, as well as NCAP and sled testing done in response to the TREAD Act. The scaled head injury criterion limits from the Standard No. 208 rulemaking are proposed herein for Standard No. 213, as well as the chest deflection and acceleration limits. The Nij neck criterion would also be added to Standard No. 213, but without the limits on axial force. For Standard No. 208, the agency originally proposed Nij without limits on axial force. However, the Alliance of Automotive Manufacturers persuaded the agency to incorporate more conservative axial force limits for the out-of-position air bag loading environment. 65 FR 30717, 30718; May 12, 2000. Children in child restraints are correctly positioned and not sustaining neck injuries such as those associated with exposure to severe out-of-position air bag loading. Therefore, the agency is proposing that Nij without limits on axial force be added to Standard No. 213.

NHTSA has examined the benefits and costs of these proposed amendments, wishing to adopt only those amendments that contribute to improved safety, and mindful of the principles for regulatory decisionmaking set forth in Executive Order 12866, Regulatory Planning and Review. Its efforts to do so, however, have been limited by several factors. Two factors stand out. One is the limited time allowed by the schedule specified in the TREAD Act for initiating and completing this rulemaking. That has limited the amount and variety of information that the agency could obtain and testing that the agency could conduct to examine the efficacy of possible countermeasures under consideration and the effects of the various proposed amendments on child restraint performance. The other is the lack of specific accident data on children in motor vehicle crashes generally. For example, there is little available data on neck injury in children involved in motor vehicle crashes. Together, these limitations have made it difficult to assess and compare the benefits and costs of this rulemaking.

NHTSA estimates that the proposal to use the new and scaled injury criteria of Standard No. 208 would prevent an estimated 3–5 fatalities and 5 MAIS 2–5 non-fatal injuries for children ages 0–1 annually. In addition, the proposal would save 1 fatality and mitigate 1 MAIS 2–5 injury in the 4-to 6-year-old age group annually. The agency does not believe that updating the seat assembly and revising the crash pulse would affect dummy performance to an extent that benefits would accrue from such changes. Research will be conducted later this year to assess the effects of such changes on dummy performance.

At this time, NHTSA has not identified countermeasures to improve child restraint performance in frontal tests that would allow child restraint manufacturers to meet the proposed neck injury criterion. Consequently, we were unable to estimate the costs of such countermeasures. Comments are requested on possible countermeasures and their costs. The proposal to use new dummies in compliance tests, including testing with a weighted 6-year-old dummy, could result in increased testing costs for manufacturers that want to certify their restraints using the tests that NHTSA will use in compliance testing. NHTSA estimates that use of the new dummies and other changes to the test procedure would add testing costs of $2.72 million. We believe that those changes would not result in redesign of child restraints.

II. Background

The lack of occupant restraint use by motorists is a significant factor in most fatalities resulting from motor vehicle crashes. Of the 31,910 passenger vehicle occupants killed in 2000, over half (55 percent) were unrestrained. Forty-three percent of the 1,079 child occupant fatalities, ages 0 through 10 years old, were unrestrained. For child occupants less than 5 years old, 36 percent of the 529 fatalities were unrestrained.

Of the 2,938,000 passenger vehicle occupants injured in crashes in 2000, only 14 percent (409,000) were reported as unrestrained. The rates are about the same for child occupants. For children ages 0–10 years old, approximately 165,000 were injured in motor vehicle traffic crashes in 2000, and 13 percent (18,800) of these children were unrestrained. Of the 67,000 child occupants less than 5 years of age who were injured, 10 percent (6,500) were unrestrained.

Child restraints are highly effective in reducing the likelihood of death and or serious injury in motor vehicle crashes. NHTSA estimates (''Revised Estimates of Child Restraint Effectiveness,'' Hertz, 1996) that for children less than one-year-old, a child restraint can reduce the risk of fatality by 71 percent when used in a passenger car and by 58 percent when used in a pickup truck, van, or sport utility vehicle (light truck). Child restraint effectiveness for children between the ages 1 to 4 years old is 54 percent in passenger cars and 59 percent in light trucks.

Notwithstanding the effectiveness of child restraints certified to Standard No. 213, the agency is continuing to examine whether the safety of children in child restraints can be enhanced even further. In 2000, 256 child occupants under 5 years of age were killed while restrained in child restraints, and another 34,600 were injured. Today's NPRM is part of an effort to reduce these numbers.

On November 27, 2000, we published a planning document that defined our vision for enhancing child passenger safety over the next 5 years (65 FR 70687). The plan contained our views on implementing three strategies for enhancing the safety of child occupants from birth through age 10: increasing restraint use; improving the performance and testing of child restraints; and improving mechanisms for providing safety information to the public. The agency requested comments on the plan and received suggestions on the various initiatives (Docket NHTSA 7938).

Many commenters responded to the second of the three strategies, making suggestions as to how they believed Standard No. 213 should be improved to further enhance child restraint performance. There was general concurrence with the agency's plan to undertake rulemaking with regard to the five elements included today in this NPRM. There was no objection to the agency's then-announced intention to improve side impact protection as a measure that would be pursued internationally in concert with other government and industry bodies. However, it was apparent from the few comments we received on the subject that those commenters considered it to be a long-term project requiring several years of research and development.

After NHTSA completed its draft plan, but before it published the plan in the **Federal Register**, the TREAD Act was enacted on November 1, 2000. Sections 14 of the TREAD Act directed NHTSA to initiate a rulemaking for the purpose of improving the safety of child restraints by November 1, 2001, and to complete it by issuing a final rule or taking other action by November 1, 2002. The relevant provisions in Sections 14 are as follows:

(a) In General. Not later than 12 months after the date of enactment of this Act, the Secretary of Transportation shall initiate a rulemaking for the purpose of improving the safety of child restraints, including minimizing head injuries from side impact collisions.

(b) Elements for Consideration. In the rulemaking required by subsection (a), the Secretary shall consider—

(1) whether to require more comprehensive tests for child restraints than the current Federal motor vehicle safety standards requires, including the use of dynamic tests that—

(A) replicate an array of crash conditions, such as side-impact crashes and rear-impact crashes; and

(B) reflect the designs of passenger motor vehicles as of the date of enactment of this Act;

(2) whether to require the use of anthropomorphic test devices that—

(A) represent a greater range of sizes of children including the need to require the use of an anthropomorphic test device that is representative of a ten-year-old child; and

(B) are Hybrid III anthropomorphic test devices;

(3) whether to require improved protection from head injuries in side-impact and rear-impact crashes;

(4) how to provide consumer information on the physical compatibility of child restraints and vehicle seats on a model-by-model basis;

(5) whether to prescribe clearer and simpler labels and instructions required to be placed on child restraints;

(6) whether to amend Federal Motor Vehicle Safety Standard No. 213 (49 CFR 571.213) to cover restraints for children weighing up to 80 pounds;

(7) whether to establish booster seat performance and structural integrity requirements to be dynamically tested in 3-point lap and shoulder belts; [1]

(8) whether to apply scaled injury criteria performance levels, including neck injury, developed for Federal Motor Vehicle Safety Standard No. 208 to child restraints and booster seats covered by in [sic] Federal Motor Vehicle Safety Standard No. 213; and

(9) whether to include [a] child restraint in each vehicle crash tested under the New Car Assessment Program.

(c) Report to Congress. If the Secretary does not incorporate any element described in subsection (b) in the final rule, the Secretary shall explain, in a report to the Senate Committee on Commerce, Science, and Transportation and the House of Representatives Committee on Commerce submitted within 30 days after issuing the final rule, specifically why the Secretary did not incorporate any such element in the final rule.

(d) Completion. Notwithstanding any other provision of law, the Secretary shall complete the rulemaking required by subsection (a) not later than 24 months after the date of the enactment of this Act.

Each of the initiatives contemplated by the TREAD Act as possible upgrades to Standard No. 213 were included in the agency's plan as possible candidates for rulemaking to enhance the performance of child restraint systems. [2] Notwithstanding the effectiveness of child restraints certified to Standard No. 213, the thrust of the 5-year plan was to consider possible rulemaking that could enhance the performance of child restraints even further. Enhancements were considered in terms of improved crash protection and in terms of increased usability of the restraints so that misuse is reduced. At the same time, we believed then, and continue to do so now, that in making regulatory

[1] Standard No. 213 currently requires booster seats to be dynamically tested in 3-point (lap and shoulder) belts. As such, the agency is taking no action with respect to this provision of the TREAD Act. [Footnote added.]

[2] In addition, Section 14 of the TREAD Act required an NPRM to establish a child restraint safety rating consumer information program to provide consumers information for use in the purchase of child restraints. The NPRM was issued on October 29, 2001, and published November 6, 2001 (66 FR 56146, 66 FR 56048). Further, on October 29, 2001, the agency issued an NPRM on Standard No. 213's labeling and owner's manual requirements that responds to section 14(b)(5) of the Act. 66 FR 55623, November 2, 2001. The Act also required a study on the use and effectiveness of booster seats and a 5-year strategic plan to reduce, by 25 percent, deaths and injuries caused by failure to use the appropriate booster seat in the 4-to 8-year-old age group.

decisions on possible safety enhancements, the agency must bear in mind the consumer acceptance of cost increases.

Weighing all these factors, the agency has tentatively decided that safety enhancements are warranted in the aspects of the child1 restraint standard discussed below in section IV.

III. Existing Requirements of Standard No. 213

The following discussion summarizes current provisions in Standard No. 213 relating to the performance of child restraint systems.

1. The performance of a child restraint system is evaluated in dynamic tests involving a 30 mph velocity change, which is representative of a severe crash. Each child restraint is tested while attached to a standardized seat assembly. Restraints are tested while attached to the standard seat assembly by various means. The restraint system is anchored to a test seat with a lap belt only, or a lap/shoulder belt if the restraint system is a booster seat designed for these belts. In another test, the child restraint is required to meet more demanding requirements with respect to the permissible forward motion of the dummy's head, which is typically accomplished by use of a tether attached to the top of the child restraint. Beginning in 2002, child restraints will also be subjected to frontal crash simulations when anchored to the test seat assembly by a new child restraint anchorage system (49 CFR 571.225).[3] Built-in child seats are evaluated by crash testing the vehicle they are built into, or by simulating a crash with the built-in seat dynamically tested with parts of the vehicle surrounding it.

2. To protect the child, limitations are set on the amount of force that can be exerted on the head and chest of a child test dummy during the dynamic testing. (S5.1.2 of Standard No. 213). To reduce the possibility of injury that child occupants in child restraint systems may incur if they contact vehicle interior surfaces during a crash, limitations are also set on the amount of frontal head and knee excursions that can be experienced by the test dummy. To prevent a child from being ejected from rearward-facing restraints (e.g., infant restraints), limitations are set on the amount that such restraints can tip forward (S5.1.4 of Standard No. 213).

3. During dynamic testing, no load-bearing or other structural part of any child restraint system may separate so as to create jagged edges that could cut and injure a child. If the child restraint has adjustable positions, it may not shift positions if doing so could potentially catch a child's limbs between the shifting parts or allow the child to ''submarine'' (*i.e.,* allow the child to slide down and out of the restraint during a crash) (S5.1.1 of Standard No. 213).

4. To prevent injuries to children during crashes from contact with the surfaces of the child restraint itself, the standard specifies requirements for the size and shape of those surfaces. In addition, protective padding requirements are set for restraints designed for use by infants (S5.2 of Standard No. 213). The standard specifies a minimum surface area for those surfaces that support the side of the child's torso. Each surface must be flat or concave and have a continuous surface of not less than 24 square inches for systems recommended for children weighing 20 lb or more, or 48 square inches for systems recommended for children weighing less than 20 lb (S5.2.2.1(b)).

5. The belts, buckles, and attachment hardware used in child restraint systems have to meet abrasion and corrosion resistance requirements (S5.4.1 and S5.4.2). Additionally, the belts in child restraints must adjust to snugly fit occupants, not transfer any crash loads from the vehicle to the child, and must restrain the child's upper and lower torso (S5.4.3 of Standard No. 213).

6. The amount of force necessary to open belt buckles and release a child from a restraint system is specified so that children will not be able to unbuckle themselves, but adults will be able to do so quickly and easily (S5.4.3.5 and S6 of Standard No. 213).

7. Information necessary for the proper use of the child restraint system must be permanently labeled on the child restraint and presented in an information booklet that accompanies the child restraint system. The child restraint must also provide a special location or compartment on the child restraint system in which the information booklet may be permanently stored, so that the parent or other user of the child restraint can always have available the necessary safety information (S5.5 of Standard No. 213). Standard No. 213 also requires each child restraint system to be accompanied by a postage-paid registration form so that purchasers can register with the manufacturer and thereby be directly notified in the event of a safety recall. Manufacturers must retain the names and addresses of registrants for a period of six years. (S5.8 of Standard No. 213; 49 CFR part 588).

8. Each material used in a child restraint system must meet the flammability requirements of S4 of FMVSS No. 302 (49 CFR 571.302) (S5.7 of Standard No. 213).

9. Beginning September 1, 2002, child restraint systems must have components permanently attached to them that will enable them to be anchored to a new child restraint anchorage system that will be standard on all new passenger vehicles. The vehicle anchorage system consists of two bars that are at or close to the intersection of the vehicle seat cushion and seat back, and a top tether anchorage located typically (a) on the rear shelf below the rear window in passenger cars, or (b) on the floor or on or under the seat structure of sport utility vehicles and minivans. Child restraints will still be capable of being anchored to the vehicle seat by the vehicle seat belts.

10. Child restraints certified for use in both motor vehicles and aircraft must pass an additional test when attached to a representative airplane seat, and provide additional information on the proper use of the restraint system in an airplane seat (S8 of Standard No. 213).

IV. ANPRM on Side Impact Protection

In an advance notice of proposed rulemaking (ANPRM) published concurrently with today's NPRM, we are seeking public comments on the agency's work on developing a possible side impact protection standard for child restraint systems and on possible refinements to the approach we have taken thus far. In its review of the child restraint standard in response to the TREAD Act, NHTSA placed particular emphasis on improving the ability of child restraints to provide protection in side impact crashes. Although we have conducted extensive testing and

[3] Standard No. 225 requires motor vehicle manufacturers to provide vehicles equipped with the child restraint anchorage systems that are standardized and independent of the vehicle seat belts. The new independent system has two lower anchorages, and one upper anchorage. Each lower anchorage includes a rigid round rod or ''bar'' unto which a hook, a jaw-like buckle or other connector can be snapped. The bars are located at the intersection of the vehicle seat cushion and seat back. The upper anchorage is a ring-like object to which the upper tether of a child restraint system can be attached. (The system is widely known as the ''LATCH system,'' an acronym developed by manufacturers and retailers for ''lower anchors and tether for children.'') The LATCH system is required to be installed at two rear seating positions. In addition, a tether anchorage is required at a third position. By requiring an easy-to-use anchorage system that is independent of the vehicle seat belts, NHTSA's standard makes possible more effective child restraint installation and thereby increases child restraint effectiveness and child safety. The standard is estimated to save 36 to 50 lives annually, and prevent 1,231 to 2,929 injuries. See 64 FR 10786; March 5, 1999.

analysis over the past year aimed at providing additional side impact protection for children in child restraints, there are many unknowns. We seek comment on the suitability of the test procedures we are considering, on appropriate injury criteria for children in side impacts, on cost beneficial countermeasures, and on other issues. The agency anticipates that comments to the advance notice will help us assess the benefits and costs of a side impact rulemaking, which will help us decide whether to issue a notice of proposed rulemaking in the near future and/or identify the work that needs to be done.

V. Agency Proposals

a. Updated Bench Seat

1. Introduction

This NPRM proposes to update the standard vehicle seat assembly used in Standard No. 213's dynamic testing. The original seat assembly was developed in the mid-1970's by the Highway Safety Research Institute at the University of Michigan. The bench seat was based on the configuration and performance parameters of the 1974 Chevrolet Impala production front bench seat. Static and dynamic characteristics of the production seat were modeled into the frame deformation and foam stiffness of the standard seat.

NHTSA proposes to update the following features of the seat assembly: the seat bottom cushion angle would be increased from 8 degrees off horizontal to 15 degrees; the seat back cushion angle would be increased from 15 degrees off the vertical to 22 degrees; the spacing between the anchors of the lap belt would be increased from 222 millimeters (mm) to 392 mm in the center seating position and from 356 mm to 472 mm in the outboard seating positions; and the seat back of the seat assembly would be changed from a flexible seat back to one that is fixed, to represent a typical rear seat in a passenger car. Figures 1A, 1B and 1B' of Standard No. 213 would be revised to reflect these changes, as would the drawing package of the seat assembly (SAS–100–1000, with Addendum A, dated October 23, 1998) that is incorporated by reference (*see* 49 CFR 571.5) into the standard.

This proposal is based on evaluations we have made regularly over the years, and most recently this year in response to the TREAD Act, of the need to update or improve the seat assembly used for testing child restraints. There is no question that the seat assembly should be representative of production seats to the extent possible so that a child restraint's true performance in a crash can be assessed. However, while to the extent possible it may be desirable for the seat assembly to mirror production seats, our program work developing and evaluating the standard seat assembly was guided by a number of additional considerations. The seat assembly must be durable and must contribute to obtaining repeatable and comparable test results for child restraints. Meeting the performance requirements of Standard No. 213 on the test seat should ensure that child restraints performed adequately on the variety of different seats found in cars on the road. In comparison to some vehicle seats, the test seat might present more demanding test conditions, but this was acceptable if the test seat were representative of many seats used in vehicles. Differences between the standard seat assembly and production seats could be disregarded if the differences did not affect child restraint performance on the seat. The seat assembly did not need to conform to non-identical features that were unlikely to have a confounding effect on child restraint performance.

These considerations counseled against changing the seat assembly significantly in the past. Child restraints were performing well in the field. The few features that we thought could be updated, such as the seat assembly's cushion angle and seat back angle, were not thought to affect safety sufficiently to warrant use of the agency's limited resources for that purpose. We were also concerned about possible cost increases to child restraints that might occur as some manufacturers passed on the costs of possibly having to retest all child restraints on the market.

With the passage of section 14(b) of TREAD, Congress has presented its belief that the seat assembly should be updated to reflect the designs of production seats. We concur with considering the issue further. We have identified a number of features of the present seat assembly that could be updated, which are discussed below. Later this year, NHTSA will undertake an assessment of what effect, if any, the updated seat assembly might have on the performance of child restraints.

2. Post-TREAD Rulemaking Support Program

In response to TREAD, NHTSA initiated a test program to assess seat parameters of production seats, working with Veridian Engineering (Veridian) and the U.S. Naval Air Warfare Center Aircraft Division at Patuxent River, Maryland (PAX). Veridian gathered information on geometry and stiffness of seats of vehicles tested in NHTSA's 2001 New Car Assessment Program (NCAP). PAX analyzed the seat geometry data, including seat cushion angle, seat back angle, seat cushion length, seat back length, tether anchor locations, child restraint anchorage system anchor locations, and seat belt locations. A report by PAX on the project is available in the docket. This preamble provides an overview of the results. Readers are referred to the report for a detailed explanation of the methodology used in the test program, and the results of each parameter, sorted by vehicle class.

To summarize the report, the research program analyzed the seat geometries of 35 vehicles. Because of time constraints and the fact that the test for determining force/deflection characteristics of the vehicle seat is a destructive test (that is, a section of the seat cushion had to be cut out and removed), the agency utilized vehicles that had previously undergone testing in the agency's New Car Assessment Program but whose rear seats had not been destroyed or discarded. Every attempt was made to obtain vehicles from a range of vehicle classes for evaluation. Of these vehicles, 19 were passenger cars, 11 were SUVs, 4 were minivans, and 1 was a pickup truck. PAX analyzed the various seat geometry measurements of the vehicles, by seating position (outboard or middle) and vehicle class, and identified some features of the bench that do not reflect current vehicle designs.

We have tentatively determined that a number of those features should be changed, that some others need not be, and that a few features (e.g., seat cushion stiffness) require further analysis before we can decide whether we should change them. Generally, where there is a notable difference between the existing seat assembly and the fleet, the agency has proposed changing the seat assembly to make it more representative of the existing vehicle fleet.

We request comments on the proposal, particularly with regard to the latter category. NHTSA will be conducting further analyses of some of the proposed changes, since the analyses could not be completed in time for this NPRM. Information we obtain will be placed in the docket. Further, later this year, NHTSA will be evaluating dynamically most of the changes that we propose to make to the seat bench, to ensure that these changes do not result in compromising the safety currently afforded by child restraints. Results of this testing will be compared to compliance test data of existing child restraints to evaluate the effect of the changes. Comparison of these tests will aid in the agency's decision regarding whether to adopt the proposed changes in a final rule.

3. Features That Should Be Changed

i. Bottom Seat Cushion Angle

Currently, the seat assembly has a seat pan angle of 8° off horizontal. In the 35 vehicles surveyed, 77 seat pan angle measurements were made of rear seats, from either the outboard position or the center position, or if the vehicle had a third seating position, from that position as well. PAX found that 39% of the seat pan angle measurements were within 16° to 20° off horizontal and 35% of the seat pan angle measurements fell within 11° to 15° of horizontal. The test data show an average seat pan angle of 15.5°. We have tentatively decided that the seat pan angle of the seat assembly should be increased to 15° off horizontal. A 15° angle would be in accordance with the bottom seat cushion angle specified by ECE Regulation 44.

Comments are requested on the effect of this change on the performance of child restraints in actual vehicles. In a September 18, 2000 petition for rulemaking, Ford Motor Company indicated that using the ECE Regulation 44 seat cushion angle would solve a problem it has found using the present seat assembly to test ''rear-facing child restraint systems (CRS) equipped with rigid Lower Anchors and Tethers for Children (LATCH) system attachments.'' Under Standard No. 213, child restraints may use rigid attachments to connect to the lower anchorage bars of LATCH systems, or may use non-rigid attachments (such as those attached to the child restraint by webbing material). Ford believed that the seat cushion angle of the seat assembly is driving the design of rear-facing child restraints. Because the current seat assembly is flatter than actual vehicle seats, when infant restraints are installed on actual vehicle seats, the restraints are installed at an overly steep angle. Ford stated that the overly steep angle can be corrected in conventional restraints by tipping the restraint back and placing a rolled towel under the base, near the seat bight. However, an infant restraint with rigid LATCH attachments will not have any flexibility that will allow it to be tipped backwards while remaining connected to the lower anchorage bars. To solve this problem, Ford suggested using the ECE Regulation 44 seat assembly, which has a 15° bottom seat cushion angle, modified to have the LATCH anchorage bars included in the assembly.[4]

ii. Seat Back Angle

Currently, the seat assembly has a seat back angle of 15° off vertical. Seventy-eight seat back angle measurements of rear seats in the 35 vehicles surveyed were taken from either the outboard or center seat position, or, if available, the third seating position. From this analysis, the average seat back angle for all measurements taken is 22° off of vertical. This is an increase of 7° over the current angle specified for the FMVSS No. 213 seat assembly. Forty-four percent of all the measurements taken yielded seat back angles between 21° and 25°. For these reasons, NHTSA proposes increasing the angle to 22°.

iii. Seat Belt Anchors

The current seat assembly has a lateral spacing of 222 mm between the lap belt anchors in the center seating position, and a lateral spacing of 500 mm for the outboard seating positions. Based on the evaluation of the 35 vehicles surveyed, the average lap belt anchor spacing in center seating positions in the modern vehicle fleet is 392 mm. Thirty-nine percent of the measurements taken for the center seating position fell in the range of 351 mm to 400 mm, while 63 percent of the measurements were between 301 mm and 400 mm. As such, the current seat assembly represents a distance that is 170 mm smaller than that of the current vehicle fleet. We propose increasing the spacing to 392 mm for the center seating position to represent the average of the current vehicle fleet. Based on the evaluation of the 35 vehicles surveyed, the average lap belt anchor spacing in the outboard seating positions is 472 mm, as compared to 500 mm on the current Standard No. 213 standard seat assembly. Thirty-three percent of the measurements taken were greater than 500 mm, while 90 percent were above 400 mm. As the average anchorage spacing for outboard seating positions in the modern vehicle fleet is 28 mm less than that on the current standard seat assembly, we propose to change the spacing to 472 mm to more accurately represent actual vehicles. Comments are requested on how changing the spacing will affect the performance of a child restraint in dynamic tests.

iv. Fixed Seat Back

NHTSA proposes that the seat back of the seat assembly be changed to represent a fixed vehicle seat. Steel rods should replace the existing aluminum rods. A fixed seat back will be more representative of the rear seat of today's passenger cars, and would harmonize with ECE regulations. Because NHTSA strongly recommends that children under the age of twelve ride in the back seat, changing the seat assembly to represent a typical rear seat seems appropriate. However, vans and multipurpose vehicles with multiple seating rows may be more closely represented by a flexible seat back. Comments are requested on this issue. NHTSA is currently evaluating the effect of the change on child restraint performance by use of MADYMO simulations, and will further study the effect of flexible versus rigid seat backs through sled testing to be performed later this year.

4. Features That Need Not Be Changed

NHTSA has tentatively decided that the following features of the bench seat need not be changed because they either reflect the design of production seats or are different but that difference is deemed not to have an effect on child restraint performance in dynamic testing. Comments are requested on these features.

i. Bottom Seat Cushion Length

Currently, the seat assembly has a bottom seat cushion length of 508 mm. In order to find the average bottom seat cushion length, 78 measurements were taken in the 35 vehicles surveyed. Analysis depicts the average seat pan length as 461 mm. The average bottom seat cushion length for 64% of the measurements was found to lie within the range of 451 mm to 500 mm. Therefore, the current FMVSS No. 213 seat assembly has a seat pan length that is about 50 mm longer than the average seat pan length observed in today's vehicle fleet. We do not believe that this difference is consequential, as the reduced seat cushion length does not cause an incompatibility with existing child restraint designs.

ii. Seat Back Height

Currently, the 213 seat assembly has a seat back height of 610 mm. In the 35 vehicles surveyed, 78 measurements of the height of the seat back were made in both the outboard and center positions. These data yield an average seat back height of 619 mm. The highest percentage of seat back length measurements fell within the range of 601 mm to 700 mm. This percentage

[4] The petition is granted to the extent it is consistent with today's NPRM. However, granting of the petition does not mean that the changes requested will be adopted. Granting of the petition indicates that the agency believes that the recommended change has merit and warrants further review and evaluation. A decision whether to adopt the recommended change will be made on the basis of all available information developed in the course of the rulemaking proceeding, in accordance with statutory criteria.

represented 64% of the vehicle measurements. Because the Standard No. 213 seat assembly is only 9 mm lower than the average seat back height observed in today's fleet, we do not see a need to propose to raise the height of the seat back.

iii. Test Bench Floor

In response to the agency's draft Child Protection System Safety Plan, Ford recommended that the standardized bench seat should have a floor (*see* Docket 7938–20). Ford believed that the current test seat assembly cannot evaluate a rear-facing child restraint that is equipped with a support leg, as has been developed and is currently used in other countries. We are declining to add a floor to the test assembly at this time, since Standard No. 213 does not allow support legs in compliance testing. Under Standard No. 213, rear-facing restraints are only to be attached to the seat assembly via the lap belt or the anchorages of the LATCH system. As such, the inclusion of a floor structure on the Standard No. 213 standard seat assembly is not necessary at this time.

5. What About Cushion Stiffness?

Comments are requested on whether the seat assembly's cushion should be made stiffer. PAX found the average stiffness of the Standard No. 213 seat assembly to be marginally softer than most, but not all new vehicles on the road today. The force deflection curves generated by PAX show that the current Standard No. 213 seat cushion is softer at both the fore and aft outboard positions than almost all seat cushions in vehicles of the modern fleet. As part of the work performed in 1988 to reexamine the Standard No. 213 procedures,[5] the stiffness characteristics of the Standard No. 213 seat cushion material were compared with the characteristics of then current model vehicle seats. Static force versus deflection tests were conducted on the Standard No. 213 seat cushion foams, and these curves were then compared with similar curves that had been developed for ten vehicles which had been measured in a separate project in 1987. The distribution of force versus deflection curves found in that evaluation closely parallel those found by PAX, in that most vehicle seats were stiffer than the Standard No. 213 seat assembly, but there was at least one vehicle seat that was softer. Sled tests were performed in 1988 to compare the dummy response of the Standard No. 213 seat cushion, a representative cushion that was softer, and a stiff cushion. The dummy response differences were not sufficiently large or consistent to warrant specifying a different cushion than the foam used in Standard No. 213. Thus, the Standard No. 213 cushion was considered to be ''representative'' of the rear seats of then current cars.

We are interested in increasing the stiffness of the cushion, but are uncertain what, if any, differences will be seen in dynamic testing. We request comments on what the stiffness should be. Comments are also requested on what effect changing the test seat stiffness would have on child restraint performance in dynamic testing.

b. Crash Pulse

This NPRM would slightly revise the Standard No. 213 pulse. We propose to extend the pulse to approximately 90 milliseconds (msec), and to widen the test corridor to make it easier for more test facilities to reproduce it. The expanded corridor would not reduce the stringency of the test, and would also make it easier to conduct compliance tests at speeds closer to 30 mph. We found in studying vehicle crash pulses that the Standard No. 213 pulse is more severe than most other pulses, but is similar to crash pulses of large sport utility vehicles and light trucks—passenger vehicles that are becoming more and more popular for use as family vehicles—and very similar to the crash pulse of small school buses.

1. The Current Crash Pulse

In Standard No. 213's dynamic sled test, a test dummy is secured in a child restraint, which in turn is attached to a representative vehicle bench seat (seat assembly). The assembly is then subjected to acceleration to simulate a vehicle crash. The child restraint must manage the force from the simulated crash so that the forces imparted to the dummy are within tolerable limits. The force imposed on the child restraint and dummy is a function of the acceleration onset rate, peak, and duration. Paragraph S6.1.1(b)(1) of Standard No. 213 specifies that when child restraints are tested in the 48 km/h (30 mph) dynamic test, the acceleration of the test platform must be entirely within the curve shown in Figure 2 of the standard.[6] ''Crash pulse'' refers to the change in the sled's velocity over time. The severity of a crash pulse is a function of its onset rate, peak g and its time of occurrence, and duration. The standard has a relatively severe crash pulse, in that the sled is accelerated relatively quickly to an acceleration of approximately 24 g's (24 times the force of gravity) and maintains the 24 g level for a relatively long time period (37 to 42 msec) before returning to zero acceleration.

Pulses can vary as to their shape, onset rate, peak acceleration, and duration. NHTSA's research in the mid-1990's showed that Standard No. 213's pulse was more severe than the ''average car'' pulse of 1988–1991. Crash pulses obtained from Standard No. 208 vehicle crash tests indicated a peak G occurring much later in the crash event compared to Standard No. 213 and a longer pulse duration. The upper limit of the Standard No. 208 pulse ended at 135 msec, compared to 81 msec for the Standard No. 213 pulse.

Since the mid-1970's, vehicle front ends of passenger cars have become softer, allowing for more front-end crush to take place. This results in crash pulses that are much longer in duration than car crash pulses of 30 years ago. Current cars have crash pulses that are generally longer in duration than that of Standard No. 213. The peak G's are similar, so the longer duration means that the average model year 2001 passenger car has a less severe pulse than the standard.[7] Because of these changes in car design, we have been asked to reconsider the crash pulse in Standard No. 213 to ensure that it is representative of the crash pulses of today's vehicles. See, e.g., Ford's comment on NHTSA's draft Child Restraint Systems Safety Plan, docket 7938–20.

We have also been asked to re-examine the crash pulse because it is difficult to duplicate due to the narrow corridors in the laboratory test procedure. Very few labs are able to replicate the 213 pulse. Transportation Research Center (TRC), a testing laboratory, submitted a petition to NHTSA on October 6, 1999, which we

[5] Hiltner, Edward C. and MacLaughlin, Thomas F., ''Child Seating Test Procedure Development,'' NHTSA Final Report No. DOT HS 807 466, March 1989.

[6] Our laboratory test procedure (TP) for Standard 213 (TP–213–04, September 1, 1997), specifies a ''tolerance band,'' or ''acceleration function envelope,'' that incorporates the upper limit of Figure 2 and that also sets a lower limit (*see* section D.3.3, ''Impact Severity'' (page 53)).

[7] FMVSS No. 213's pulse is quite different than any other pulse used to regulate child restraints. The Europeans, the Canadians and the Australians all use different crash pulses to test their child restraints. The FMVSS No. 213 pulse seems to be more severe than the other pulses because of its sharp rise time and the short duration of the crash pulse. Of these three international pulses, the only similarity between the three was the time duration. All other pulses used to regulate child restraints, except FMVSS No. 213, ended beyond 100 msec. The U.S. has about 10 times the LTV sales as Europe (50 percent versus 5 percent). In Australia, LTV sales constitute about 25 percent of the total vehicles sold in that country.

granted, regarding the pulse corridor specified in the laboratory test procedure for Standard No. 213. Due to features of the TRC sled and others of its type generally (HYGE), TRC stated that there is a problem with achieving the acceleration curve specified in the standard and suggested that the pulse can be slightly revised, by manipulating time zero, to accommodate HYGE sleds without affecting test results.

Standard No. 213 specifies that, when testing child restraints in the 48 km/h test, the acceleration of the test platform must be entirely within a specified curve. The curve begins at zero g's and zero time. TRC stated that its HYGE sled is generally unable to produce the required acceleration curve. The sled ''fires'' by cracking a seal between a high pressure chamber and a low pressure chamber, with the flow of gas (around a metering pin, which controls acceleration curve shapes) from high pressure to low pressure providing the acceleration force. TRC explained that initially, the area available for gas flow is small, and a short amount of time is required for pressure to build enough to cause significant acceleration. Because there is a lag time between initiation of the test and appreciable acceleration of the sled, when the curve begins at zero g's and zero time, a significant portion of the curve is not within the tolerance band required by the present test procedure. When time zero is manipulated so that the initial acceleration pulse falls within the zero to 10 millisecond envelope, and the acceleration at time zero is 1.25 g's, the required tolerance band is achieved.

We have determined that TRC's petition merits consideration. In December 1998, NHTSA issued a final rule amending the sled test requirement in Standard 208, ''Occupant Crash Protection,'' by, among other things, revising how time zero is defined (63 FR 71390, December 28, 1998). The sled test in that standard tests occupant response for air bag restraint systems. In that rulemaking, NHTSA determined that it is impractical for that test to have time zero at 0.0 g acceleration, because of the time lag between initial movement of the sled and significant acceleration. The agency decided that the start of the sled test will be determined by a specific acceleration level for the sled which corresponds to a time at which the most rapid acceleration begins, at about 0.5 g's (63 FR at 71393). Similarly, TRC would like NHTSA to revise its pulse envelope specifications for child restraint testing to allow a small deviance at time zero ''so that * * * sleds [similar to TRC's] may defendably participate in certification and compliance testing.''

2. The Crash Pulse Is Not Overly Severe

Following passage of the TREAD Act, NHTSA had PAX analyze the crash pulses of over 150 vehicles tested under FMVSS No. 208 and under the agency's frontal New Car Assessment Program (NCAP). Based on the analysis of model year (MY) 1995 to MY 2000 vehicles, PAX found that the current pulse in Standard No. 213 was more severe [8] than that of most passenger vehicles in today's fleet, but was similar to the pulses of truck and truck-like multipurpose passenger vehicles (*i.e.*, large sport utility vehicles, SUVs) in Standard No. 208 tests, except that the truck pulse was much longer in duration than the Standard No. 213 pulse. A report by PAX on the research project is available in the docket.

To summarize the report, PAX obtained ''average'' crash pulses from the FMVSS No. 208 vehicle crash tests and NCAP tests. To obtain average NCAP and FMVSS No. 208 pulses, 59 vehicles were separated into 4 classes: Cars, SUV's, trucks, and vans. The pulses were then filtered, and the peak velocity, peak G, and duration of the crash pulse were recorded.

The Society of Automotive Engineers (SAE) Recommended Practice for electronic processing of vehicle crash test acceleration data, as given in SAE J211, is Channel Frequency Class 60. Filtered at SAE J211 Class 60 (100 Hz cutoff frequency), the average car pulse had a peak acceleration of 24 g's at 70 msec and pulse duration of approximately 115 msec. When this pulse was overlaid with the Standard No. 213 pulse, the 213 pulse enclosed no portion of the average car curve. The average car had an initial slope similar to FMVSS No. 213, but then the vehicle began to crush before stiffening up again. For vans, the average van pulse had a peak acceleration of 22 g's at 42 msec and pulse duration of 140 msec. Both the van pulse and the 213 pulse had almost identical rise times, but then after 10 msec, the van pulse began to behave like the car pulse. However, small portions of the van pulse were enclosed by the 213 pulse corridor.

With SUV's, the average SUV pulse had a peak acceleration of 26 g's at 27 msec and a pulse duration of 113 msec. When the SUV pulse was overlaid with the 213 corridor, the time of peak G for the SUV pulse was very similar to the 213 pulse, which peaks at 20 msec, and the rise time between the two pulses was also very similar. Portions of the SUV pulse fell within the 213 corridor a number of times.

For pick-up trucks, the average truck pulse had a peak acceleration of 26 g's at 24 msec and a pulse duration of 114 msec. When the truck pulse was overlaid with the 213 corridor, there were many similarities. Not only did the two curves peak at almost the same time but the rise time was very similar. Also, for the first 65 msec, the truck pulse fell within the corridors of 213 many times. Although the duration of the pulse was different, the truck pulse and the 213 pulse appeared to be very similar.

A summary of the PAX findings are set forth in Table 4.

TABLE 4.—SUMMARY OF PAX PULSE DATA FILTERED AT SAE CLASS 60 (100 HZ)

Pulse type	Peak G	Time (msec)		ΔV (kph)
		Duration	Peak G	
Average Passenger Car	24	115	31	55
Average SUV	26	113	35	52
Average Truck	29	114	39	52
Average Van	22	140	26	54
FMVSS No. 213	21	81	20	48

[8] A more severe crash pulse is defined as one having a higher acceleration onset rate, higher peak acceleration, and/or a shorter time duration.

Based on this information, we have decided not to reduce the severity of Standard No. 213's crash pulse. PAX found that the current crash pulse is very similar to the pulse of light trucks, SUVs and small school buses in acceleration onset rate and peak magnitude.

Figures 2, 3 and 4 plot acceleration curves of SUVs, trucks, and a small school bus. These plots show that the existing Standard No. 213 pulse corridor closely represents pulses of these vehicles. As shown in the figures, the first 70 msec represents several modern day vehicles used to transport children. Increasingly, light trucks, SUVs and small school buses are being used to transport children in child restraints. Based on these findings, we conclude that the stringency of the FMVSS No. 213 crash pulse is justified to better ensure that each child restraint will not have structural degradation in a crash, and will limit forces to the head, neck, and torso to tolerable levels, no matter the vehicle the child is in.

The agency is seeking comment on whether a more severe crash pulse should be established for testing child restraint systems. Comments are sought on the trapezoidal-shaped corridor proposed, and on the parameters that determine the level of severity of a pulse for child restraint systems. Does the trapezoidal-shaped corridor provide a sufficient representation of the current vehicle fleet, or are there other pulse shapes that would be more representative and/or more severe?

The agency is also seeking comment as to whether the total change of velocity of the current Standard No. 213 pulse (delta v = 30 mph) should be increased to 33 mph to be equivalent to a 30 mph crash into a rigid barrier. Typically, a delta v of 33 mph is seen in a 30 mph rigid wall test required for adult protection in Standard No. 208.

3. Adjusting the Corridors of the Pulse

We are proposing minor revisions to the crash pulse. We would extend it to approximately 90 msec, and would widen the test corridor so that several testing facilities can satisfactorily reproduce the FMVSS No. 213 crash pulse (*see* figure 5). The expanded corridor would not sacrifice the stringency of the current pulse. The proposal would ensure the rapid rise as is currently in the standard but also accommodate small deviations at time zero as requested by the TRC petition. The change in the boundary of the corridor would provide laboratories the flexibility to generate a pulse that would be closer to a ΔV = 30 mph.

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Figure 2: FMVSS 213 vs 208-SUV Crash Pulse Filtered @ 100Hz

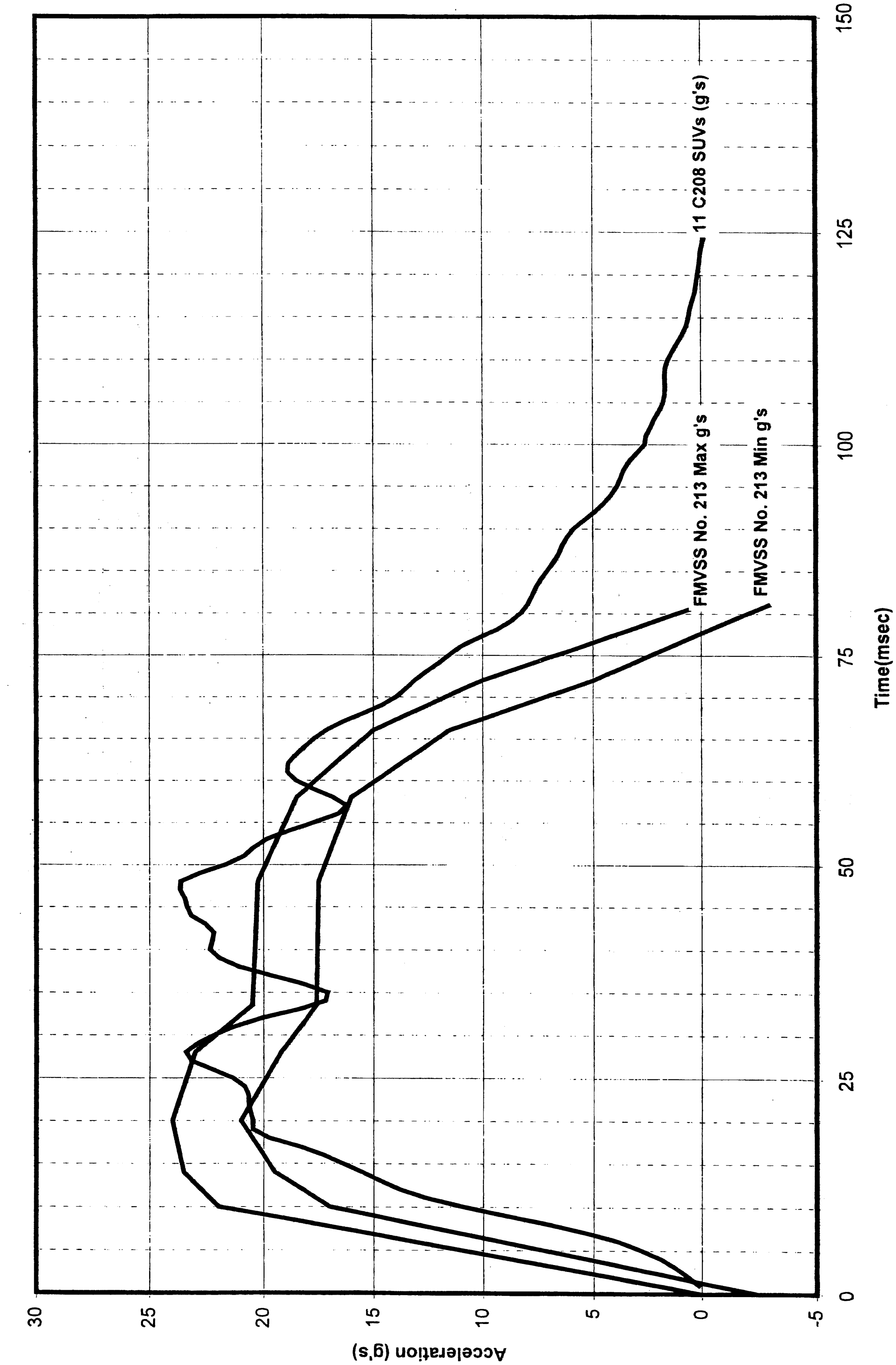


Figure 3: FMVSS 213 vs 208-Truck Crash Pulse Filtered @ 100Hz

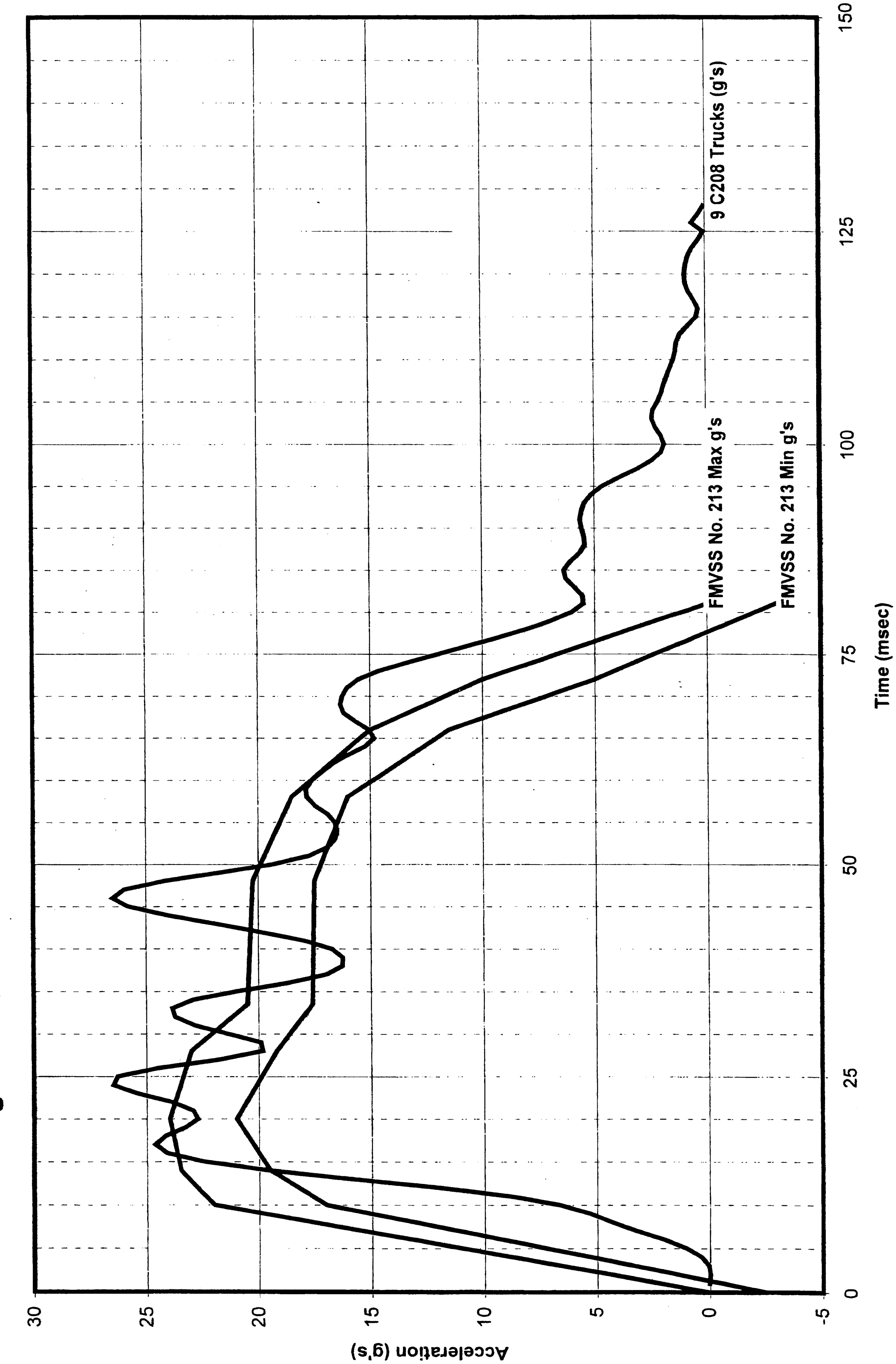


Figure 4: FMVSS 213 vs. Small School Bus Crash Pulse Acceleration

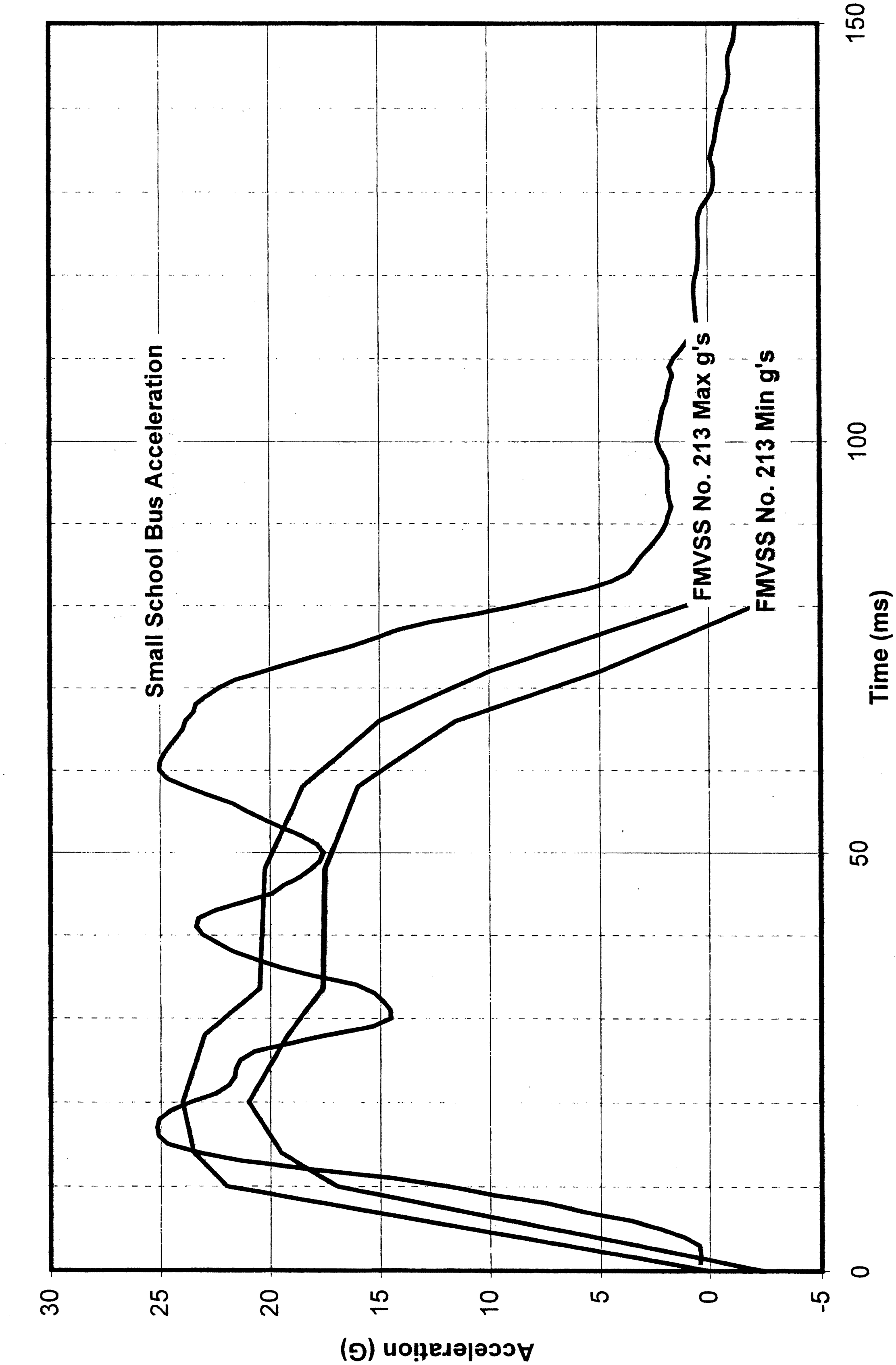
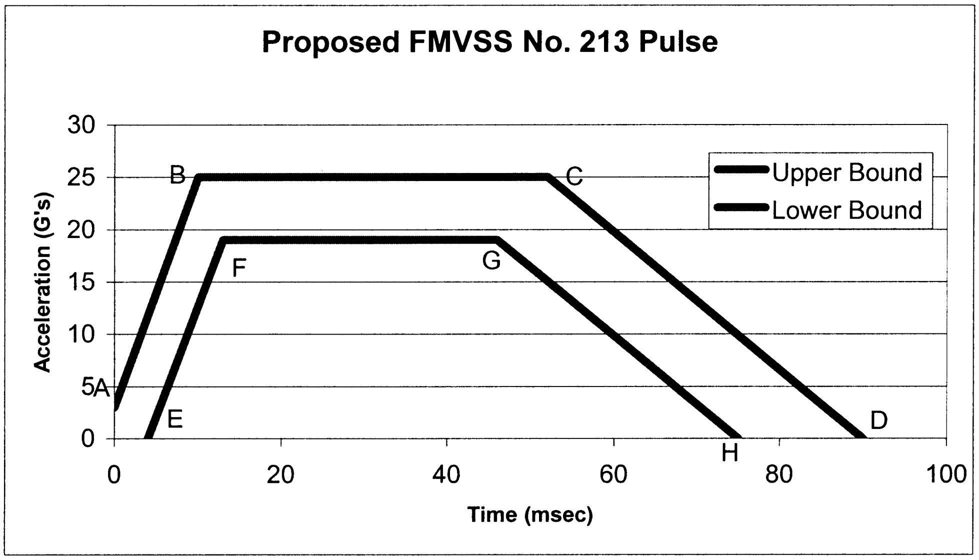


FIGURE 5: Proposed FMVSS No. 213 Pulse



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NHTSA proposes that the sled pulse for Standard No. 213 (see figure 5, above) should have the coordinates given in the following table 5:

TABLE 5.—PROPOSED SLED PULSE COORDINATES

Point	Time	Acceleration
Upper Bound		
A	0	3
B	10	25
C	52	25
D	90	0
Lower Bound		
E	4	0
F	13	19
G	46	19
H	75	0

NHTSA will be further evaluating the proposed changes. Sled tests using the proposed crash pulse will be conducted later this year, and the information we obtain will be placed in the docket. Results of this testing will be compared to compliance test data of existing child restraints to evaluate the effect of the changes. Comparison of these tests will aid in the agency's decision as to whether the proposed changes should be adopted in a final rule.

c. Improved Child Test Dummies

This document proposes two initiatives toward enhancing the use of test dummies in the evaluation of child restraints under Standard No. 213. NHTSA proposes to replace some of the existing dummies with improved dummies representing children of approximately the same age as the replaced dummies. NHTSA also proposes testing child restraints for older children by using a weighted 6-year-old dummy (*i.e.,* a dummy to which weights have been added). The total weight of the dummy would be 62 lb. The weighted dummy would be used to test child restraints that are recommended for children weighing 50 to 65 lb. (This NPRM also proposes expanding the applicability of Standard No. 213 to restraint systems recommended for use by children weighing up to 65 lb. See section IV(e) of this preamble.)

Child restraint systems must be certified as meeting Standard No. 213's requirements when dynamically tested with test dummies that represent children of different ages. The current dummies used in Standard No. 213 compliance testing are the uninstrumented newborn infant, the uninstrumented 9-month-old infant, and the Hybrid II 3- and 6-year-old dummies. NHTSA selects which test dummy to use based on the mass of the children for whom the manufacturer recommends for the child restraint. Table 6 sets forth which dummies are used to test child restraints based on the mass recommendations established for the restraint by the manufacturer. If a child restraint were recommended for a range of children whose mass overlaps, in whole or in part, two or more of the mass ranges in the table, the restraint is tested with the dummies specified for each of those ranges. Thus, for example, if a child restraint were recommended for children having masses greater than 13 kg and up to 20kg, it would be tested with the 9-month-old dummy, the 3-year-old dummy and the 6-year-old dummy.

TABLE 6.—USE OF CURRENT DUMMIES

Recommended mass range (kilograms)	Dummy(ies) currently used in compliance testing
Not greater than 5 kg (0 to 11 lb)	Newborn.
Greater than 5 but not greater than 10 kg (11 to 22 lb)	Newborn, 9-month-old.
Greater than 10 but not greater than 18 kg (22 to 40 lb)	9-month-old, Hybrid II 3- year-old.
Greater than 18 (40 to 50 lb)	Hybrid II 6- year-old.

1. CRABI, Hybrid III Dummies

i. Replacing Current Dummies

The first initiative is a proposal to replace three of the test dummies now used in Standard No. 213 compliance tests with new test dummies. The design and performance criteria for the new dummies were incorporated into NHTSA's regulation for anthropomorphic test devices, 49 CFR part 572, by rulemaking actions concluded last year. The new dummies are the Child Restraint Air Bag Interaction (CRABI) 12-month-old infant dummy (Part 572, Subpart R), the Hybrid III 3-year-old child dummy (Subpart P), and the Hybrid III 6-year-old child dummy (Subpart N). The dummies are used in compliance tests that the agency adopted last year for testing advanced air bag systems under Standard No. 208, ''Occupant Crash Protection.'' We would retain the newborn infant dummy in Standard No. 213's compliance tests, but would replace the 9-month-old dummy (Part 572, Subpart J) with the CRABI.[9] We would replace the Hybrid II 3- and 6-year-old dummies with their Hybrid III (HIII) counterparts. Thus, just as in the protocol today under Standard No. 213, there would be four child test dummies used for compliance testing.

The new dummies were incorporated into Part 572 because they comprise a new generation of test dummies that are more representative of human children than their Hybrid II counterparts, and allow for the assessment of the potential for more types of injuries in motor vehicle crashes. The biofidelity, reliability and repeatability of the test dummies were discussed in the final rules incorporating the dummies into Part 572. *See,* final rules for the CRABI (65 FR 17188; March 31, 2000); Hybrid III 3-year-old (65 FR 15254; March 22, 2000); Hybrid III 6-year-old dummy (65 FR 2065; January 13, 2000). The CRABI dummy is instrumented with head, neck and chest accelerometers, while the 9-month-old dummy is not. The Hybrid III child dummies have a broader selection of instruments to assess the injury potential to child occupants, including a multi-segmented neck, multi-rib thorax and abdominal load monitors, while the Hybrid II dummies have limited biofidelity in the neck area and are not instrumented to measure neck injury. Because of their superior instrumentation, the CRABI dummy and the Hybrid III child dummies can provide a fuller evaluation of the performance of child restraint systems in protecting young children.

Simply substituting the dummies for the existing ones might not, in itself, affect child restraint performance. There does not seem to be a significant difference between the Hybrid II and Hybrid III dummies in their ability to measure head and chest accelerations or in dummy kinematics relevant to head and knee excursions. A series of frontal, Standard No. 213 sled tests were conducted to evaluate the equivalency between the Hybrid II child dummies currently used in the standard with the CRABI dummy and the Hybrid III 3- and 6-year-old dummies. Results from previously performed compliance tests (Hybrid II dummies) were identified, and the Hybrid III and CRABI dummies were seated in various CRS and vehicle belt configurations in order to establish a full complement of tests with both the Hybrid II and Hybrid III dummies. Where needed, additional sled tests were performed with the Hybrid II dummies. HIC, chest acceleration, and head and knee excursion values were compared between the Hybrid II and Hybrid III dummies for each age group. Test results indicate similar performance between the Hybrid II and Hybrid III child dummy families. *See,* ''A Comparative Evaluation of the Hybrid II and Hybrid III Child Dummy Families,'' a copy of which has been placed in the docket. Nonetheless, replacing the Hybrid II 3- and 6-year-old dummies with their Hybrid III counterparts would enhance safety by the latter's greater instrumentation capabilities and improved biofidelity, and by the adoption of injury criteria that the Hybrid II dummies cannot measure. This NPRM proposes new injury criteria of that sort, which are discussed in section V (f), *infra.*

ii. Retaining the Criteria Used To Determine Which Dummy Is Used in Compliance Tests

NHTSA proposes to retain the criteria that are used to determine which dummy is used in Standard No. 213's compliance test. Table 7 sets forth the dummies that would be used to test child restraints, based on the mass of the children for whom the restraint is recommended.

TABLE 7.—PROPOSED USE OF NEW DUMMIES

Recommended mass range (kilograms)	Dummy(ies) currently used in compliance testing	Dummies proposed for use
Not greater than 5 kg (0 to 11 lb)	Newborn	Newborn.
Greater than 5 but not greater than 10 kg (11 to 22 lb).	Newborn, 9-month-old	Newborn, CRABI.
Greater than 10 but not greater than 18 kg (22 to 40 lb).	9-month-old, 3-year-old	CRABI, HIII 3-year-old.
Greater than 18 kg but not greater than 22.7 kg (40 to 50 lb).	6-year-old	HIII 6-year-old.
Greater than 22.7 kg (Over 50 lb)		Weighted HIII 6-year-old.

Comments are requested on the merits of replacing the existing dummies with the three new ones. The agency has tentatively decided that it would no longer use the 9-month-old dummy (which weighs 20 lb) to test child restraints because the newborn and the CRABI (22 lb) appear sufficient to evaluate the performance of a child restraint recommended for infants. Comments are requested on whether the 9-month-old dummy would still be needed to test child restraints, and if so, which restraints should be tested with that dummy. The 9-month-old dummy better represents a 9-month-old child than the CRABI, since the CRABI is slightly more massive as a device representing a 12-month-old. Thus, retaining the 9-month-old in compliance testing might increase the scrutiny of the standard of infant restraints, which argues for continued use of the dummy in compliance tests (although there would be costs associated with such use). Also, some rear-facing infant car seats/carriers that are designed with a

[9] Britax Child Safety Inc. submitted a petition for rulemaking on September 22, 2000, to allow manufacturers to specify use of the CRABI in compliance testing in place of the 9-month-old dummy. To the extent the petition is consistent with this NPRM, it is granted.

handle for toting the infant outside of the vehicle are recommended for use with infants weighing only up to 20 lb. Even though the CRABI (at 22 lb) is heavier than the children recommended for those restraints, we tentatively conclude that the CRABI can and should be used in compliance tests of these restraints because it is instrumented and the 9-month-old (20 lb) dummy is not. Do all infant car seat/carriers have back supports that are high enough to support the CRABI?

Relatedly, the agency's policy has been, to the extent possible, to test each child restraint with dummies that are at the ends of the weight range of children for whom the restraint is recommended. The smaller of the two dummies with which we test child restraints is used for assessing the potential for ejection, while the larger dummy is used for assessing structural integrity. Be that as it may, we would test a child restraint that is recommended for use by children weighing 20 to 40 lb forward-facing with the CRABI (22 lb) dummy, and not with the 9-month-old (20 lb) dummy, even though the 9-month-old dummy is closer in weight/mass to the lower end of the recommended weight range for the restraint. The difference in stature between the 9-month-old and the 12-month-old CRABI is nominal—the 9-month-old is 27.9 inches tall, while the 12-month-old CRABI is 29.4 inches tall (the sitting heights are 17.7 inches and 18.3 inches, respectively). As such, both dummies will likely provide nearly identical measures of the possibility for ejection. Comments are requested on this issue.

Comments are requested on whether there is a need to specify in Part 572 a test dummy representing an 18-month-old child. Transport Canada has evaluated an 18-month-old CRABI child dummy that weighs 25 lb. However, because NHTSA has not evaluated the dummy, we have not assessed whether it should be used in compliance testing. There also does not appear to be a significant need for the dummy. The dummy would be used in tests of convertible[10] restraints that are recommended for use in the rear-facing configuration by children weighing over 22 lb. As noted above, restraints that are recommended for use by children over 22 lb (and less than 40 lb) are subject to testing with the Hybrid II 3-year-old (33 lb) dummy. Virtually all convertible restraints currently on the market are certified rear-facing for up to at least 30 lb, and often to 35 or 40 lb. The 3-year-old dummy therefore is more representative of children at the upper end of the recommended weight ranges for these restraints than the 18-month-old dummy.

The height recommendations would not change. The 850 mm height criterion was originally based on the 95th percentile 1-year-old and not the 9-month-old, so the substitution of the CRABI 12-month-old for the 9-month does not require a change.

TABLE 8.—DUMMY SELECTION BASED ON HEIGHT RECOMMENDATIONS

Recommended height range (kilograms)	Dummy(ies) currently used in compliance testing	Dummies proposed for use
Not greater than 650 mm	Newborn	Newborn.
Greater than 650 mm but not greater than 850 mm.	Newborn, 9-month-old	Newborn, CRABI.
Greater than 850 mm but not greater than 1100 mm.	9-month-old, HII 3-year-old	CRABI, HIII 3-year-old.
Greater than 1100 mm	HII 6-year-old	HIII 6-year-old.

iii. Conditioning the Dummies

This document proposes detailed descriptions of the clothing, conditioning and positioning procedures for the dummies to ensure that the test conditions are carefully controlled.

Clothing for the 12-month-old CRABI and the Hybrid III 3- and 6-year-old dummies is currently specified in the corresponding sections of Part 572 that identify the design and performance criteria for each dummy. (Clothing is described in § 572.154(c)(2) of Part 572 for the CRABI 12-month-old; in § 572.144(c)(1) for the Hybrid III 3-year-old; and in § 572.124(c)(2) for the Hybrid III 6-year-old.) It is proposed that the clothing specified in Part 572 for each dummy be used in the Standard No. 213 compliance test, except with respect to the identification of appropriate footwear. S9.1(c) of Standard No. 213 prescribes size 7M sneakers for the 3-year-old dummy and size 12½ M sneakers for the 6-year-old dummy with rubber toe caps, uppers of Dacron and cotton or nylon and a total mass of 0.453 kg. No such specifications are in Part 572. As such, we propose that S9.1(c) Standard No. 213 maintain the specification of footwear for the Hybrid III 3- and 6-year-old dummies. The clothing and footwear for the weighted 6-year-old dummy (see section V.d.2, *infra*) would be the same as that specified in Part 572 for the Hybrid III 6-year-old dummy.

The conditioning specifications specified in S9.3 of Standard No. 213 would be revised to reflect the same pre-test conditioning procedures that are currently specified in Standard No. 208 for the CRABI 12-month-old and the Hybrid III 3- and 6-year-old dummies. Namely, each dummy would be maintained at a temperature between 69 and 72 degrees F (between 20.6 and 22.2 degrees C) for at least 4 hours prior to a test. This would ensure that each dummy is conditioned in a manner that is consistent with the provisions specified in Part 572 for each dummy and its specific subassemblies. The dummy positioning requirements in S10 of Standard No. 213 would remain essentially unchanged. We note that S10.2.1(a) of Standard No. 213, which specifies rotating the legs of the 9-month-old dummy prior to placement of the dummy in a child restraint, is not needed for the CRABI 12-month-old dummy because of the spinal structure of the CRABI dummy.[11]

2. Using a Weighted 6-Year-Old Dummy

The second initiative relates to enhancing the dynamic evaluation of child restraints that are designed for older children. This NPRM proposes to use a weighted Hybrid III 6-year-old dummy to test child restraints that are

[10] A convertible child restraint can be used rear-facing with infants and young toddlers, and forward-facing with older toddlers. They typically are recommended for use by children from birth until the child reaches 40 lb.

[11] The proposed regulatory text of this NPRM retains the specifications in Standard No. 213 for conditioning and positioning the 9-month-old dummy and the Hybrid II dummies because the dummies would continue to be used in compliance tests until the mandatory compliance date of a final rule (which is proposed to be November 1, 2004).

recommended for use by children with masses up to 29.5 kg (65 lb).

A child reaching 40 lb (18 kg) has outgrown a convertible or toddler restraint, but still must be restrained by special means to safely ride in a vehicle. Parents tend to move these young children into the vehicle belt system, only to find that the lap and shoulder belts do not properly fit their children. The children are not yet large enough to sit with their backs against the vehicle seat back cushion with their knees bent over the seat edge. To compensate for a shoulder belt crossing their face or neck, some children tend to place the shoulder belt behind their backs, which results in no restraint of the child's upper torso. Children also find it more comfortable to bend their knees at the vehicle seat cushion's edge than to ride with the edge of the cushion pressing against their calves. Because their legs are not long enough to enable them to bend their knees at the cushion's edge while riding in a vehicle, children generally slouch down in the vehicle seat and scoot forward on the seat. Slouching raises the lap belt over their soft-tissue areas, which exposes abdominal organs to crash forces that can be imposed by the lap belt.

Klinich et al. estimates that children who are less than 148 centimeters in standing height do not adequately fit the seat belt and seating system in vehicles (''Study of Older Child Restraint/Booster Seat Fit and NASS Injury Analysis,'' DOT HS 808 248, November 1994.) Current NHTSA guidelines recommend booster seat use for children up to age 8, unless the child is 4′ 9″.

A booster seat improves the fit of a vehicle's belts on children. Booster seats are ''child restraint systems'' regulated in the same manner as other child restraint systems by Standard No. 213. The boosters come in a variety of styles, the majority having high-backs, with shoulder strap adjuster features on the sides. Belt-positioning seats (also referred to as ''belt-positioning boosters'') must be used with a lap and shoulder belt system. Boosters provide a raised seating platform for the child, which provides a taller sitting height. Raising the child helps position both the vehicle's lap and shoulder belts correctly. The seating platform also allows the child's knees to bend comfortably while the child is riding in the vehicle, which greatly reduces the tendency to slouch. Booster seats are dynamically tested by the agency using the 6-year-old test dummy, which weighs approximately 48 pounds and is about 48″ tall.

In September 1996, the NTSB issued Safety Recommendation H–96–25, which asked NHTSA to revise Standard No. 213 to establish performance standards for booster seats that can restrain children up to 80 pounds. The Safety Board expressed concern about the performance of boosters when restraining a child that weighs more than the 6-year-old dummy that is currently used in Standard No. 213 compliance testing. This concern was also expressed by the Blue Ribbon Panel II in March 1999 (''Blue Ribbon Panel II: Protecting Our Older Child Passengers'') in its report on ways to increase the use of age- and size-appropriate occupant restraints by children ages 4 through 15. Most booster seats currently on the market are certified for use by children weighing up to 80 lb. To better evaluate the performance of these boosters with children at the higher end of the weight range recommended for the restraint, the agency is pursuing two separate but parallel efforts to address the protection needs of older children. The first is a long-term program to develop a 76-lb, 10-year-old dummy. The second is a short-term initiative to use a weighted 6-year-old dummy to test booster seats beyond the 50-lb weight limit specified in FMVSS No. 213. The weighted dummy weighs 62 lb.

i. Development of the 10-Year-Old Dummy Is a Long-Term Measure

A 10-year-old dummy is being developed, but it is not far enough along in its development to be part of this NPRM. [12] The following summarizes the work on the dummy thus far.

In early 2000, NHTSA asked the Society of Automotive Engineers (SAE) Dummy Family Task Group (DFTG) to develop a test dummy representative of a 10-year-old child. The development and adoption of a dummy this size is seen as a long-term solution to ensuring the proper restraint of the approximately 10 percent of the population between the sizes of 6-year-olds and 5th percentile adult females, and could potentially be used in evaluating the performance of booster seats and vehicle belt systems. The group met initially in May 2000 to define the concept. The weight and height of the proposed dummy were provided from the Center for Disease Control Data Bank, and was targeted to be approximately 4′6″ and 72 lb. The basic construction was envisioned to be similar to that of the small female dummy. The dummy was to be able to be positioned in erect seated, slouched seated, standing, and kneeling postures to fully evaluate possible restraint configurations.

The task group held its first review meeting in June 2000, and reviewed impact responses scaled from the small female and 6-year-old dummies. At that time, provisional performance requirements were defined, and the anthropometry and mass goals were finalized. The dummy instrumentation was specified to measure injury parameters for the following body regions: head, neck, shoulder, thorax, pelvis, femur, and tibia.

The first 10-year-old prototype was assembled in February 2001. It weighed about 76 lb. The task group reviewed this prototype, and directed design corrections. Subsequently, the first drawings were completed in April 2001. GM and NHTSA separately performed preliminary dummy performance verifications in Spring 2001 and Summer 2001, respectively. The agency is now conducting an extensive evaluation of the dummy, which will include a series of sled testing of the dummy. If no problems are encountered, NHTSA may issue an NPRM proposing the incorporation of the 10-year-old dummy into Part 572 by early 2003. When it issues such an NPRM, NHTSA will also undertake rulemaking on Standard No. 213 to propose using the dummy in compliance tests. At this time, we invite views on the development and potential use of the 10-year-old dummy in Standard No. 213's compliance tests.

ii. A Weighted 6-Year-Old Dummy Is a Feasible Short-Term Alternative

As a short-term, interim measure, NHTSA is proposing the use of a weighted Hybrid III 6-year-old dummy (hereinafter ''HIII–6CW'') for use in testing child restraints that are recommended for use by children weighing from 50 to 65 lb.

The agency developed the dummy by adding weights to the current Hybrid III 6-year-old child dummy to increase the

[12] The legislative history to TREAD indicates that Congress was interested in the potential for using the 10-year-old dummy specified in ECE 44. That dummy is manufactured by the Netherlands Organisation for Applied Scientific Research (TNO), which manufactures the other test dummies referenced in ECE 44. These dummies are TNO's ''P'' series of child dummies, which includes a newborn, a 9-month, 18-month, and 3-, 6-, and 10-year-old. All P series dummies are of similar construction. The agency evaluated the 3-year-old child dummy and found it to have insurmountable seating stability problems when placed in a child restraint, and un-human-like impact kinematics because of its cervical and thoracic spine construction. We also found problems with the instrumentation. As a result, because of design similarities of all P series dummies, our engineering judgment was the 10-year-old TNO dummy would not be suitable for use in crash testing. Subsequently, TNO began developing the Q series dummies, which appear likely to be more biofidelic, stable and reliable than their predecessor. The dummies are still in development and are not available for use now.

total weight from approximately 52 pounds[13] to over 60 pounds.[14] NHTSA added approximately 10 pounds to the dummy so that it could be used to represent slightly heavier children. The initial design concept utilized carbon steel weights that were rigidly attached to the dummy in two locations: (1) a weight located on the superior side of the pelvis between the pelvis and the lumbar adaptor; and (2) weights located on the lateral sides of the thoracic spine box. The steel pelvis weight added 3.8 pounds to the dummy while the spine weights added a total of 5 pounds (each weight was 2.5 pounds on right and left sides). The resulting dummy weight was approximately 60 pounds. The modifications also increased the dummy's seating height by one inch. This change in stature appeared to be acceptable; a heavier occupant could also be slightly taller.

Following preliminary testing with the carbon steel weights and upon experiencing some belt retention problems, we determined that better weight and center of gravity distributions could be achieved through the use of a dense Tungsten alloy material. The geometry of the spine and pelvis weights was redesigned to achieve a weight of 5.1 pounds for the pelvis weight and 5.2 pounds total for the spine weights. The increased density offered by the Tungsten alloy allowed each of the weights to be reduced in size, thus reducing the possibility of interference between the ribs and the spine weights. Further, the dummy's seated height was only increased by approximately 0.7 inches over the unweighted HIII–6C dummy.

Preliminary evaluation tests have been conducted on dummies equipped with both the steel and Tungsten alloy versions of the weights. These tests included thoracic calibration impacts, torso flexion tests, and dynamic sled tests. The weights withstood dynamic impacts and testing without causing excessive noise or vibrations in the data channels. (Adding the weights does not require any permanent modifications to the dummy. When the weights are removed, the dummy reverts to its original condition and meets the existing Part 572 specifications for the Hybrid III unweighted 6-year-old dummy.)

Component tests conducted with the steel version indicate that the added weights did not appear to introduce structural or instrumentation problems. The thoracic responses met the calibration requirements of the unweighted HIII–6C dummy; however, the peak probe force measured during the compression interval was near the upper end of the corridor. Thus, the thoracic impact response corridor may need to be adjusted for the weighted dummy. Electronic responses and visual observations confirmed that there was no contact between the ribs and the spine weights during the oblique impacts. The torso flexion tests also met all of the requirements of the unweighted HIII–6C dummy.

Sled tests have been conducted with both the steel and Tungsten versions. For all sled tests, the current Standard No. 213 pulse and buck were used. Both versions of the dummy have been tested with different booster seats and with 3-point (lap and shoulder) belt systems. The results of the dummy, particularly with the high mass Tungsten weights, appear to be reasonable as compared to the standard HIII–6C dummy. That is, there have been no structural or electronic deficiencies observed as a result of the sled testing. Additionally, a series of four Standard No. 213 sled tests using various child restraints were performed to compare the response of the unweighted Hybrid III 6-year-old dummy to the HIII–6CW. Tests of the revised weighted 6-year-old H-III dummy produced normal dummy kinematics (motion in midsagittal plane) in booster seats and regular belt systems.

A technical report discussing the agency's work in developing the dummy, titled ''Evaluation of the Weighted Hybrid III Six-Year-Old Dummy,'' has been placed in the docket. A proposal to incorporate the specifications and performance criteria for the HIII–6CW in Part 572 will be published in early 2002 in the **Federal Register**.

d. Expanding the Applicability of the Standard to 65 Lb

NHTSA proposes to amend Standard No. 213 to increase the upper limits of its applicability so that it would apply to child restraint systems for children who weigh 65 lb or less. Currently, the standard defines ''child restraint system'' as ''any device except Type I [lap] or Type II [lap/shoulder] seat belts, designed for use in a motor vehicle or aircraft to restrain, seat, or position children who weigh 50 pounds or less'' (S4). We would amend the definition to increase the weight limit to 65 lb.

The effect of the amendment would be to apply Standard No. 213 to devices that are recommended for children weighing 50 to 65 lb. There has been considerable interest over the years in raising the limit to require that child restraint systems that are recommended for older children (*i.e.,* booster seats) perform adequately in a crash. The aim of raising the limit was to bring booster seats that are recommended for children over 50 lb within Standard No. 213 and subject them to that standard's dynamic test, just as other restraints are tested under the standard. The intent to evaluate booster seat performance more thoroughly by dynamically testing them could not be realized, however, without a test dummy representing an older child. It would make little sense to raise the standard's limit above 50 lb if a test device were not available to test the performance of the restraint. Further, booster seats were not being marketed so as to be beyond the standard's purview; their recommended usage included children weighing less than 50 lb so they were, at least, subject to the 30 mph dynamic test with the 6-year-old (48 lb) dummy. For these reasons, NHTSA decided against increasing the 50 lb limit in the definition of ''child restraint system.'' (*See* 58 FR 46928, 46932 for a discussion of the agency's decision not to undertake rulemaking on this issue.)

Today, we are proposing to incorporate a weighted 6-year-old dummy (62 lb total weight) into Part 572. We tentatively conclude that the dummy can provide useful information on the performance of booster seats that are recommended for children above 50 lb. Accordingly, we propose to increase the 50 lb weight limit in the definition of child restraint system to 65 lb. In the event that the weighted 6-year-old dummy is not determined to be sufficient for testing child restraints for children weighing above 50 lb, what would be the advantages and disadvantages of raising the limit nonetheless? Regardless of whether the

[13] The Hybrid III 6-year-old dummy weighs about 51.5 lb, whereas the Hybrid II dummy weighs approximately 48 lb. A 50th percentile 6-year-old weighs 51 lb.

[14] The agency originally began this project by evaluating whether weight could be added to the HIII 6-year-old dummy by way of a weighted vest. We purchased a weighted vest from First Technology Safety Systems, a dummy manufacturer, to evaluate its design. The weights were contained in pouches located over the abdomen in the front and over the lower back of the dummy's posterior. On inspection of the vest on the dummy, we decided that this design would be unacceptable for use in compliance testing. Because the weights were not rigidly attached to the dummy, the weights could rattle or even slap in a dynamic event and possibly create noisy data signals in the dummy's instrumentation responses. Further, the vest was somewhat bulky, and the agency was concerned that it could affect the positioning of the dummy within the restraint system. The agency therefore concluded that the weighted vest concept was not a feasible alternative.

weighted 6-year-old dummy were adopted, comments are also requested on the advantages and disadvantages of increasing the weight limit to eighty pounds (80 lb) in the absence of an 80-lb test device. Our tentative conclusion is that the weighted 6-year-old dummy is not sufficient to assess the dynamic performance of a booster seat in restraining an 80-lb child. Consumers Union (CU) has suggested in its comment to the agency's draft child passenger protection plan (Docket NHTSA–7938, page 11) that manufacturers should not be permitted to recommend a child restraint for children of weights above the weight of the largest test dummy used to evaluate the restraint in compliance testing. NHTSA previously declined the suggestion, believing that limiting the recommendations in the manner suggested could result in safety losses. (For example, a manufacturer would not be able to recommend a toddler restraint for children above the weight of the 3-year-old dummy, 33 lb, which would result in 3-year-olds being graduated out of child restraints at too early an age.) (61 FR 30824; June 18, 1996.) Comments are requested on CU's suggestion with respect to booster seats. If the weighted dummy were adopted, should manufacturers be allowed to recommend boosters for children only up to 62 lb?

e. New or Revised Injury Criteria

This section describes proposed amendments to the measures that we use to assess the performance of child restraints under Standard No. 213. We propose injury criteria that are the same as the scaled injury criteria for children specified in Standard No. 208, *Occupant Crash Protection.* We also propose some requirements similar to the static testing requirements of Standard No. 213. The requirements that child restraints must maintain system integrity and limit excursion of the torso, head and knees in the simulated frontal impact would not be changed.

The agency requests comments on each of the proposed injury criteria. Comments are solicited on what risk levels are acceptable, what factors should be considered in selecting performance limits and whether the same limits as in Standard No. 208 should be established for the child restraint standard. The two standards address different sources of potential harm to children. The injury criteria for children in Standard No. 208 are intended to minimize the risk from a deploying air bag (ensuring that the air bag deploys in a manner much less likely to cause serious or fatal injury to out-of-position occupants). The injury criteria in Standard No. 213 are intended to limit the severity of forces imposed on a child during a crash. Child restraints meeting these criteria have worked effectively to maintain high levels of performance in crashes. Because the injury criteria of the standards are intended to minimize risks from different injury sources, it might be reasonable to have non-identical criteria.

1. Scaled Injury Criteria

The injury criteria that a child restraint must meet when restraining a dummy would change in several ways. Lower head and chest injury criteria are proposed, but the duration within which accelerations are measured would be limited. A new criterion for chest deflection is also proposed, as well as new criteria for neck injury. Currently, Standard No. 213 specifies a head injury criterion (HIC) of 1000 and maximum acceleration level for the chest (60g). These were based on the criteria that were specified for the adult male test dummy in Standard No. 208 in the early 1980's, when injury criteria were incorporated into Standard No. 213 (44 FR 72131; December 13, 1979). At that time, there were no injury criteria that were separately scaled from an adult dummy to reflect anatomical differences and differing injury tolerance of children. In the agency's May 2000 final rule on advanced air bag technology, NHTSA amended Standard No. 208 by, among other things, adjusting the criteria and performance limits to account for motor vehicle injury risks faced by different size occupants. (65 FR 30680; May 12, 2000.) See also a paper titled ''Development of Improved Injury Criteria for the Assessment of Child Restraint Systems,'' that has been placed in the docket.

i. Head Injury

This NPRM proposes to replace the HIC 1000 limit in Standard No. 213 with the scaled HIC values adopted by the May 2000 air bag final rule: 700 for 6-year-old dummy, 570 for the 3-year-old dummy; and 390 for the CRABI 12-month-old. In Standard No. 208, these values are calculated over a 15 millisecond (msec) duration. We propose to calculate HIC over a 15 msec duration (HIC_{15}) for Standard No. 213. Comments are requested on this issue, however, because while HIC_{15} is appropriate for Standard No. 208, there currently is no limit on the time duration used to calculate HIC in Standard No. 213. Generally speaking, limiting the time duration lowers the calculated HIC values.

A. Should HIC Duration Be Limited to 15 Milliseconds?

We have previously declined to limit the time duration for calculating HIC in Standard No. 213 compliance tests because of the possible lessening of the stringency of the standard. Prior to the May 2000 rule on advanced air bags, Standard No. 208 limited HIC to 1000 but limited the calculation to a maximum time interval of 36 msec (1000_{36}). In 1995, we were asked to amend Standard No. 213 to calculate HIC using a 36 msec time duration, as was done at the time for Standard No. 208. The agency decided against limiting HIC because we determined that HIC values were generally lower when the time interval was limited to 36 msec (HIC_{36}), compared to $HIC_{unlimited}$ (an unlimited time duration may be used to calculate HIC). Given that a HIC_{36} limit could have reduced the stringency of the standard, there was not enough information justifying any limit on the time interval. Thus, NHTSA decided against limiting HIC to 36 msec in Standard No. 213. 69 FR 35127, July 6, 1995.

Now, however, we are considering limiting the time interval for measuring HIC in the child restraint standard. Standard No. 208 had provided for calculating HIC for the entire crash duration as the child restraint standard does now, but NHTSA limited the maximum time duration of the HIC calculation to 36 msec for Standard No. 208 because low acceleration crashes over a long time duration could exceed HIC $1000_{unlimited}$ even though they were not likely to result in brain injuries. The agency determined that limiting the duration over which HIC is calculated to a maximum of 36 msec, while limiting HIC to 1000, assured that the acceleration level of the head will not exceed 60 g's for any period greater than 36 msec. The 60 g acceleration limit was set as a reasonable head injury threshold by the originators of the ''Wayne State Tolerance Curve,'' which was used in the development of the HIC calculation. 51 FR 37028; October 17, 1986.

The time interval was further reduced to 15 msec by the May 2000 final rule amending Standard No. 208. The May 2000 rule on advanced air bags replaced 1000_{36} with HIC 700_{15}, based on recommendations from motor vehicle manufacturers that the duration for the HIC computations should be limited to 15 msec with a limit of 700 for the 50_{th} percentile adult male dummy. NHTSA determined that the stringency of HIC 700_{15} was equivalent to HIC 1000_{36} for long duration pulses, because while HIC[15] produces a lower numerical value for long duration events, its 700 lower failure threshold compensated for the reduction.[15] The final rule employed a 15 msec time interval whenever calculating the HIC function in Standard No. 208, and limited the maximum response of the adult male dummy to 700 and the response of the smaller dummies to suitably scaled maximums (700 for the 6-year-old, 570 for the 3-year-old, and 390 for the CRABI).

Since the TREAD Act directs us to consider adopting the scaled injury criteria adopted by the May 2000 final rule on advanced air bags, we are proposing that the HIC limits of 700_{15}, 570_{15} and 390_{15} be incorporated into Standard No. 213 for tests with the 6-year-old, the 3-year-old and the CRABI, respectively. NHTSA believes that it should take a cautious approach in modifying the head injury tolerance level set by the HIC requirement. Comments are requested on the appropriateness of both the scaled HIC limits and on a 15 msec (or other) time interval for calculating HIC. In cases of head contacts with softer surfaces, such as an airbag system, the time duration of the contact is longer than in head contacts with hard surfaces. Since HIC was initially developed for high acceleration, short duration impact events, it is appropriate to limit the HIC calculation in such airbag impacts, since the acceleration levels are low but time duration is long and not similar to the original intent of the HIC criterion. Data from sled testing of child restraints conducted at the agency's Vehicle Research & Test Center (VRTC) and from evaluating child restraints as part of the agency's New Car Assessment Program (NCAP) show that there was not a major difference between $HIC_{unlimited}$ and HIC_{36}, indicating that the HIC responses are from contact events shorter than 36 msec. Further, accident data show that 79 percent of all brain injuries for children 0–8 years old are due to contact, which would imply the prevalence of short duration head acceleration events. This finding appears to indicate a reasonable basis for making Standard No. 213's calculation of HIC consistent with Standard No. 208. Comments are requested on whether the time interval should be limited to 15 msec, to 36 msec, or not at all. Limiting the time interval to 15 msec would produce lower HIC values than the current method of calculating HIC in Standard No. 213, but the reduction in $HIC1000_{36}$ to the lower failure thresholds of 700_{15}, 570_{15} and 390_{15} should achieve equivalent performance.

The agency does not know at this time the degree to which HIC 700_{15} and the scaled thresholds for the smaller dummies would reduce the current HIC failure rate of Standard No. 213 because data from past tests are unavailable in a format that allows us to recalculate the relevant values. However, based upon agency test results, we expect a high passage rate for HIC_{15}. A series of five rear-facing and five forward-facing tests were conducted at VRTC with the CRABI dummy. In those tests, all five passed the $HIC_{15}390$ requirement in the rear-facing tests. Three of five passed for the forward-facing tests. Forward facing tests with the Hybrid III 3-year-old dummy have indicated 100 percent passage of the $HIC_{15}570$ requirement in Standard No. 213 conditions. A series of nine sled tests conducted under the NCAP program at an elevated sled test velocity of 35 mph also experienced a 100 percent passage of the requirement; a series of 20 in-vehicle crash tests with Hybrid III 3-year-old dummies conducted in NCAP produced over a 60 percent passage of the HIC_{15} requirement for these higher speed impact test conditions. For the 6-year-old Hybrid III dummy, the $HIC_{15}700$ requirement was met 91 percent of the time in a series of 11 tests. Based upon these results, the agency has tentatively concluded that incorporation of the scaled HIC_{15} criteria for these Hybrid III child dummies would be reasonable. Comments on test result experience of vehicle and/or child restraint manufacturers with the Hybrid III child dummies and the scaled HIC_{15} responses are sought.

B. Test Data

The agency conducted two series of tests to evaluate if the child injury tolerance limits specified in FMVSS No. 208 are appropriate and practicable for use in testing child restraints using Hybrid III child dummies. The first series of sled tests was performed by VRTC to determine the performance of typical forward-facing child restraint systems secured by either a lap belt only, a lap and shoulder belt, or the LATCH system (the child restraint's attachments were attached to the child restraint by webbing material). The Hybrid III 3-year-old test dummy was used in this testing. The child restraint systems were installed and tested in either the rear seat of a contemporary sedan or the seating assembly specified in FMVSS No. 213. In addition, three sled acceleration pulses were studied: a typical Standard No. 208 frontal barrier crash (30 mph), an NCAP frontal crash (35 mph), and a Standard No. 213 pulse. The results of the VRTC sled testing are tabulated in Table 9 and discussed in a paper titled, "Dynamic Evaluation of Child Restraints Using Various Frontal Crash Pulses," which is available from the docket.

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[15] In addition, the agency also believed that, for pulse durations shorter than approximately 25 mses, the HIC 700_{15} requirement is more stringent than HIC 1000_{36}.

Table 9: Results of VRTC Sled Testing

TSTNO	Pulse Type	Sled Type	CRS Description	HIC 15	Max Nij	Chest Acceleration	Chest Deflection
3621	208	GrandAm Buck	CoscoTouriva LS	294	0.69	36	
3622	NCAP	GrandAm Buck	CoscoTouriva LS	322	0.69	34	17
3623	NCAP	GrandAm Buck	FP SafeEmbrace LS	320	0.80	36	17
3624	213-30	GrandAm Buck	CoscoTouriva LS	358	0.96	50	17
3625	213-33	GrandAm Buck	CoscoTouriva LS	540	0.91	52	19
3626	213-37	GrandAm Buck	CoscoTouriva LS	936	1.17	55	19
3627	213-37	GrandAm Buck	FP SafeEmbrace LS	637	1.06	68	20
3632	213-30	213 Bench	Cosco Triad LATCH	173	0.72	48	12
3633	213-33	213 Bench	Cosco Triad LATCH	237	0.80	50	14
3634	213-37	213 Bench	Cosco Triad LATCH	278	0.90	50	16
3690	208-32	213 Bench	CoscoTouriva Lap Only	373	0.80	41	17
3691	208-32	213 Bench	CoscoTouriva LS	417	0.74	38	18
3692	208-37	213 Bench	CoscoTouriva LS	473	0.72	38	19
3693	208-37	213 Bench	CoscoTouriva Lap Only	475	0.77	42	20
3694	213-29	213 Bench	CoscoTouriva LS	487	0.76	54	18
3695	213-32	213 Bench	CoscoTouriva LS	578	0.85	56	22
3696	213-37	213 Bench	CoscoTouriva LS	848	1.33	63	21
3621	208	GrandAm Buck	Cosco Triad LATCH	166	0.56	35	14
3622	NCAP	GrandAm Buck	Cosco Triad LATCH	219	0.59	34	14
3623	NCAP	GrandAm Buck	FP SafeEmbrace LATCH	218	0.75	35	17
3624	213-30	GrandAm Buck	Cosco Triad LATCH	362	0.78	49	11
3625	213-33	GrandAm Buck	Cosco Triad LATCH	325	0.69	47	12
3626	213-37	GrandAm Buck	Cosco Triad LATCH	454	0.77	52	15
3627	213-37	GrandAm Buck	FP SafeEmbrace LATCH	461	1.03	55	19
3632	213-30	213 Bench	Cosco Touriva Lap Only	374	0.85	43	20
3633	213-33	213 Bench	Cosco Touriva Lap Only	509	0.86	44	22
3634	213-37	213 Bench	Cosco Touriva Lap Only	441	0.92	47	16
3690	208-32	213 Bench	Cosco Triad LATCH	152	0.51	26	17
3691	208-32	213 Bench	Cosco Triad LATCH	155	0.56	29	18
3692	208-37	213 Bench	Cosco Triad LATCH	168	0.53	NA	19
3693	208-37	213 Bench	Cosco Triad LATCH	154	0.55	27	15
3694	213-29	213 Bench	Cosco Triad LATCH	345	0.69	48	14
3695	213-32	213 Bench	Cosco Triad LATCH	373	0.74	52	13
3696	213-37	213 Bench	Cosco Triad LATCH	277	0.71	55	19

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The second series of tests were performed in 20 NCAP vehicle crash tests to determine the performance of forward-facing child restraint systems restrained in the rear seat by a lap and shoulder belt with top tether and by a LATCH system (lower anchorages and top tether). The Hybrid III 3-year-old test dummy was also used in this testing. The results of these NCAP crash tests are tabulated and set forth in Table 10, *infra.*

Data from the VRTC sled tests and the NCAP full scale vehicle tests suggest that the new Standard No. 208 head injury criteria, HIC_{15} with its lower performance limit (570 for 3-year-old) is equivalent to the current $HIC_{unlimited}$ with a performance limit of 1000. This conclusion is reached based upon the observation that both the Hybrid II $HIC_{unlimited}$, and the Hybrid III HIC_{15}, responses in Standard No. 213 appear to comply with their respective criteria limits with roughly a 50 percent margin.

ii. Thoracic Injury

A. Chest Acceleration

This document proposes new limits on chest acceleration and chest deflection. Currently, Standard No. 213 limits chest acceleration to 60 g's. The May 2000 final rule on advanced air bags scaled this value to 55 g's for the 3-year-old dummy and 50 g's for the CRABI. The chest acceleration limit remained at 60 g's for the 6-year-old dummy. We propose incorporating the same limits into Standard No. 213. For the 12-month-old CRABI dummy, the agency has observed chest accelerations of around 40 g's in rearward-facing child restraints. For forward-facing restraints using the 12-month-old CRABI dummy, nearly 75 percent of agency test results exceeded the 50 g limit, with accelerations generally less than 55 g's. Chest acceleration responses for both the 3- and 6-year-old dummies were well below their respective criteria in agency tests.

B. Chest Deflection

Currently, there is no chest deflection limit in Standard No. 213 because the current Hybrid II test dummies cannot measure chest deflection. Incorporating the Hybrid III 6- and 3-year-old dummies into Standard No. 213, as proposed in this NPRM, would enable us to measure deformation-deflection of the thorax sternum. Because the dummies would be capable of measuring this injury parameter, we propose that Standard No. 213 include limits on chest deflection.

The May 2000 final rule on advanced air bags reduced the deflection limit for the 50th percentile male dummy from 76 mm to 63 mm (from 3 inches (in) to 2.5 in). These limits were then scaled to obtain equivalent performance limits for the 6- and 3-year-old dummies. The CRABI does not measure chest deflection, so no limit was specified for that dummy. Compression deflection of the sternum relative to the spine was limited in Standard No. 208 to 40 mm (1.6 in) for the 6-year-old dummy and 34 mm (1.3 in) for the 3-year-old dummy.

We propose the same limits for Standard No. 213, except for the weighted 6-year-old dummy (see next section, below). Comments are requested as to whether these limits are appropriate for testing child restraint systems, particularly with respect to webbing systems and impact shields that some child restraints use to restrain forward movement of the child's torso.

C. Weighted 6-Year-Old Dummy

Based upon scaling considerations of increased mass of the thoracic spine, greater chest compression limits appear to be justified for the HIII–6CW since this dummy would represent either an 8-year-old, or an 80th- to 90th-percentile 6-year-old in weight and stature.

In evaluating chest acceleration, a pure mathematical evaluation would indicate that accelerations should be somewhat lower for the heavier dummy. However, considering that both the 5th-percentile female and Hybrid III 6-year-old dummy have a 60g limit for injury assessment purposes, the agency is reluctant to propose a reduction to a lower g level for a dummy that is sized between the female and the existing 6-year-old.

Accordingly, the agency proposes to incorporate a 42 mm deflection limit for the weighted 6-year-old and a chest acceleration limit of 60 g.

D. Test Data

Data from the VRTC and NCAP tests indicate a high passing rate for chest acceleration and deflection tests. In the VRTC frontal sled tests, 94 percent of the tests of the LATCH seats (15 out of 16) resulted in passing values for chest acceleration (average 43 g's), and 100 percent (17 out of 17) passed chest deflection (average 0.61 in). For the non-LATCH seats, 76 percent (13 out of 17) passed chest acceleration (average 47 g's) and 100 percent (16 out of 16) passed chest deflection (average 0.73 in). These data suggest that the Standard No. 208 chest acceleration and chest deflection limits are practicable for child restraint systems.

iii. Neck Injury

Currently, there is no neck injury criterion in Standard No. 213, because the current Hybrid II test dummies are not designed with neck force measurement capability. However, the CRABI 12-month-old and the Hybrid III 3- and 6-year-old dummies have been designed to measure neck bending moments and forces in the fore and aft direction, and axial compression and tension loads. Because the dummies are capable of measuring neck injury parameters, we are proposing that the standard include a new neck criterion.

The May 2000 final rule on advanced air bags specified limits for a neck injury criterion, Nij, for the adult and child dummies used in Standard No. 208 compliance testing. Nij is a new injury formula that accounts for the combination of flexion, extension, tension and compression. Nij accounts for the superposition of loads and moments, and the additive effects on injury risk. Standard No. 208 includes an additional, more stringent tension/compression limit to independently control these potentially injurious loading modes in the air bag environment to out-of-position children.

This NPRM proposes to incorporate an Nij criterion in Standard No. 213 that is the same as that specified in Standard No. 208, except that the limit on peak tension and compression would not be adopted and the ''in-position'' critical values [16] would be used for calculation of the Nij. This decision is consistent with the agency's recognition of in-position critical values in the Standard No. 208 final rule, and with the observation that neck injury for children properly restrained in child restraints is not as prevalent as for those positioned in close proximity to an air bag at the time of deployment. A precise determination of neck injuries to children in child restraints has been difficult to quantify. When the NASS and FARS data are sorted to examine neck injury for children restrained in a child restraint and involved in a crash severity comparable to the Standard No. 213 sled pulse, few neck injuries are observed. However, biomechanics researchers have indicated to the agency that, although not frequent, such injuries do occur under severe crash

[16] The FMVSS No. 208 final rule proposed both ''out-of-position'' and ''in-position'' critical values for Nij. The out-of-position values are applicable to the air bag loading environment where the loading to the neck is due to the occupant being out of a normal seating position in close proximity to the air bag. In-position critical values are applicable for conditions such as child restraints, where the occupant is properly positioned and neck forces and moments result from inertial loadings.

conditions. In the agency's tests of child restraints, discussed below, the Nij values calculated when applying the in-position critical values ranged around Nij = 1. NHTSA has tentatively determined that Standard No. 213 will incorporate the neck criterion of Nij = 1.0, where the critical values are the in-position values shown in Table 10, and the axial force is not limited. Comments are requested on this issue. NHTSA also requests comments on the need for any type of neck injury criterion at all in Standard No. 213, and the difficulty child restraint manufacturers may have in meeting this new injury measurement requirement.

TABLE 10.—NIJ IN-POSITION CRITICAL VALUES

Dummy size	Nij intercepts			
	Tension	Compress	Flexion	Extension
CRABI	1460 N (328 lbf)	1460 N(328 lbf)	43 Nm (32 lbf-ft)	17 Nm (13 lbf-ft)
3 YO	2340 N (526 lbf)	2120 N (477 lbf)	68 Nm (50 lbf-ft)	30 Nm (22 lbf-ft)
6 YO	3096 N (696 lbf)	2800 N (629 lbf)	93 Nm (69 lbf-ft)	42 Nm (31 lbf-ft)

iv. Tabulated Data

Table 9, *supra,* and the following table 11, set forth the data from the NCAP tests. They show that meeting the Nij is practicable, especially for LATCH seats, but that the neck measurements have little compliance margin for Nij = 1.0. A detailed discussion of the findings can be found in the technical paper, ''Dynamic Evaluation of Child Restraints Using Various Frontal Crash Pulses,'' previously referenced in this preamble.

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Table 11: Results of Frontal NCAP Tests With Child Restraints

Testno	Vehicle Size	Model	Type of Child Seat: Left Rear	CRS-to-car Attachment	HIC 15	Max Nij	Chest Acceleration	Chest Deflection
3549	Medium	Stratus 4dr	Cosco Triad-LAT	LATCH	463	0.85	45	18
3554		Volvo S60	Century STE	3PT+Tether	744	1.02	58	12
3643		Maxima	Evenflo Horizon V-NOLAT	3PT+Tether	742	1.05	49	16
3611		Accord	Evenflo Horizon V-LAT	LATCH	456	0.95	41	14
3648		Impala	Century STE	3PT+Tether	622	0.98	43	14
3548	Heavy	Lincoln LS	Cosco Triad-NOLAT	3PT+Tether	1029	1.35	53	14
3593	SUV	Escape	Fisher Price Safe Embrace II-NOLAT	3PT+Tether	493	1.09	53	15
3645		Escape	Cosco Triad-NOLAT	3PT+Tether	516	0.87	46	13
3642		Durango	Century STE	3PT+Tether	638	0.98	48	16
3553		Suburban	No CRS	NA				
3573	Minivan	Grand Caravan	Century STE	3PT+Tether	771	1.05	54	15
3644		Grand Caravan	Fisher Price Safe Embrace II-LAT	LATCH	556	1.04	56	17
3594		Windstar	Fisher Price Safe Embrace II-NOLAT	3PT+Tether	342	0.86	38	15
3650		Windstar	Cosco Triad-NOLAT	3PT+Tether	422	0.88	38	12
3562	Light	Sentra	Cosco Triad-LAT	LATCH	342	0.79	43	10
3612		Sentra	Fisher Price Safe Embrace II-LAT	LATCH	456	0.99	45	22
3610		Civic 4 dr	Cosco Triad-LAT	LATCH	568	0.87	55	16
3537	Compact	Echo	Cosco Triad-LAT	LATCH	302	0.76	54	12
3647		Echo	Hoizon V-LAT	LATCH	916	1.03	55	18
3563		Elantra	Fisher Price Safe Embrace II-LAT	LATCH	450	1.04	48	20
3549	Medium	Stratus 4dr	Cosco Triad-LAT	LATCH	368	0.81	44	17
3554		Volvo S60	Evenflo Horizon V	3PT+Tether	817	0.95	53	20
3643		Maxima	Evenflo Horizon V-LAT	LATCH	777	1.13	48	21
3611		Accord	Fisher Price Safe Embrace II-LAT	LATCH	375	0.99	39	19
3648		Impala	Roundabout	3PT+Tether	361	0.75	42	20
3548	Heavy	Lincoln LS	Cosco Triad-LAT	LATCH	394	0.89	47	13
3593	SUV	Escape	Fisher Price Safe Embrace II-LAT	LATCH	387	0.96	47	16
3645		Escape	Cosco Triad-LAT	LATCH	634	0.97	44	
3642		Durango	Evenflo Horizon V	3PT+Tether	534	1.00	47	21
3553		Suburban	Roundabout-NOLAT	3PT+Tether	564	0.86	38	16
3573	Minivan	Grand Caravan	Evenflo Horizon V-LAT	LATCH	734	NA	54	14
3644		Grand Caravan	Evenflo Horizon V-LAT	LATCH	585	0.92	51	18
3594		Windstar	Fisher Price Safe Embrace II-LAT	LATCH	371	NA	38	18
3650		Windstar	Cosco Triad-LAT	LATCH	409	0.78	37	13

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2. Static Testing Criteria

Certain changes to the requirements for which compliance is measured in a static test seem appropriate by an incorporation of the new test dummies.

Comments are requested on whether changes are needed to S5.2.3, which specifies a padding requirement for child restraints used by children weighing less than 22 lb. Should the requirement be deleted? NHTSA specified the requirement (whose thickness and static compression specifications are compliance-tested statically) because there was no instrumented infant test dummy available at the time (1979) the requirement was adopted. The agency's goal was to establish dynamic test requirements for infant restraints, so that the total energy absorption capability of the padding and underlying structure could be measured. (44 FR 72131, 72135). Since today's NPRM proposes use of the instrumented CRABI 12-month-old dummy for use in testing restraints recommended for children under 22 lb, we propose deleting S5.2.3.

The standard refers to use of one or more Hybrid II dummies in some of the static tests. These references would be changed to the Hybrid III dummies or the CRABI. See, *e.g.*, S5.2.1.2, on use of the dummies to determine whether a seat back is required. See also S5.4.3.5(b) and S6.2.3 (post-impact buckle force release). NHTSA proposes to amend S6.2.3 so that the tension would be 90 N when a child restraint is tested with the CRABI, and 350 N when a child restraint is tested with the weighted 6-year-old dummy. Comments are requested as to what other requirements should be changed.

VI. Proposed Effective Dates

TREAD requires us to complete this rulemaking by November 1, 2002. Based on that date, the following section discusses tentative conclusions about the dates on which compliance with the requirements would become mandatory.

a. We believe that manufacturers could begin certifying their child restraints based on testing done on the new seat assembly by 2 years after the date of a final rule. That compliance date would be November 1, 2004. While we do not expect the proposed changes to the seat assembly to have a major effect on the results of compliance tests, restraint manufacturers will likely have to conduct testing to confirm compliance of their restraints. This will be a financial impact on the manufacturers that, coupled with the fact that some redesign may be necessary to meet the revised injury criteria (see next section), would be more appropriately spread out over a 2-year time period.

b. We propose providing 2 years of leadtime (two years after publication of a final rule) before specifying the use of the new CRABI and Hybrid III dummies in compliance tests and the revised or new injury criteria. That compliance date would be November 1, 2004. We believe that child restraint systems generally are already able to meet the proposed requirements using the new dummies, so redesign of current child restraints would not be generally needed. For some non-LATCH restraints, however, redesign might be needed to meet the new HIC_{15} and chest acceleration requirements, so longer leadtime might be needed. (As noted in section V(f), *supra*, some of the tested restraints failed to meet the proposed limits in the VRTC tests.) Comments are requested on how much leadtime would be necessary.

We also propose that manufacturers should be permitted the option of voluntarily using the new test dummies prior to the date on which they would be required to do so. Note, however, that this proposal also specifies that a manufacturer's selection of a compliance option (*i.e.*, to use the new dummies prior to the mandatory compliance date) must be made prior to, or at the time of the compliance test and that the selection is irrevocable for that child restraint. This provision is needed for us to efficiently carry out our enforcement responsibilities. We want to avoid the situation of a manufacturer confronted with an apparent noncompliance (based on a compliance test) with the option it has selected responding to that noncompliance by arguing that its products comply with a different option for which the agency has not conducted a compliance test. To ensure that we will not be asked to conduct multiple compliance tests first for one compliance option, then for another, we would require manufacturers to select the option by the time it certifies the child restraint system and prohibit them from thereafter selecting a different option for the restraint. This would mean that failure to comply with the selected option would constitute a noncompliance regardless of whether the restraint complies with another option. (Of course, a manufacturer may petition for an exemption from the recall requirements of the statute on the basis that the noncompliance is inconsequential as it relates to motor vehicle safety.)

c. As for using the weighted 6-year-old dummy to test restraints (typically booster seats) recommended for children with masses of over 22.7 kg (weights over 50 lb), we propose that the dummy can begin to be used in compliance tests 180 days after publication of a final rule to incorporate the dummy into Part 572. The weighted dummy's kinematic performance is comparable to that of the unweighted 6-year-old dummy. We do not anticipate that manufacturers would have to redesign their booster seats to certify compliance using the dummy.

VII. Child Passenger Safety Plan and Other Issues of the TREAD Act

a. Comments on Possible Rulemaking

On November 27, 2000, the agency published a request for comments on a draft planning document that NHTSA prepared that outlined our vision for enhancing child passenger safety over the next few years (65 FR 70687). The plan contained our views on implementing three strategies for improving the safety of child occupants from birth through age 10: increasing restraint use; improving the performance and testing of child restraints; and improving mechanisms for providing safety information to the public. The agency received about 30 comments on the draft plan.

Many commenters responded to the second of the three strategies, making suggestions as to how they believed Standard No. 213 should be improved to further enhance child restraint performance. Based on the comments we received, we believe that this NPRM substantially addresses them. Commenters strongly supported the plan to update the standard seat assembly and evaluate the crash pulse specified in Standard No. 213 for compliance tests of child restraint systems. Commenters endorsed the plan to undertake rulemaking to add the CRABI and Hybrid III child test dummies to the standard, along with the scaled injury criteria. Commenters supported extending the scope of the standard to child restraint systems recommended for children above 50 lb. Additionally, the November 2, 2001 NPRM (66 FR 55623) addressed comments suggesting improvements to Standard No. 213's labeling requirements.

It should be noted that there were a few comments on amending Standard No. 213 to incorporate side impact protection requirements. These comments will be addressed in the forthcoming ANPRM.

b. Rear-Impact Test

No comments were received on incorporating rear impact test requirements into Standard No. 213.

As directed by the TREAD Act, we have considered whether to incorporate a rear impact test into the standard. During 1991–2000, 9,580 passenger vehicle occupants under 9 years old were fatally injured. Of these, 690 were killed in rear impact crashes (average of 69 per year), while 3751 and 2759 children were killed in front and side impact crashes, respectively. Of the 690 children killed in rear impact crashes in 1991–2000, 129 were restrained with a lap and/or shoulder belt; 218 were in child restraint systems; 280 were unrestrained and 63 were of other or unknown restraint use. Of the 69 children killed per year in rear impacts, on average 22 of them were in child restraint systems.

Data from the Fatal Analysis Reporting System (FARS) for 1991–2000 show 108 children, ages less than 1 year old, were fatally injured in rear impact crashes, while 655 children of that age group were killed in frontal crashes and 391 were killed in side crashes.

Based on these data and the timeframe of the TREAD Act, we have primarily focused on frontal and side impact protection. However, the agency intends to explore potential upgrades to Standard No. 213 in rear impact protection as part of the ANPRM.

c. Child Restraints in NCAP Tests

Section 14(b)(9) of the TREAD Act requires consideration of ''[w]hether to include child restraints in each vehicle crash tested under the New Car Assessment Program.''

Each year since 1979, the agency has evaluated vehicle crashworthiness in frontal impact under the New Car Assessment Program (NCAP). In 1997, a side impact program was initiated and added to the NCAP. Under the NCAP, the agency conducts approximately 40 frontal and 40 side impact crash tests each year. For the frontal crash, the agency does these tests with two 50th percentile dummies in the front seat. Side impact crash tests are also conducted with a two 50th percentile dummies, however one dummy is placed in the driver seat and the other in the left rear passenger seat.

In response to the TREAD Act, NCAP incorporated various child restraints into frontal NCAP crash tests for the model year 2001 testing. Child restraints were placed in a total of twenty vehicles, varying in type and size. The agency evaluated performances of six different five-point-harness forward-facing child restraints. A fully instrumented Hybrid-III three-year-old dummy was used to assess performance. In each vehicle tested, the subject child restraint was secured tightly, as prescribed by the child restraint manufacturer's instructions. In addition, all child restraints, whether secured with LATCH or secured with a lap/shoulder belt, used a top tether. Similar testing will be conducted for both the front and side NCAP program in model year 2002.

Section 14(g) of the TREAD Act requires NHTSA to establish a child restraint safety rating consumer information program. NHTSA published a proposed rating program on November 6, 2001 (66 FR 56146, 66 FR 56048), which discussed the placement of child restraints in each vehicle crash tested under the New Car Assessment Program as a possible approach to obtain information for a rating program. We used the results of the child restraint NCAP tests in determining the feasibility of the proposal. The agency has asked for public comment on the rating program proposal and will consider the comments received, and all other available information, in deciding whether to include child restraints in vehicles tested under NCAP over the long-term.

VIII. Rulemaking Analyses and Notices

a. Executive Order 12866 (Regulatory Planning and Review) and DOT Regulatory Policies and Procedures

The agency has considered the impact of this rulemaking action under Executive Order 12866 and the Department of Transportation's regulatory policies and procedures and determined that it is ''significant'' because of Congressional and public interest in upgrading Standard No. 213 and the performance of child restraint systems. Accordingly, the action was reviewed under the Executive Order.

As discussed below and in NHTSA's preliminary regulatory evaluation (PRE) for this NPRM [17], the proposal to use new dummies in compliance tests, including a weighted 6-year-old dummy, could result in increased testing costs for manufacturers that want to certify their restraints using the tests that NHTSA will use in compliance testing. The PRE estimates that use of the new dummies and other aspects of the changes to the test procedure would add testing costs of $2.72 million. We believe that use of the new dummies, in itself, would not necessitate redesign of child restraints. The new dummies perform similarly to the ones presently used in compliance testing.

On the other hand, the new neck injury criteria would necessitate improvements in the performance of some child restraints. The agency estimates that the proposal to use the new and scaled injury criteria of Standard No. 208 would prevent an estimated 3–5 fatalities and 5 MAIS 2–5 non-fatal injuries for children ages 0–1 annually. In addition, the proposal would save 1 fatality and mitigate 1 MAIS 2–5 injury in the 4- to 6-year-old age group annually. These were estimated by evaluating the test results of some child restraints that failed the proposed neck injury criterion, and estimating what benefits would accrue if those restraints were redesigned so that they could just pass the proposed criterion. The needed design changes appear to be small, because the restraints that met or came close to meeting the proposed Nij limit appear outwardly to be the same as those that failed to meet it. Thus far, NHTSA has been unable to identify what changes manufacturers could make to enable their restraints to meet the proposed criterion. While meeting the proposed Nij limit appears feasible because test results for some current child restraints show that they met the proposed Nij value, we do not know which particular design features generally reduced Nij. Thus, we could not estimate the costs of such countermeasures. Comments are requested on possible countermeasures and their costs.

The agency does not believe that updating the seat assembly and revising the crash pulse would affect dummy performance to an extent that benefits would accrue from such changes. Research will be conducted later this year to assess the effects of such changes on dummy performance.

b. Regulatory Flexibility Act

The Regulatory Flexibility Act of 1980, as amended, requires agencies to evaluate the potential effects of their proposed and final rules on small businesses, small organizations and small governmental jurisdictions. I hereby certify that this NPRM would not have a significant economic impact on a substantial number of small entities. NHTSA estimates there to be about 10 manufacturers of child restraints, four or five of which could be small businesses. Manufacturers might have to make some design changes to some child restraints to meet the new injury criteria, particularly the neck injury criterion. NHTSA does not know the extent or nature of such changes, and has requested comments on them and their costs. We believe that only small changes to child restraints would be needed to allow them to pass the proposed neck injury criterion. Thus, there would likely be no impact on the number of child restraint producers. Comments are requested on the changes that are needed and the effect of this rule on the number of child restraint producers.

A rule adopting today's proposals would increase the testing that NHTSA conducts of child restraints, which in turn could increase the certification responsibilities of manufacturers. However, the agency does not believe such an increase would constitute a significant economic impact on small entities, because these businesses currently must certify their products to the dynamic test of Standard No. 213. That is, the products of these manufacturers already are subject to dynamic testing using child test dummies. The effect of this proposal on most child restraints is to subject them to testing with new dummies in place of

[17] NHTSA's preliminary regulatory evaluation (PRE) discusses issues relating to the potential costs, benefits and other impacts of this regulatory action. The PRE is available in the Docket for this rule and may be obtained by contacting docket Management at the address or telephone number provided at the beginning of this document. You may also read the document via the Internet, by following the instructions in the section below entitled, ''Viewing Docket Submissions.'' The PRE will be listed in the docket summary.

existing ones. Testing child restraints on a new seat assembly is not expected to significantly affect the performance of the restraints.

c. Executive Order 13132 (Federalism)

Executive Order 13132 requires NHTSA to develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.'' ''Policies that have federalism implications'' is defined in the Executive Order to include regulations that have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.'' Under Executive Order 13132, the agency may not issue a regulation with Federalism implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments, the agency consults with State and local governments, or the agency consults with State and local officials early in the process of developing the proposed regulation. NHTSA also may not issue a regulation with Federalism implications and that preempts State law unless the agency consults with State and local officials early in the process of developing the proposed regulation.

We have analyzed this proposed rule in accordance with the principles and criteria set forth in Executive Order 13132 and have determined that this proposal does not have sufficient Federal implications to warrant consultation with State and local officials or the preparation of a Federalism summary impact statement. The proposal would not have any substantial impact on the States, or on the current Federal-State relationship, or on the current distribution of power and responsibilities among the various local officials.

d. Unfunded Mandates Reform Act

Section 202 of the Unfunded Mandates Reform Act of 1995 (UMRA) requires Federal agencies to prepare a written assessment of the costs, benefits and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local or tribal governments, in the aggregate, or by the private sector, of more than $100 million in any one year ($100 million adjusted annually for inflation, with base year of 1995). (Adjusting this amount by the implicit gross domestic product price deflator for the year 2000 results in $109 million.) This NPRM will not result in costs of $109 million or more to either State, local, or tribal governments, in the aggregate, or to the private sector. Thus, this NPRM is not subject to the requirements of sections 202 of the UMRA.

e. National Environmental Policy Act

NHTSA has analyzed this proposal for the purposes of the National Environmental Policy Act. The agency has determined that implementation of this action would not have any significant impact on the quality of the human environment.

f. Executive Order 12778 (Civil Justice Reform)

This proposal would not have any retroactive effect. Under 49 U.S.C. 21403, whenever a Federal motor vehicle safety standard is in effect, a State may not adopt or maintain a safety standard applicable to the same aspect of performance which is not identical to the Federal standard, except to the extent that the state requirement imposes a higher level of performance and applies only to vehicles procured for the State's use. 49 U.S.C. 21461 sets forth a procedure for judicial review of final rules establishing, amending or revoking Federal motor vehicle safety standards. That section does not require submission of a petition for reconsideration or other administrative proceedings before parties may file suit in court.

g. Plain Language

Executive Order 12866 requires each agency to write all rules in plain language. Application of the principles of plain language includes consideration of the following questions:

- Have we organized the material to suit the public's needs?
- Are the requirements in the rule clearly stated?
- Does the rule contain technical language or jargon that isn't clear?
- Would a different format (grouping and order of sections, use of headings, paragraphing) make the rule easier to understand?
- Would more (but shorter) sections be better?
- Could we improve clarity by adding tables, lists, or diagrams?
- What else could we do to make the rule easier to understand?

If you have any responses to these questions, please include them in your comments on this proposal.

h. Paperwork Reduction Act

Under the Paperwork Reduction Act of 1995, a person is not required to respond to a collection of information by a Federal agency unless the collection displays a valid OMB control number. This proposed rule does not contain any collection of information requirements requiring review under the Paperwork Reduction Act.

i. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (NTTAA) directs us to use voluntary consensus standards in our regulatory activities unless doing so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (*e.g.,* materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies, such as the International Organization for Standardization (ISO). The NTTAA directs us to provide Congress, through OMB, explanations when we decide not to use available and applicable voluntary consensus standards.

There are no voluntary consensus standards available for use at this time.

IX. Submission of Comments

How Can I Influence NHTSA's Thinking on This Proposed Rule?

In developing this proposal, we tried to address the concerns of all our stakeholders. Your comments will help us improve this proposed rule. We invite you to provide different views on options we propose, new approaches we haven't considered, new data, how this proposed rule may affect you, or other relevant information. We welcome your views on all aspects of this proposed rule, but request comments on specific issues throughout this document. Your comments will be most effective if you follow the suggestions below:

—Explain your views and reasoning as clearly as possible
—Provide solid technical and cost data to support your views
—If you estimate potential costs, explain how you arrived at the estimate
—Tell us which parts of the proposal you support, as well as those with which you disagree
—Provide specific examples to illustrate your concerns
—Offer specific alternatives
—Refer your comments to specific sections of the proposal, such as the

units or page numbers of the preamble, or the regulatory sections

—Be sure to include the name, date, and docket number with your comments

How Do I Prepare and Submit Comments?

Your comments must be written and in English. To ensure that your comments are correctly filed in the Docket, please include the docket number of this document in your comments.

Your comments must not be more than 15 pages long (49 CFR 553.21). We established this limit to encourage you to write your primary comments in a concise fashion. However, you may attach necessary additional documents to your comments. There is no limit on the length of the attachments.

Please submit two copies of your comments, including the attachments, to Docket Management at the address given above under ADDRESSES.

Comments may also be submitted to the docket electronically by logging onto the Dockets Management System Web site at *http://dms.dot.gov.* Click on ''Help & Information'' or ''Help/Info'' to obtain instructions for filing the document electronically.

How Can I Be Sure That My Comments Were Received?

If you wish Docket Management to notify you upon its receipt of your comments, enclose a self-addressed, stamped postcard in the envelope containing your comments. Upon receiving your comments, Docket Management will return the postcard by mail.

How Do I Submit Confidential Business Information?

If you wish to submit any information under a claim of confidentiality, you should submit three copies of your complete submission, including the information you claim to be confidential business information, to the Chief Counsel, NHTSA, at the address given above under FOR FURTHER INFORMATION CONTACT. In addition, you should submit two copies, from which you have deleted the claimed confidential business information, to Docket Management at the address given above under ADDRESSES. When you send a comment containing information claimed to be confidential business information, you should include a cover letter setting forth the information specified in our confidential business information regulation. (49 CFR part 512.)

Will the Agency Consider Late Comments?

We will consider all comments that Docket Management receives before the close of business on the comment closing date indicated above under DATES. To the extent possible, we will also consider comments that Docket Management receives after that date. If Docket Management receives a comment too late for us to consider it in developing a final rule (assuming that one is issued), we will consider that comment as an informal suggestion for future rulemaking action.

How Can I Read the Comments Submitted by Other People?

You may read the comments received by Docket Management at the address given above under ADDRESSES. The hours of the Docket are indicated above in the same location.

You may also see the comments on the Internet. To read the comments on the Internet, take the following steps:

(1) Go to the Docket Management System (DMS) Web page of the Department of Transportation (*http://dms.dot.gov/*).

(2) On that page, click on ''search.''

(3) On the next page (*http://dms.dot.gov/search/*), type in the four-digit docket number shown at the beginning of this document. *Example:* If the docket number were ''NHTSA–2002–1234,'' you would type ''1234.'' After typing the docket number, click on ''search.''

(4) On the next page, which contains docket summary information for the docket you selected, click on the desired comments. You may download the comments. However, since the comments are imaged documents, instead of word processing documents, the downloaded comments are not word searchable.

Please note that even after the comment closing date, we will continue to file relevant information in the Docket as it becomes available. Further, some people may submit late comments. Accordingly, we recommend that you periodically check the Docket for new material. Upon receiving the comments, the docket supervisor will return the postcard by mail.

List of Subjects in 49 CFR Part 571

Motor vehicle safety, Reporting and recordkeeping requirements, Tires.

In consideration of the foregoing, NHTSA proposes to amend 49 CFR Part 571 as set forth below.

PART 571—[Amended]

1. The authority citation for Part 571 continues to read as follows:

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

2. Section 571.213 would be amended by:

a. Revising the definition of ''child restraint system'' in S4;

b. Revising the introductory text of S5.1.2;

c. Adding S5.1.2.1 and S5.1.2.2;

d. Revising the introductory text of S5.2.1.2, revising S6.1.1(a)(1), S6.1.1(d), and the introductory text of S6.2.3;

e. Revising S7, and S9.1(c);

f. Adding S9.1(d), S9.1(e) and S9.1(f);

g. Revising S9.3, S10.2.1(b)(2), S10.2.1(c)(1)(i), S10.2.1(c)(1)(i), introductory text, S10.21(c)(1)(i)(B) and S10.2.1(c)(2) and S10.2.2(c)(2); and,

h. Revising Figure 2.

The revised and added text and figure would read as follows:

§ 571.213 Standard No. 213, Child restraint systems.

* * * * *

S4. *Definitions.*

Child restraint system means any device, except Type I or Type II seat belts, designed for use in a motor vehicle or aircraft to restrain, seat, or position children who weigh 65 pounds or less.

* * * * *

S5.1.2 *Injury criteria.* When tested in accordance with S6.1 and with the test dummies specified in S7, each child restraint system manufactured before November 1, 2004, shall—

* * * * *

S5.1.2.1 When tested in accordance with S6.1 and with the test dummies specified in S7, each child restraint system manufactured on or after November 1, 2004, shall—

(a) Limit the resultant acceleration at the location of the accelerometer mounted in the test dummy head such that, for any two points in time, t_1 and t_2, during the event which are separated by not more than a 15 millisecond time interval and where t_1 is less than t_2, the maximum calculated head injury criterion (HIC_{15}) shall not exceed the limits specified in the table in this S5.1.2.1, determined using the resultant head acceleration at the center of gravity of the dummy head, a_r, expressed as a multiple of g (the acceleration of gravity), calculated using the expression:

$$HIC = \left[\frac{1}{t_2 - t_1} \int_{t_1}^{t_2} a dt \right]^{2.5} (t_2 - t_1)$$

(b) The resultant acceleration calculated from the output of the thoracic instrumentation shall not exceed the limits specified in the table in this S5.1.2.1, except for intervals whose cumulative duration is not more than 3 milliseconds.

(c) Compression deflection of the sternum relative to the spine, as determined by instrumentation, shall not exceed the limits specified in the table in this S5.1.2.1.

TABLE TO S5.1.2.1(a)–(c).—INJURY LIMITS FOR HEAD AND THORAX

Test dummy	Maximum calculated HIC_{15} values (S5.1.2.1(a))	Maximum thoracic G's (S5.1.2.1(b))	Maximum chest deflection (S5.1.2.1(c))
12-month-old subpart R	390	50 g's	N/A.
3-year-old subpart P	570	55 g's	34 mm (1.3 in).
6-year-old subpart N	700	60 g's	40 mm (1.6 in).
Weighted 6-year-old	700	60 g's	42 mm (1.65 in).

(d) *Neck injury.* For the measurement of neck injury, the following injury criteria shall be met when calculated based on data recorded for the first 300 milliseconds of the sled pulse.

(1) The shear force (Fx), axial force (Fz), and bending moment (My) shall be measured by the dummy upper neck load cell for 300 milliseconds, as specified in S5.1.2.1(d). Shear force, axial force, and bending moment shall be filtered for Nij purposes at SAE J211/1 rev. Mar95 Channel Frequency Class 600 (*see* 49 CFR 571.208, S4.7).

(2) During the event, the axial force (Fz) can be either in tension or extension, the occipital condyle bending moment (Mocy) can be in either flexion or extension. This results in four possible loading conditions for Nij: tension-extension (Nte), tension-flexion (Ntf), compression-extension (Nce), or compression-flexion (Ncf). For the calculation of Nij using the equation set forth in S5.1.2.1(d)(3), the critical values, Fzc and Myc, are as specified in the table to this S5.1.2.1(d) for each of the dummies used in the test.

(3) At each point in time, only one of the four loading conditions occurs. The Nij value corresponding to that loading condition is computed and the three remaining loading modes shall be considered to have a value of zero. The equation for calculating each Nij loading condition is given by:

Nij = (Fz/Fzc) + (Mocy/Myc)

(4) None of the four Nij values shall exceed 1.0 at any time during the event.

TABLE TO S5.1.2.1(d)—CRITICAL VALUES FOR CALCULATING NIJ

Test dummy	Fzc when Fz is in tension	Fzc when Fz is in compression	Myc when a flexion moment exists at the occipital condyle	Myc when an extension moment exists at the occipital condyle
12-Month-Old Subpart R	1460 N (328 lbf)	1460 N (328 lbf)	43 Nm (32 lbf-ft)	17 Nm (13 lbf-ft)
3-Year-Old Subpart P	2340 N (526 lbf)	2120 N (477 lbf)	68 Nm (50 lbf-ft)	30 Nm (22 lbf-ft)
6-Year-Old Subpart N	3096 N (696 lbf)	2800 N (629 lbf)	93 Nm (69 lbf-ft)	42 Nm (31 lbf-ft)
Weighted 6-Year-Old	3096 N (696 lbf)	2800 N (629 lbf)	93 Nm (69 lbf-ft)	42 Nm (31 lbf-ft)

S5.1.2.2 At the manufacturer's option (with said option irrevocably selected prior to, or at the time of, certification of the restraint), child restraint systems manufactured before November 1, 2004 may be tested to the requirements of S5 while using the test dummies specified in S7.1.2 of this standard according to the criteria for selecting test dummies specified in that paragraph. That paragraph specifies the dummies used to test child restraint systems manufactured on or after November 1, 2004. If a manufacturer selects the dummies specified in S7.1.2 to test its product, the injury criteria specified by S5.1.2.1 of this standard must be met. Child restraints manufactured on or after November 1, 2004, must be tested using the test dummies specified in S7.1.2.

* * * * *

S5.2 *Force distribution.*

* * * * *

S5.2.1.2 The applicability of the requirements of S5.2.1.1 to a front-facing child restraint, and the conformance of any child restraint other than a car bed to those requirements, is determined using the largest of the test dummies specified in S7 for use in testing that restraint, provided that the 6-year-old dummy described in subpart I or in subpart N of part 572 of this chapter is not used to determine the applicability of or compliance with S5.2.1.1. A front-facing child restraint system is not required to comply with S5.2.1.1 if the target point on either side of the dummy's head is below a horizontal plane tangent to the top of—

* * * * *

S6.1.1 *Test conditions.*

(a) *Test devices.*

(1) The test device for testing add-on restraint systems to frontal barrier impact simulations is a standard seat assembly consisting of a simulated vehicle bench seat, with three seating positions, which is described in Drawing Package SAS–100–1000 with Addendum ______: Seat Base Weldment (consisting of drawings and a bill of materials), dated ______ (will be

incorporated by reference in § 571.5). The assembly is mounted on a dynamic test platform so that the center SORL of the seat is parallel to the direction of the test platform travel and so that movement between the base of the assembly and the platform is prevented.

* * * * *

(d)(1) When using the test dummies specified in 49 CFR part 572, subparts C, I, J, or K, performance tests under S6.1 are conducted at any ambient temperature from 19° C to 26° C and at any relative humidity from 10 percent to 70 percent.

(2) When using the test dummies specified in 49 CFR part 572, subparts N, P or R, performance tests under S6.1 are conducted at any ambient temperature from 20.6° C to 22.2° C and at any relative humidity from 10 percent to 70 percent.

* * * * *

S6.2.3 Pull the sling tied to the dummy restrained in the child restraint system and apply the following force: 50 N for a system tested with a newborn dummy; 90 N for a system tested with a 9-month-old dummy; 90 N for a system tested with a 12-month-old dummy; 200 N for a system tested with a 3-year-old dummy; 270 N for a system tested with a 6-year-old dummy; or 350 N for a system tested with a weighted 6-year-old dummy. The force is applied in the manner illustrated in Figure 4 and as follows:

* * * * *

S7 *Test dummies.* (Subparts referenced in this section are of part 572 of this chapter.)

S7.1 *Dummy selection.* Select any dummy specified in S7.1.1, S7.1.2 or S7.1.3, as appropriate, for testing systems for use by children of the height and mass for which the system is recommended in accordance with S5.5. A child restraint that meets the criteria in two or more of the following paragraphs in S7 may be tested with any of the test dummies specified in those paragraphs.

S7.1.1 Child restraints that are manufactured before November 1, 2004, are subject to the following provisions.

(a) A child restraint that is recommended by its manufacturer in accordance with S5.5 for use either by children in a specified mass range that includes any children having a mass of not greater than 5 kg, or by children in a specified height range that includes any children whose height is not greater than 650 mm, is tested with a newborn test dummy conforming to part 572 subpart K.

(b) A child restraint that is recommended by its manufacturer in accordance with S5.5 for use either by children in a specified mass range that includes any children having a mass greater than 5 but not greater than 10 kg, or by children in a specified height range that includes any children whose height is greater than 650 mm but not greater than 850 mm, is tested with a newborn test dummy conforming to part 572 subpart K, and a 9-month-old test dummy conforming to part 572 subpart J.

(c) A child restraint that is recommended by its manufacturer in accordance with S5.5 for use either by children in a specified mass range that includes any children having a mass greater than 10 kg but not greater than 18 kg, or by children in a specified height range that includes any children whose height is greater than 850 mm but not greater than 1100 mm, is tested with a 9-month-old test dummy conforming to part 572 subpart J, and a 3-year-old test dummy conforming to part 572 subpart C and S7.2, provided, however, that the 9-month-old dummy is not used to test a booster seat.

(d) A child restraint that is recommended by its manufacturer in accordance with S5.5 for use either by children in a specified mass range that includes any children having a mass greater than 18 kg, or by children in a specified height range that includes any children whose height is greater than 1100 mm, is tested with a 6-year-old child dummy conforming to part 572 subpart I.

(e) A child restraint that is manufactured on or after [date to be inserted would be the date 180 days after publication of a final rule incorporating a weighted 6-year-old dummy into Part 572], and that is recommended by its manufacturer in accordance with S5.5 for use either by children in a specified mass range that includes any children having a mass greater than 22.7 kg (50 lb), or by children in a specified height range that includes any children whose height is greater than 1100 mm, is tested with a weighted 6-year-old child dummy conforming to part 572 Subpart [to be determined].

S7.1.2 Child restraints that are manufactured on or after November 1, 2004, are subject to the following provisions.

(a) A child restraint that is recommended by its manufacturer in accordance with S5.5 for use either by children in a specified mass range that includes any children having a mass of not greater than 5 kg, or by children in a specified height range that includes any children whose height is not greater than 650 mm, is tested with a newborn test dummy conforming to part 572 subpart K.

(b) A child restraint that is recommended by its manufacturer in accordance with S5.5 for use either by children in a specified mass range that includes any children having a mass greater than 5 but not greater than 10 kg, or by children in a specified height range that includes any children whose height is greater than 650 mm but not greater than 850 mm, is tested with a newborn test dummy conforming to part 572 subpart K, and a 12-month-old test dummy conforming to part 572 subpart R.

(c) A child restraint that is recommended by its manufacturer in accordance with S5.5 for use either by children in a specified mass range that includes any children having a mass greater than 10 kg but not greater than 18 kg, or by children in a specified height range that includes any children whose height is greater than 850 mm but not greater than 1100 mm, is tested with a 12-month-old test dummy conforming to part 572 subpart R, and a 3-year-old test dummy conforming to part 572 subpart P and S7.2, provided, however, that the 12-month-old dummy is not used to test a booster seat.

(d) A child restraint that is recommended by its manufacturer in accordance with S5.5 for use either by children in a specified mass range that includes any children having a mass greater than 18 kg, or by children in a specified height range that includes any children whose height is greater than 1100 mm, is tested with a 6-year-old child dummy conforming to part 572 subpart N.

(e) A child restraint that is manufactured on or after [date to be inserted would be the date 180 days after publication of a final rule incorporating a weighted 6-year-old dummy into Part 572], and that is recommended by its manufacturer in accordance with S5.5 for use either by children in a specified mass range that includes any children having a mass greater than 22.7 kg (50 lb), or by children in a specified height range that includes any children whose height is greater than 1100 mm, is tested with a weighted 6-year-old child dummy conforming to Part 572 Subpart [to be determined].

S7.1.3 *Voluntary use of alternative dummies.* At the manufacturer's option (with said option irrevocably selected prior to, or at the time of, certification of the restraint), child restraint systems manufactured before November 1, 2004 may be tested to the requirements of S5 while using the test dummies specified in S7.1.2 according to the criteria for selecting test dummies specified in that paragraph. Child restraints manufactured on or after November 1, 2004, must be tested using the test dummies specified in S7.1.2.

* * * * *

S9.1 *Type of clothing.*

* * * * *

(c) *12-month-old dummy (49 CFR part 572, subpart R).* When used in testing under this standard, the dummy specified in 49 CFR part 572, subpart R, is clothed in a cotton-polyester based tight fitting sweat shirt with long sleeves and ankle long pants whose combined weight is not more than 0.25 kg (.55 lb).

(d) *Hybrid II three-year-old and Hybrid II six-year-old dummies (49 CFR part 572, subparts C and I).* When used in testing under this standard, the dummies specified in 49 CFR part 572, subparts C and I, are clothed in thermal knit, waffle-weave polyester and cotton underwear or equivalent, a size 4 long-sleeved shirt (3-year-old dummy) or a size 5 long-sleeved shirt (6-year-old dummy) having a mass of 0.090 kg, a size 4 pair of long pants having a mass of 0.090 kg, and cut off just far enough above the knee to allow the knee target to be visible, and size 7M sneakers (3-year-old dummy) or size 12½M sneakers (6-year-old dummy) with rubber toe caps, uppers of dacron and cotton or nylon and a total mass of 0.453 kg.

(e) *Hybrid III 3-year-old dummy (49 CFR part 572, subpart P).* When used in testing under this standard, the dummy specified in 49 CFR part 572, subpart P, is clothed in a cotton-polyester based tight fitting sweat shirt with long sleeves and ankle long pants whose combined weight is not more than 0.25 kg (.55 lb), and size 7M sneakers with rubber toe caps, uppers of dacron and cotton or nylon and a total mass of 0.453 kg.

(f) *Hybrid III 6-year-old dummy (49 CFR part 572, subpart N) and Hybrid III weighted 6-year-old dummy (40 CFR part 572, subpart____).* When used in testing under this standard, the dummy specified in 49 CFR part 572, subpart N, and in Subpart [to be determined], is clothed in a light-weight cotton stretch short-sleeve shirt and above-the-knee pants, and size 12.5M sneakers with rubber toe caps, uppers of dacron and cotton or nylon and a total mass of 0.453 kg.

* * * * *

S9.3 *Preparing dummies.* (Subparts referenced in this section are of Part 572 of this chapter.)

S9.3.1 When using the test dummies conforming to part 572 subparts C, I, J, or K, prepare the dummies as specified in this paragraph. Before being used in testing under this standard, dummies must be conditioned at any ambient temperature from 19°C to 25.5°C and at any relative humidity from 10 percent to 70 percent, for at least 4 hours.

S9.3.2 When using the test dummies conforming to Part 572 Subparts N, P, R, or [subpart on the weighted 6-year-old dummy to be inserted], prepare the dummies as specified in this paragraph. Before being used in testing under this standard, dummies must be conditioned at any ambient temperature from 20.6° to 22.2° C (69° to 72° F) and at any relative humidity from 10 percent to 70 percent, for at least 4 hours.

* * * * *

S10.2.1 * * *

(b) * * *

(2) When testing rear-facing child restraint systems, place the newborn, 9-month-old or 12-month-old dummy in the child restraint system so that the back of the dummy torso contacts the back support surface of the system. For a child restraint system which is equipped with a fixed or movable surface described in S5.2.2.2 which is being tested under the conditions of test configuration II, do not attach any of the child restraint belts unless they are an integral part of the fixed or movable surface. For all other child restraint systems and for a child restraint system with a fixed or movable surface which is being tested under the conditions of test configuration I, attach all appropriate child restraint belts and tighten them as specified in S6.1.2. Attach all appropriate vehicle belts and tighten them as specified in S6.1.2. Position each movable surface in accordance with the instructions that the manufacturer provided under S5.6.1 or S5.6.2. If the dummy's head does not remain in the proper position, tape it against the front of the seat back surface of the system by means of a single thickness of 6 mm-wide paper masking tape placed across the center of the dummy's face.

(c)(1)(i) When testing forward-facing child restraint systems, extend the arms of the 9-month-old or 12-month-old test dummy as far as possible in the upward vertical direction. Extend the legs of the 9-month-old or 12-month-old test dummy as far as possible in the forward horizontal direction, with the dummy feet perpendicular to the centerline of the lower legs. Using a flat square surface with an area of 2,580 square mm, apply a force of 178 N, perpendicular to:

(B) The back of the vehicle seat in the specific vehicle shell or the specific vehicle, in the case of a built-in system, first against the dummy crotch and then at the dummy thorax in the midsagittal plane of the dummy. For a child restraint system with a fixed or movable surface described in S5.2.2.2, which is being tested under the conditions of test configuration II, do not attach any of the child restraint belts unless they are an integral part of the fixed or movable surface. For all other child restraint systems and for a child restraint system with a fixed or movable surface that is being tested under the conditions of test configuration I, attach all appropriate child restraint belts and tighten them as specified in S6.1.2. Attach all appropriate vehicle belts and tighten them as specified in S6.1.2. Position each movable surface in accordance with the instructions that the manufacturer provided under S5.6.1 or S5.6.2.

* * * * *

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(2) When testing rear-facing child restraint systems, extend the dummy's arms vertically upwards and then rotate each arm downward toward the dummy's lower body until the arm contacts a surface of the child restraint system or the standard seat assembly in the case of an add-on child restraint system, or the specific vehicle shell or the specific vehicle, in the case of a built-in child restraint system. Ensure that no arm is restrained from movement in other than the downward direction, by any part of the system or the belts used to anchor the system to the standard seat assembly, the specific shell, or the specific vehicle.

* * * * *

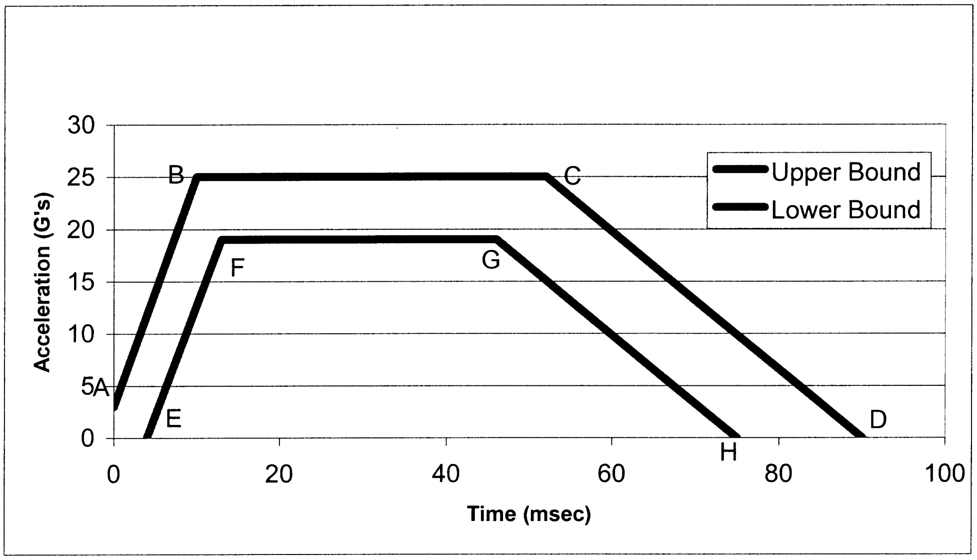
S10.2.2 * * *

(c) * * *

(2) The back of the vehicle seat in the specific vehicle shell or the specific vehicle, in the case of a built-in system, first against the dummy crotch and then at the dummy thorax in the midsagittal plane of the dummy. For a child restraint system with a fixed or movable surface described in S5.2.2.2, which is being tested under the conditions of test configuration II, do not attach any of the child restraint belts unless the belt is an integral part of the fixed or movable surface. For all other child restraint systems and for a child restraint system with a fixed or movable surface that is being tested under the conditions of test configuration I, attach all appropriate child restraint belts and tighten them as specified in S6.1.2. Attach all appropriate vehicle belts and tighten them as specified in S6.1.2. Position each movable surface in accordance with the instructions that the

manufacturer provided under S5.6.1 or S5.6.2.

* * * * *



Upper Bound			Lower Bound		
Point	**Time**	**Acceleration**	**Point**	**Time**	**Acceleration**
A	0	3	E	4	0
B	10	25	**F**	13	19
C	52	25	**G**	46	19
D	90	0	**H**	75	0

Figure 2

Issued on April 24, 2002.

Stephen R. Kratzke,

Associate Administrator for Safety Performance Standards.

[FR Doc. 02–10507 Filed 4–25–02; 10:00 am]

BILLING CODE 4910–59–C

DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

49 CFR Part 571

[Docket No. 02–12151]

RIN 2127–AI83

Federal Motor Vehicle Safety Standards; Child Restraint Systems

AGENCY: National Highway Traffic Safety Administration (NHTSA), Department of Transportation.

ACTION: Advance notice of proposed rulemaking (ANPRM).

SUMMARY: The Transportation Recall Enhancement, Accountability and Documentation Act of 2000 directed NHTSA to initiate a rulemaking for the purpose of improving the safety of child restraints and specified various elements that must be considered in the rulemaking. NHTSA has issued two notices of proposed rulemaking that together address all but side and rear impact protection requirements for children in child restraint systems.

NHTSA is addressing side impact protection in an ANPRM, instead of a notice of proposed rulemaking, because there are uncertainties in too many areas to issue a proposal now. These areas include: the determination of child

injury mechanisms in side impacts, and crash characteristics associated with serious and fatal injuries to children in child restraints; development of test procedures, a suitable test dummy and appropriate injury criteria; and identification of cost beneficial countermeasures. Uncertainties in these areas, together with the statutory schedule for this rulemaking, make it difficult for the agency to assess and make judgments concerning the benefits and costs of a rulemaking on side impact protection. Accordingly, we believe that the most appropriate course of action at this point is to issue this ANPRM to obtain additional information that will help us decide whether it is possible and appropriate to issue a proposal in the near future and/or identify additional work that needs to be done.

Also in response to the Act, this ANPRM requests comments on the appropriateness of proposing to incorporate a rear impact test procedure into Standard No. 213, for rear-facing child restraint systems.

DATES: You should submit your comments early enough to ensure that Docket Management receives them not later than July 1, 2002.

ADDRESSES: You may submit your comments in writing to: Docket Management, Room PL–401, 400 Seventh Street, SW., Washington, DC 20590. Alternatively, you may submit your comments electronically by logging onto the Docket Management System Web site at *http://dms.dot.gov.* Click on ''Help & Information'' or ''Help/Info'' to view instructions for filing your comments electronically. Regardless of how you submit your comments, you should mention the docket number of this document. You may call Docket Management at 202–366–9324. You may visit the Docket from 10:00 a.m. to 5:00 p.m., Monday through Friday.

FOR FURTHER INFORMATION CONTACT: For non-legal issues, you may call Mike Huntley of the NHTSA Office of Crashworthiness Standards, at 202–366–0029.

For legal issues, you may call Deirdre Fujita of the NHTSA Office of Chief Counsel at 202–366–2992.

You may send mail to both of these officials at the National Highway Traffic Safety Administration, 400 Seventh St., SW., Washington, DC 20590.

SUPPLEMENTARY INFORMATION:

Table of Contents

I. Background

This document requests comments on the agency's work in developing a possible side impact protection requirement for child restraint systems and on refinements to the approach the agency has taken thus far. The agency's work on this subject was prompted by section 14 of the Transportation Recall Enhancement, Accountability and Documentation Act (the TREAD Act) (November 1, 2000, Pub. L. 106–414, 114 Stat. 1800). Section 14 directs the agency to initiate a rulemaking for the purpose of improving the safety of child restraints and specifies elements that the agency is to consider in that rulemaking. The section directed NHTSA to initiate that rulemaking by November 1, 2001, and to complete it by issuing a final rule or taking other action by November 1, 2002.

The relevant provisions in section 14 are as follows:

(a) In General.—Not later than 12 months after the date of enactment of this Act, the Secretary of Transportation shall initiate a rulemaking for the purpose of improving the safety of child restraints, including minimizing head injuries from side impact collisions.

(b) Elements for Consideration.—In the rulemaking required by subsection (a), the Secretary shall consider—

(1) Whether to require more comprehensive tests for child restraints than the current Federal motor vehicle safety standards requires, including the use of dynamic tests that—

(A) Replicate an array of crash conditions, such as side-impact crashes and rear-impact crashes; and

(B) Reflect the designs of passenger motor vehicles as of the date of enactment of this Act;

(2) Whether to require the use of anthropomorphic test devices that—

(A) Represent a greater range of sizes of children including the need to require the use of an anthropomorphic test device that is representative of a ten-year-old child; and

(B) Are Hybrid III anthropomorphic test devices;

(3) Whether to require improved protection from head injuries in side-impact and rear-impact crashes;

(4) How to provide consumer information on the physical compatibility of child restraints and vehicle seats on a model-by-model basis;

(5) Whether to prescribe clearer and simpler labels and instructions required to be placed on child restraints;

(6) Whether to amend Federal Motor Vehicle Safety Standard No. 213 (49 CFR 571.213) to cover restraints for children weighing up to 80 pounds;

(7) Whether to establish booster seat performance and structural integrity requirements to be dynamically tested in 3-point lap and shoulder belts;

(8) Whether to apply scaled injury criteria performance levels, including neck injury, developed for Federal Motor Vehicle Safety Standard No. 208 to child restraints and booster seats covered by in [sic] Federal Motor Vehicle Safety Standard No. 213; and

(9) Whether to include [a] child restraint in each vehicle crash tested under the New Car Assessment Program.

(c) Report to Congress.—If the Secretary does not incorporate any element described in subsection (b) in the final rule, the Secretary shall explain, in a report to the Senate Committee on Commerce, Science, and Transportation and the House of Representatives Committee on Commerce submitted within 30 days after issuing the final rule, specifically why the Secretary did not incorporate any such element in the final rule.

(d) Completion.— Notwithstanding any other provision of law, the Secretary shall complete the rulemaking required by subsection (a) not later than 24 months after the date of the enactment of this Act.

Federal Motor Vehicle Safety Standard No. 213, ''Child Restraint Systems'' (49 CFR 571.213) regulates the performance of a child restraint system in dynamic tests involving a 30 mph velocity change, representative of a frontal impact. To protect children, the standard limits the amount of force that can be exerted on the head and chest of a child test dummy during the dynamic testing. It also limits the amount of excursion of head and knee excursion in those tests to reduce the possibility that children in child restraint systems might contact vehicle interior surfaces and be injured during a frontal crash. Additional performance and labeling requirements are also specified in the standard.

Partly in response to the TREAD Act and partly in fulfillment of agency plans to upgrade Standard No. 213, NHTSA has issued two notices of proposed rulemaking (NPRM) addressing all elements specified in section 14 except for side and rear impact protection. On November 2, 2001, the agency issued an NPRM proposing to improve the instructions and labels required on child restraints. (66 FR 55623). The second NPRM has been issued concurrently with today's document, and is published in today's edition of the **Federal Register**. In it, the agency is proposing to incorporate the following elements into the standard: (a) An updated bench seat used to dynamically test add-on child restraint systems; (b) a sled pulse that provides a wider test corridor; (c) improved child test dummies; (d) expanded applicability to child restraint systems recommended for use by children weighing up to 65 pounds; and (e) new or revised injury criteria to assess the dynamic performance of child restraints.

NHTSA is addressing side impact protection in an ANPRM, instead of a notice of proposed rulemaking, because there are uncertainties in too many areas to issue a proposal now. These areas include: (a) Crash characteristics associated with serious and fatal injuries to children in child restraints and the child injury mechanisms in side impacts, and; (b) development of test procedures, a suitable test dummy and appropriate injury criteria; and (c) identification of cost beneficial countermeasures. The schedule specified in the TREAD Act for initiating and completing this rulemaking has limited the amount and variety of information that the agency could obtain, and testing that the agency could conduct, to develop test procedures and injury criteria and identify possible countermeasures and examine their efficacy on child restraint performance. The agency has also been hampered by a lack of specific accident data on children in motor vehicle crashes generally, and particularly in side impact crashes. There are few available data on how children are being injured and killed in side impacts (*e.g.,* to what degree injuries are caused by intrusion of an impacting vehicle or other object). Together, these limitations have made it difficult to assess and compare the benefits and costs of provisions that could be included in a rulemaking proposal on side impact.

Notwithstanding these limitations, we believe we have made progress toward developing a potential regulatory proposal to improve the side impact performance of child restraint systems. We have analyzed crash data and have developed a dynamic side impact test. We have identified possible countermeasures. However, we have not evaluated the countermeasures to determine their feasibility and benefit, although we will study potential countermeasures for rear-facing restraints in 2002. Information from that study will help us further evaluate the course of action that the agency should pursue in this rulemaking. From the information and analysis that we have, it appears that if we were to issue a notice of proposed rulemaking on side impact, it might involve significantly higher costs per equivalent life saved than those in most NHTSA vehicle safety rulemakings.

Because of all these factors, we believe that the most appropriate course of action at this point is to issue this ANPRM to obtain additional information that will help us decide whether it is possible and appropriate to issue a proposal in the near future and/or identify additional work that needs to be done. Through issuing this ANPRM, we hope to obtain more information about matters such as the harm to restrained children in side impacts, such as the child injury mechanisms and the crash characteristics associated with serious and fatal injuries. We seek comment on the suitability of the test procedures we are considering, of the dummy we might use in a test procedure, and on possible injury criteria. We want cost, benefit and other information on possible countermeasures that would be effective in improving side impact protection, particularly the possible countermeasures we have identified. As a result of issuing this ANPRM, the agency anticipates receiving information that will improve its ability to assess the merits of this rulemaking and thus aid the agency in making decisions about the future course of this rulemaking.

II. Side Impact Safety Problem

a. Fatalities

Passenger vehicle occupant fatalities in the United States, as reported in the Fatality Analysis Reporting System (FARS), for all ages, increased slightly (4 percent) over the period from 1991 to 2000 (from 30,776 in 1991 to 31,910 in 2000). In comparison, fatalities involving children in the age range 0 to 8 years old decreased slightly (3 percent), from 923 in 1991 to 895 in 2000. Child occupant fatalities, 0 to 8 years old, accounted for approximately 3 percent of all passenger vehicle occupant fatalities in each of those years.

Despite the slight increase in total passenger vehicle occupant fatalities, the overall motor vehicle crash fatality rate has been declining, from 1.9 fatalities per 100 million vehicle miles traveled (VMT) in 1991 to 1.5 fatalities per 100 million VMT in 2000. Part of the decline in the fatality rate is attributable to the increasing use of occupant restraints. The first National Occupant Protection Use Survey (NOPUS), in 1994, estimated that 58 percent of passenger vehicle front seat occupants were restrained. By December 1999, this rate had increased to 67 percent. Correspondingly, the percentage of unrestrained passenger vehicle occupant fatalities decreased, from 67 percent in 1991 to 55 percent in 2000, although unrestrained occupants still make up the majority of passenger vehicle occupant fatalities. Similarly, the restraining of children has also increased. NOPUS shows the percentage of children under 5 being restrained increased from 66 percent in 1994 to 92 percent in 2000. This increase is reflected in FARS data. The percentage of fatally injured children, 0 to 8 years old, who were unrestrained, decreased from 61 percent in 1991 to 41 percent in 2000. Unrestrained child occupants no longer are the majority of child occupants killed in motor vehicle crashes, but still constitute a large percentage of the overall total.

Prompted by a media safety campaign that began in 1996 to move children to the rear seat, the rear seat has replaced the front seat as the most frequently chosen seating position for children in passenger vehicles. This change in front versus rear seat exposure has contributed to a significant change in the distribution of child occupant fatalities within vehicles. A steep decline in front seat child occupant fatalities occurred in the last half of the 1990's, with total front seat fatalities for the age group dropping from 411 in 1995 to 239 in 2000 (a decrease of 42 percent). Rear seat child occupant fatalities increased during that time period, from 463 in 1995 to 561 in 2000. Thus, of those children (in known seating positions; front seat versus rear seats), between 1995 and 2000, front seat fatalities decreased by 172 and rear seat fatalities increased by 98, resulting in an overall decrease of 74 fatalities. The reduction in overall fatalities is the result of the rear seat being a safer environment and an increase in restraint use over those years.

For passenger vehicle child occupants, ages 0 to 8 years old, data from FARS for 1991–2000 show that, regardless of whether the child was seated in the front seat or second seat, frontal and side crashes account for most child occupant fatalities. Fifty-one percent of front seat child occupant fatalities were in frontal crashes, and 31 percent were in side impact crashes. Rear impact crashes accounted for 4 percent of front seat child fatalities. For rear seat child occupants, frontal impacts and side impact crashes accounted for 44 percent and 42 percent of the fatalities, respectively, while rear impact crashes accounted for 14 percent of the fatalities.

Seating position relative to the point of impact is also a factor in side impact crash fatalities. For the 3,018 front seat child fatalities, 22 percent were killed in near side impacts, i.e., they were in the outboard seating position on the impacted side of the vehicle. Of the 3,826 rear seat fatalities, 25 percent involved near side impacts. Of the 682 children ages 0 to 8 years old who were killed in side impacts and were secured in child restraints, 64 percent (434) were seated in the near side position. The remaining 36 percent of the fatalities (248) for children in child restraints were seated either in the middle seating position or in the ''far side'' position, *i.e.,* the outboard seating position on the opposite side from the point of impact.

b. Injuries

The number of occupants of passenger vehicles injured in motor vehicle crashes in the United States, as reported by National Automotive Sampling System-General Estimates Systems (NASS–GES) for all ages, increased moderately (5 percent) over the period from 1991 to 2000 (from 2,797,000 in 1991 to 2,938,000 in 2000). In contrast, for child occupants 0 to 8 years old, the number injured decreased (7 percent), from 141,000 in 1991 to 132,000 in 2000. The number of child occupants, 0 to 8 years old, injured in motor vehicle crashes accounted for approximately 5 percent of all passenger vehicle occupant injuries in each year.

As in the case of fatalities, despite the moderate increase in the number of injured passenger vehicle occupants, the overall motor vehicle injury rate has been declining. In 1991, the number of persons injured in motor vehicle crashes per 100 million VMT was 143. By 1999, the injury rate had declined to 120 per 100 million VMT, a drop of 16 percent. The increased use of occupant restraints is reflected in the declining number of unrestrained injured occupants and increasing numbers of restrained occupants. For all ages, the percentage of unrestrained injured occupants decreased from 27 percent of injured occupants in 1991 to 12 percent in 2000. The number of child occupants, 0 to 8 years old, who were injured and unrestrained decreased from 40,800 (31 percent of all injured child occupants) in 1991 to 14,000 (12 percent of all injured) in 2000. This is a decrease of 61 percent. Correspondingly, the number of child occupants in this age group who were injured while restrained in a child restraint system or in a lap and/or shoulder belt increased significantly during this time-period. The number of child occupants injured while restrained by a child restraint rose from 20,000 in 1991 to 37,000 in 2000, an increase of 84 percent. The number of child occupants injured while restrained in a lap and/or shoulder belt rose from 48,200 in 1991 to 66,300 in 2000, an increase of 38 percent.

An examination of NASS-Crashworthiness Data System (CDS) data over the 1991–2000 period yielded important insights regarding the type and severity of injuries to children in motor vehicles crashes. First, children 0 to 8 years old are most susceptible to head injuries. Fifty-seven percent of all injuries to child occupants in crashes are head injuries (mostly scrapes, cuts and concussions). Second, the majority of injuries to child occupants, even to the head, tend to be of very low severity. By use of the abbreviated injury scale (AIS 1 = minor injury through AIS 6 = maximum, untreatable, injury), an assessment of fatality risk may be made. Of all injuries reported for children 0 to 8 years old, 91.6 percent of these injuries were within the AIS 1 (or least severe) category. Another 4.6 percent were of AIS 2 (moderate severity) category. The remaining 3.8 percent of injuries to child occupants fell within AIS 3 through AIS 6 (severe to untreatable) categories. This injury distribution for child occupants compares favorably with that for occupants of all ages, for whom 88 percent of the injuries were within the AIS 1 category, 8.0 percent were of AIS 2 category, and 3.9 percent fell within AIS 3 through AIS 6 categories.

Approximately 16 percent of the injuries to children were sustained from side impact crashes. Although detailed information of specific injury mechanisms sustained by children in this collision mode is somewhat lacking, overall trends of susceptibility to head injury is consistent for side impact.

III. Current Regulatory Approaches

a. Absence of Any Requirement Worldwide

Currently, no country or region has a requirement specifying a minimum level of performance for child restraints in a dynamic side impact simulation. Efforts around the world to improve child restraint safety have concentrated on performance in frontal impacts because they account for more injuries and fatalities than any other crash mode and because the potential for countermeasure development is greater, given the amount of available space in which the crash forces can be mitigated.[1] This focus also reflects the fact that, for side crashes, (a) data are not widely available as to how children are being injured and killed in side impacts (*e.g.,* to what degree injuries are caused by intrusion of an impacting vehicle or other object), (b) potential countermeasures for side impact intrusion have not been developed, and (c) there is not a consensus on an appropriate child test dummy and associated injury criteria for side impact testing.

b. Consumer Ratings Programs

Nonetheless, some entities around the world have focused attention on side impact safety by developing consumer information rating programs that assess child restraint performance in side impact tests. The European New Car Assessment Program (Euro NCAP) was established in 1997, and is funded by governments, the European Commission, and consumer organizations. Euro NCAP has

[1] That effort has also culminated in a harmonized standard for an improved child restraint anchorage system, which NHTSA incorporated into its regulations in 1999 (Federal Motor Vehicle Safety Standard No. 225, 49 CFR 571.225). Standard No. 225 requires motor vehicle manufacturers to provide vehicles equipped with the child restraint anchorage systems that are standardized and independent of the vehicle seat belts. The new independent system has two lower anchorages, and one upper anchorage. Each lower anchorage includes a rigid round rod or ''bar'' unto which a hook, a jaw-like buckle or other connector can be snapped. The bars are located at the intersection of the vehicle seat cushion and seat back. The upper anchorage is a ring-like object to which the upper tether of a child restraint system can be attached. (The system is widely known as the ''LATCH system,'' an acronym developed by manufacturers and retailers for ''lower anchors and tether for children.'') The LATCH system is required to be installed at two rear seating positions. In addition, a tether anchorage is required at a third position. By requiring an easy-to-use anchorage system that is independent of the vehicle seat belts, NHTSA's standard makes possible more effective child restraint installation and thereby increases child restraint effectiveness and child safety. The standard is estimated to save 36 to 50 lives annually, and prevent 1,231 to 2,929 injuries. See 64 FR 10786; March 5, 1999.

developed a protocol for rating vehicles equipped with child restraints in frontal and side impacts. The protocol is being used in Europe. (This is separate from the performance standard for child restraints that has been issued by the Economic Commission for European (ECE), ECE Regulation R44.[2]) In the Euro NCAP side impact test protocol, vehicles are impacted with a moving deformable barrier traveling at 30 mph at a 90-degree angle. An 18-month-old dummy and a 3-year-old dummy are used in the evaluation, neither of which was specifically designed to evaluate performance in side impacts. The vehicle is rated on dummy head containment, resultant head acceleration, and chest acceleration.

The New South Wales (NSW), Australia RTA, as part of its joint program with the NRMA Limited and the Royal Automotive Club of Victoria (RACV) to assess the relative performance of child restraints available in Australia, administers a program that incorporates a lateral dynamic sled test of tethered child restraints with a 20 mph pulse. NSW RTA assesses the dummy's lateral head excursion relative to a simulated vehicle door. In this test, the door structure is fixed, and there is no attempt to simulate intrusion of the door structure. Child restraints are ranked in part on their ability to prevent the dummy's head from hitting the door.

IV. Performance in a Dynamic Test

While the child's head seems to be the area most affected in side impact crashes, the agency has not been able to confirm whether the majority of injuries and fatalities occur primarily due to direct head contact with the vehicle interior or other objects in the vehicle, or whether these injuries and fatalities are a result of non-contact, inertial loadings on the head and neck structure. To address these injuries and fatalities, the agency has been considering two side impact performance tests for child restraints. The agency has assumed that child restraints that perform satisfactorily in these tests (*i.e.,* that meet certain performance criteria) when dynamically tested would be able to reduce the likelihood and/or severity of these head strikes in many side impacts.

The tests are modeled after the test that RTA of NSW, Australia, uses today in the child restraint ratings program it administers, and are similar to a proposal issued by NHTSA when dynamic testing of child restraints was first contemplated (42 FR 7959; March 1, 1974). Under the 1974 NHTSA proposal, a 90-degree lateral impact would have been conducted simulating a 20 mph crash. When tested in this fashion, each child restraint would have been required to retain the test dummy within the system, limit head motion to 19 inches in each lateral direction measured from the exterior surface of the dummy's head, and suffer no loss of structural integrity.[3]

a. Should Head Excursion Be Limited in a 20 mph Dynamic Test (''No Wall Test'')?

We have been considering the merits of a dynamic test requirement replicating a side impact, using a 20 mph velocity change (Figure 1 of this preamble depicts the pulse we are considering for the 20 mph test). This speed is consistent with the speed used by RTA of NSW, Australia, in its consumer ratings program and with the 1974 NHTSA proposal. We envision tethering the child restraint, and orienting it at 90 degrees to the direction of sled travel. The 90-degree orientation would be consistent with the Euro NCAP protocol and Australian rating program.

NHTSA conducted a series of 15 HYGE sled tests using the existing FMVSS No. 213 seat fixture oriented at both 90° and 45° relative to the motion of the sled buck. The matrix of tests is shown below.

TABLE 1.—MATRIX OF SIDE-IMPACT TESTS

	CRABI 12-month-old rear-facing				HIII 3-year-old forward-facing			
	Cosco Triad		Century STE		Cosco Triad		Century STE	
	45°	90°	45°	90°	45°	90°	45°	90°
Tethered	....	....	....	....	X	X	X	X
Untethered	X	X	X	X	X	X	X	X

Twelve of the tests (all of the above) were conducted using a ½ sine pulse. The remaining tests were selected repeats from the above matrix, but were conducted using the existing FMVSS No. 213 pulse. All of these tests were conducted at a test velocity of 32 km/h (20 mph) and a peak acceleration of 17 g's. In addition to the amount of dummy head excursion, performances with respect to other injury criteria were recorded and are summarized in the following table:

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[2] Regulation 44, Uniform Provisions Concerning the Approval of Restraining Devices for Child Occupants of Power-Driven Vehicles (''Child Restraint Systems'').

[3] NHTSA subsequently withdrew the proposal after testing a number of restraints at a speed of 20 mph and at a horizontal angle of 60 degrees from the direction of the test platform travel. The research found that for outboard seating positions, only one of those restraints—one that required a tether—could meet the lateral head excursion limits that had been proposed in the NPRM. This was of concern because tethers were widely unused at that time. Further, the agency found that some restraints with impact shields, which performed well in frontal crashes and which were rarely misused, could not pass the lateral test even when placed in the center seating position. The agency decided not to pursue lateral testing of child restraints given the cost of the design changes that would have been necessary to meet the lateral test, the problems with misuse of tethers, and the possible price sensitivity of child restraint sales. (43 FR 21470, 21474; May 18, 1978.)

We have revisited this issue in light of several developments in recent years. Forward-facing child restraints are now subject to a 28-inch head excursion limit that results in most of them having tethers. Vehicles are now required to have user-ready tether anchorages in rear seating positions, along with standardized child restraint anchorage systems, as part of the requirements of Standard No. 225. We expect that with user-ready anchorages in vehicles, and with most new child restraints incorporating tether straps in order to meet the more stringent head excursion requirement of Standard No. 213, tethers will generally be used, and thus there is a greater likelihood that countermeasures that depend on tether use will be effective.

Table 2: Summary Results for Side Impact Child Restraint Systems @ 45 and 90 Deg., 20 mph

Test #	Dummy Size	Test Type	Excursion (in.)	HIC 15	HIC unlimited	Peak Tension	Peak Compres sion	Peak Flexion (Y-axis)	Peak Extension (Y-axis)	Peak Flexion (X-axis)	Peak Extension (X-axis)	Chest Deflection (in.)	Chest Accel. (g)
TRC591	3 yo	Near Side, Cosco Triad-LATCH/ 45 deg.,1/2 Sine	22.0	122	226	963	318	6.6	12.8	0.9	36.8	0.53	29.1
TRC591	12 mos.	Far Side, Cosco Touriva-lap only (rear-facing)/ 45 deg., 1/2 Sine	23.0	82	146	849	11	3.0	8.7	1.9	2.8	NA	30.5
TRC592	3 yo	Near Side, Century STE-LATCH/ 45 deg.,1/2 Sine	23.0	150	255	419	950	5.1	15.3	2.2	35.5	0.46	31.8
TRC592	12 mos.	Far Side, Century STE-lap only (rear-facing)/ 45 deg., 1/2 Sine	26.0	126	163	591	8	2.4	8.5	2.6	3.0	NA	29.2
TRC593	3 yo	Near Side, Cosco Triad-LATCH (NO Tether)/ 45 deg.,1/2 Sine	27.0	122	268	493	436	3.6	15.7	1.7	37.2	0.51	26.4
TRC594	3 yo	Near Side, Century STE-LATCH (NO tether)/ 45 deg.,1/2 Sine	26.0	131	240	430	698	2.8	15.6	1.2	33.8	0.44	27.9
TRC595	3 yo	Near Side, Cosco Triad-LATCH/ 90 deg.,1/2 Sine	20.0	76	160	253	670	2.5	23.8	0.7	16.6	0.08	23.8
TRC595	12 mos.	Far Side, Cosco Touriva-lap only (rear-facing)/ 90 deg., 1/2 Sine	25.0	180	244	579	46	4.6	7.9	7.1	3.9	NA	24.1
TRC596	3 yo	Near Side, Century STE-LATCH/ 90 deg.,1/2 Sine	19.0	107	159	600	985	1.9	25.9	1.1	17.4	0.12	23.3
TRC596	12 mos.	Far Side, Century STE-lap only (rear-facing)/ 90 deg., 1/2 Sine	28.0	247	248	580	7	2.1	3.8	6.7	7.9	NA	27.5
TRC597	3 yo	Near Side, Cosco Triad-LATCH (NO tether)/ 90 deg.,1/2 Sine	21.0	99	200	113	643	2.2	30.6	0.1	13.0	0.15	23.8
TRC598	3 yo	Near Side, Century STE-LATCH (NO tether)/ 90 deg.,1/2 Sine	22.0	93	170	316	861	3.4	24.3	0.1	12.6	0.22	25.9
TRC602	3 yo	Near Side, Century STE-LATCH/ 90 deg., 213 pulse	22.0	67	135	278	876	1.6	21.6	0.6	12.0	0.11	21.3
TRC602	12 mos.	Far Side, Century STE-lap only (rear-facing)/ 90 deg., 213 pulse	28.0	268	307	707	27	2.1	9.5	2.1	3.7	NA	23.1
TRC603	3 yo	Near Side, Century STE-LATCH (No tether) / 90 deg., 213 pulse	21.0	71	168	322	678	1.5	24.1	0.0	13.0	0.14	24.1

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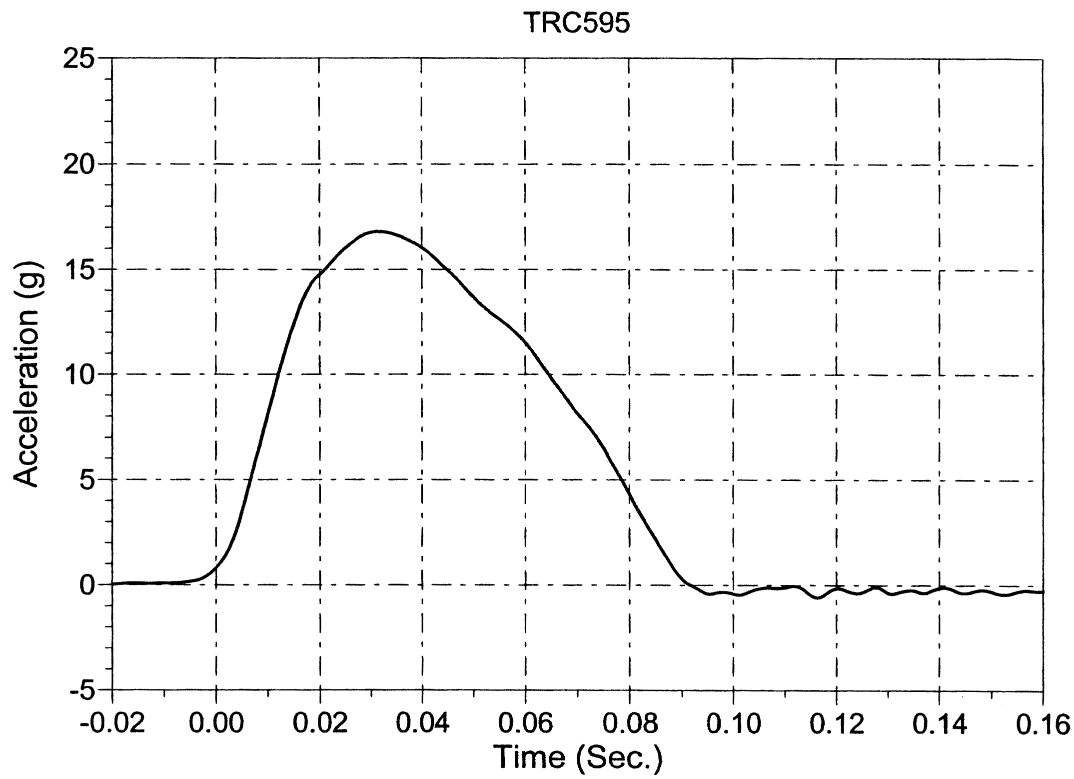
We are considering a test that would limit head excursion such that no portion of the head of the dummy could pass through a vertical plane that is parallel to the longitudinal plane of the test seat assembly, and measured relative to the centerline of the child restraint anchorage (LATCH) bar that is furthest from the simulated impact (Point Z1). The plane would be 508 millimeters (mm) (20 inches) from Point Z1 in the direction toward the side of the simulated impact.

The 508 mm (20-inch) limit was based on the location of the LATCH anchorage bars and the distance we measured from the most inboard anchorage bar to the side door structure of a Pontiac Grand Am passenger car. The Grand Am was used because it was readily available and was thought by the agency to be fairly representative of an average size car in the current fleet. (As discussed later in this document, comments are requested on the representativeness of the vehicle.) It was also based on results from two 90-degree side impact sled tests recently conducted by the agency using a 3-year-old-dummy restrained in forward-facing LATCH child restraint systems. The head excursion values for the dummy in these tests were 19 and 20 inches. (*See* test numbers TRC 595 and TRC 596 in Table 2, *supra.*) The 20-inch limit appeared to be a practicable and reasonable first step toward improving child restraint performance in side impacts. While a lower excursion limit might have greater potential benefits in reducing the likelihood of head impacts against vehicle components even further, not enough was known about the availability and efficacy of possible countermeasure to support a lower limit. It was unknown how manufacturers would be able to meet a lower excursion limit.

Figure 1 - Pulse for 20 mph Side Impact Sled Test



b. Should HIC Be Limited in a 15 mph Dynamic Test With a Rigid Side Structure (''Wall Test'')?

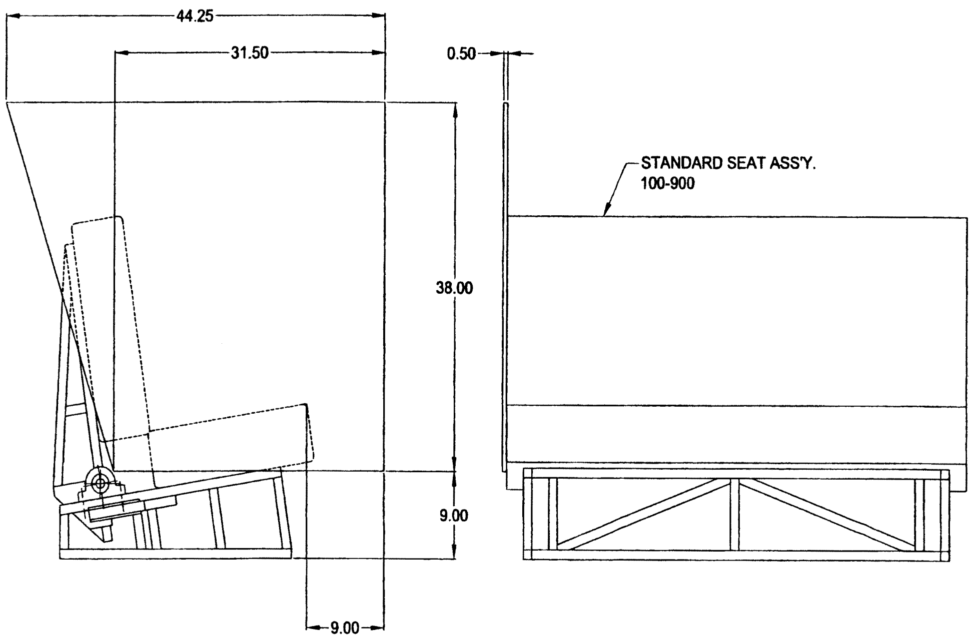
The second test under consideration also involves a simulated lateral impact on a sled, but the test would be conducted at 15 mph. NHTSA settled on a 15 mph test because head excursion sufficient to cause contact with the vehicle interior was found to occur at this speed. We also chose a 15 mph test because it is consistent with a headform impact test used in Standard No. 201, ''Occupant Protection in Interior Impact,'' and in Standard No. 222, ''School Bus Seating and Crash Protection,'' to assess the energy-absorption materials used to provide head protection in vehicle interiors. Comments are requested as to whether the purposes of the tests in each of those standards are sufficiently similar to the purposes in this case.

In this test, we envision the use of a rigid structure that would represent the location of a vehicle's side structure, positioned 508 mm (20 inches) from Point Z1, adjacent to the child restraint.[4] The structure would essentially be a rigid, flat surface adjacent to the seat assembly, extending from the seat cushion to a height of approximately 762 mm (30 inches). The height is intended to be high enough so that if the dummy's head were to contact the structure, the head would contact a flat surface, and not an edge

[4] Under this approach, the LATCH anchorages would be moved from the center seating position on the test seat assembly to an outboard seating position. The rigid structure would be attached next to the seat assembly to the same ''floor'' structure to which the seat assembly is attached.

or curve. The structure would extend forward a distance of approximately 32 inches, again, to ensure that head contact would only be with a flat surface. The structure would be unyielding, and would not bend or flex when loaded. It would be covered with an aluminum plate. Figure 2 of this preamble depicts the rigid structure, aligned with the seat assembly.

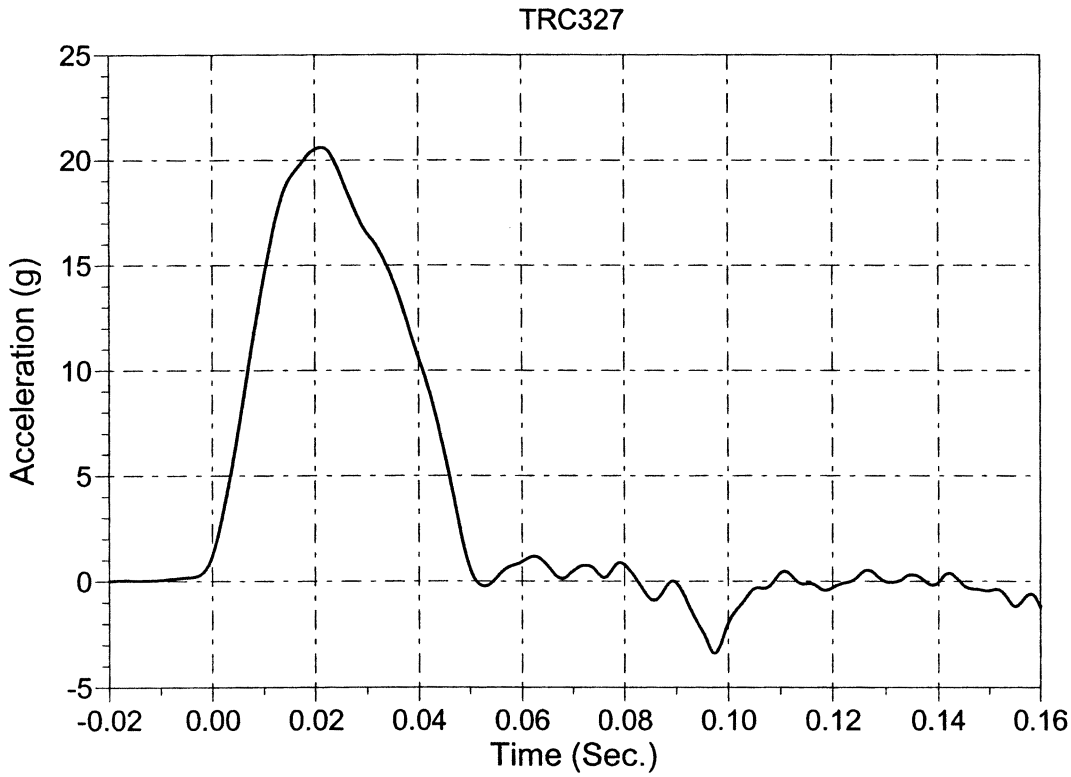
Figure 2: Seat Assembly with Wall (Dimensions in Inches)



In this test, head excursion would not be measured because it appears that the presence of the rigid structure would make it unnecessary to do so. A head excursion limit is needed when the test procedure does not include a surface representing the vehicle interior that can be struck during the test. However, in this test procedure, there would be a rigid structure that could be struck by the dummy directly or indirectly while retained in the child restraint. Limits on head and chest acceleration measurements would be measured, to ensure that if the structure were struck, the forces to the dummy's head and chest would not be excessive. Under this approach, other injury criteria limits would also have to be met, such as those relating to neck injury and chest deflection.

The 15-mph test would be conducted with the sled pulse used in the agency's side impact test program. (Figure 3 of this preamble depicts the pulse we are considering for this test.) The test pulse was derived from the crash pulses of the Grand Am when tested under Standard No. 214 (49 CFR 571.214) (velocity of 15 mph with 21g peak acceleration), and in the side impact program of the New Car Assessment Program (NCAP) (21 mph with a 26g peak acceleration). Comments are requested on the appropriateness and representativeness of using the pulses of this vehicle in these tests.

Figure 3 - Pulse for 15 mph Side Impact Sled Test



The results of the side impact tests on the Grand Am buck, for the near-side dummy only, are presented below in Table 3.

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Table 3 - Summary Results for Comparison of HIII 3 yr. Old in European and U.S. CRS in Side Impacts Using Grand Am Sled Buck

				In-Position Critical Values										
Test #	Test Type	HIC 15	HIC unlt'd	Nij ET	Nij EC	Nij FT	Nij FC	Nij Max.	Peak Tension	Peak Compress.	Peak Flexion	Peak Extension	Chest Deflection (mm)	Chest Accel. (g)
TRC327	Near Side; Touriva/ L-S No tether @ 23.3 km/h /214 pulse	382	382	0.134	0.008	0.383	0.087	0.383	778	42	6.7	1.6	2.29	47.3
TRC454	Near Side; Britax King/ L-S No tether @ 24.1 km/h /214 pulse	366	366	0.420	0.011	0.145	0.087	0.420	544	49	5.8	5.7	2.29	45.5
TRC455	Near Side; Century Accel/ L-S No tether @ 24.1 km/h /214 pulse	573	573	0.450	0.004	0.124	0.100	0.450	775	30	6.9	5.3	2.03	51.0
TRC328	Near Side; Touriva/ L-S No tether @ 33.8 km/h /SNCAP Pulse	1085	1085	0.793	0.008	0.165	0.046	0.793	1143	46	10.0	13.4	3.56	65.9
TRC329	Near Side; SafeEmb./ L-S No tether @ 33.8 km/h /SNCAP Pulse	796	796	0.774	0.034	0.139	0.018	0.774	1094	49	5.0	10.5	1.78	73.7
TRC456	Near Side; Britax King/ L-S No tether @ 33.8 km/h /SNCAP pulse	709	709	0.532	0.003	0.158	0.165	0.532	707	81	9.6	9.9	3.30	68.2
TRC457	Near Side; Century Accel/ L-S No tether @ 33.8 km/h /SNCAP pulse	1029	1029	0.976	0.003	0.136	0.095	0.976	1360	30	8.0	14.9	2.79	71.5
TRC330	Near Side; Triad LATCH @ 33.8 km/h /SNCAP pulse	817	817	1.034	0.022	0.101	0.004	1.034	1528	16	3.9	11.6	12.95	45.7
TRC458	Near Side; Britax King/ L-S w/ Tether @ 33.8 km/h /SNCAP pulse	478	480	0.582	0.071	0.194	0.055	0.582	518	111	9.1	11.9	2.03	63.9
TRC459	Near Side; Century Accel/L-S w/Tether @ 33.8 km/h /SNCAP pulse	899	899	0.874	0.008	0.221	0.006	0.874	1034	31	12.6	15.1	4.32	70.6

IARVs: HIC 15 ≤ 570; HIC (unlt'd) ≤ 1000; Nij ≤ 1.0; Chest Acc. ≤ 55 g (FMVSS 208); Chest Acc. ≤ 60 g (FMVSS 213); Chest Deflection ≤ 34 mm

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c. Are Both Tests Needed?

We have been considering the merits of having child restraints be subject to both the 20 mph ''no wall'' and the 15 mph ''rigid wall'' tests. We recognize that the tests may be duplicative to an extent, since the rigid wall of the 15 mph test would be positioned at the 20-inch excursion limit of the 20 mph test. Comments are requested concerning the duplication, and, if it is believed that there is duplication, the extent of the duplication. Which requirement is better, or are both needed? Should we consider proposing to subject child restraints to a second test requirement only if they fail the first test? For instance, if a rear-facing restraint were unable to meet the 20-inch excursion limit of the 20 mph test, we could subject it to hit the 15 mph rigid wall test and require that the injury criteria be met (presumably by additional padding and/or reinforced side structure). If it met those criteria, perhaps it should be considered to have met the side impact protection requirements. As shown in this example, an advantage to the 15 mph test over the 20 mph test is that the former allows the development and assessment of a broader range of countermeasures for child protection. That is, while the 20 mph requirement focuses on better retaining the child's head and torso, the 15 mph requirement could allow manufacturers to incorporate energy-absorption designs into the child restraint, in addition to countermeasures that reduce occupant excursion. Comments are requested on such an approach.

IV. Countermeasure Development

We were not able to engage in any type of countermeasure development within the time constraints set by the TREAD Act for an NPRM. However, several possible approaches were identified.

a. Countermeasures That Better Retain and Cushion the Child's Head

The legislative history of the TREAD Act indicated an interest in incorporating into Standard No. 213 what was thought to be superior European side impact padding requirements. (''Child Passenger Safety Act of 2000,'' S. 2070, February 10, 2000). NHTSA reviewed Regulation 44 and found that it neither prescribes any side impact tests for the evaluation of child restraints, nor requires special designs or features for enhanced side impact protection, such as deep side structures, or ''wings,'' [5] that differ substantially from the requirements of Standard No. 213.

Notwithstanding the absence of regulatory provisions addressing this aspect of performance, NHTSA evaluated U.S. and European child restraints to compare their performance in a dynamic side impact simulation. The agency ran two series of sled tests using a Pontiac Grand Am passenger car test buck, turned 90 degrees to the direction of impact. The agency used sled pulses derived from the crash pulses of the Grand Am when tested under Standard No. 214 (velocity of 15 mph with 21g peak acceleration), and the side impact program of the New Car Assessment Program (NCAP) (21 mph with a 26g peak acceleration). In the first series of tests to evaluate the performance of current U.S. restraints, Hybrid III 3-year-old dummies were positioned in the outboard rear seating positions in child restraints that were either a Cosco Triad or Touriva, or a Fisher-Price SafeEmbrace or SafeEmbrace II. In each test, one child restraint with dummy was on the ''near-side,'' *i.e.,* same side, as the impact and one child restraint with dummy was on the ''far-side.'' In each test, the near-side dummy's head contacted the interior door structure, resulting in high injury measures. The far-side dummy had minimal interaction with the vehicle interior, the near-side dummy or with any other object.

NHTSA then evaluated the side impact protection capability of child restraint systems that were certified to Regulation 44 (seats manufactured to European regulations by Britax and by Century). NHTSA obtained six child restraints, three each of the Britax King and the Century Accel. Visual review of the European seats prior to testing did not reveal significant differences in the padding or size of the ''wings'' between the Regulation 44 and the Standard No. 213 seats. Because no instrumented side impact dummy was available for use, the agency utilized instrumented Hybrid III 3-year-old dummies, and focused its evaluation of the restraints primarily on the kinematic response of the dummies. During these tests, one Hybrid III 3-year-old dummy was positioned near-side to the impact. Test results indicated that the performance of the European restraint systems was not significantly different from that of the U.S. child restraints. That is, in each case, the near-side test dummy's head went out around the side of the child restraint and impacted the door frame of the sled buck. The side wings on the European restraint did not contain the head of the dummy any better than the U.S. restraints we tested. (The results are discussed in detail in a paper entitled, ''Comparison of European and U.S. Child Restraints in Lateral Grand Am Sled Tests,'' a copy of which is in the docket.)

This finding of no difference in performance between European and U.S. child restraints was relevant to determining the level of performance of current child restraint designs, but does not address the extent of the manufacturers' capabilities to improve designs to provide better protection for a child's head in a side impact. In a study that evaluated rearward-facing child restraints in lateral impacts, researchers conducting side impact testing of prototype child restraints found that ''side protection can be increased by fairly simple methods,'' [6] for example, by providing a reinforced side structure that distributes local loads, energy absorbing materials and a modified head area that prevents the head from rotating out of the confines of the child restraint. Researchers who modified a child restraint to incorporate these features found that the restraint was able to retain the head of a 3-year-old test dummy in a lateral 50-kilometer per hour (km/h) dynamic test. *Id.* Researchers from the RTA of NSW, Australia, found head strikes could be prevented in 90-degree tests depending, in part, on the depth of the side wings.[7] This research indicates that countermeasure work could be promising. However, because NHTSA has not been able to satisfactorily consider and evaluate possible countermeasures for side impact protection, we have decided against proceeding with an NPRM at this time.

NHTSA will be undertaking a research plan later in 2002 to evaluate possible countermeasures that may

[5] The only requirements for ''wings'' in the E.C.E. Regulation 44 apply to rear-facing child restraints. These restraints must have side wings with a depth of minimum 90 mm measured from the median of the surface of the backrest. These side wings start at the horizontal plan passing through point ''A'' and continue to the top of the seat back. Starting from a point 90 mm below the top of the seat back, the depth of the side wing may be gradually reduced. Child restraints meeting these requirements do not appear substantially different in design than convertible restraints manufactured to Standard No. 213.

[6] Kamrén et al., ''Side Protection and Child Restraints—Accident Data and Laboratory Test Including New Test Methods,'' 13th International Technical Conference of Experimental Safety Vehicles, November 4–7, 1991, Paris, France.

[7] Kelly et al., ''Child Restraint Performance in Side Impacts With and Without Top Tethers and With and Without Rigid Attachment (CANFIX),'' 1995 International IRCOBI Conference on the Biomechanics of Impact, September 13–16, 1995, Brunnen, Switzerland.

enable rear-facing infant seats to better retain the child's head in a side impact. The agency hopes to assess whether potential countermeasures such as increased padding and/or depth of the side wings on these restraints could have a positive effect in limiting the head excursion of a restrained dummy. The results of this research will help shape the agency's future work on side impact protection.

b. Countermeasures That Keep the Child Restraint From Moving Laterally in a Side Impact

Another countermeasure that might provide side impact benefits is one that keeps the child restraint from moving laterally in the side impact, such as the use of rigid instead of flexible means for attaching a child restraint to the Standard No. 225 LATCH system. RTA of NSW, Australia, conducted dynamic side impact sled tests and found that a child restraint with rigid means of being attached to a LATCH system outperformed a child restraint restrained by a flexible attachment system and a lap belt plus tether system. Kelly et al., ''Comparative Side Impact Testing of Child Restraint Anchorage Systems,'' Special Report 96/100, March 1997.[8] The side impact tests were conducted in accordance with Australian Standard (AS) 3691.1, except for the addition of a simulated door structure, replicating a rear door of a large sedan, adjacent to the test seat. Testing was conducted at 32 km/hr and 14 g, with the test seat mounted at both 90 degrees and 45 degrees to the direction of sled travel. The lower anchorage points for the CAUSFIX (LATCH) system were positioned 280 mm (11 inches) apart on the test seat structure, with the inboard anchorage approximately 610 mm (24 inches) from the inner surface of the door. An instrumented 9-month-old dummy was used in all the tests.

RTA found that, for forward-facing seats, only the rigid-to-rigid CAUSFIX (LATCH) attachment system was able to prevent contact between either the dummy's head or the child restraint and the door structure in the 90-degree test. RTA stated that head contact with the door was evident in the test involving the flexible attachment system, largely due to the restraint's rotating towards the door at the end of its sideway movement.

> As a consequence, the dummy's head moved forward relative to the CRS [child restraint system] and contacted the front portion of the side-wing. In turn, the side-wing deflected and allowed the head to roll around its front edge, as the CRS rebounded from the door. The HIC values shown * * * indicate only light head contact with the door. In contrast, the CAUSFIX system did not allow rotation* * * * The CAUSFIX concept offered better head protection compared to the conventional seat belt/top tether systems. (*Id.,* page 5.)

Comments are requested on these findings. In 1999, NHTSA required the LATCH (or CAUSFIX) system to be installed on new passenger vehicles (64 FR 10786; March 5, 1999). NHTSA required child restraints to be equipped with attachments that connect to the vehicle LATCH system beginning in 2002, but allowed manufacturers to decide what type of connecters to use on their child restraints. The agency did not require that rigid connectors be used because, among other reasons, we lacked data to confirm whether use of rigid attachments on a child restraint would produce the side impact benefits reported by RTA. There was also a concern that rigid connectors would raise the price of child restraints inordinately. (Rigid connectors are estimated to add about $25 to the price of a child restraint.) Without evidence of a clear benefit in having rigid attachments, and in view of the potential price of child restraints with rigid attachment systems and the leadtime necessary for their development, NHTSA decided against mandating that type of connector.[9] In the event that the rigid attachment system with top tether is capable of preventing the dummy's head from striking the side of the vehicle, how should the agency balance that capability against the impact of possible cost increases on the use of child restraints in deciding whether to propose mandating a performance requirement that can be met only by rigid attachments at this time?

Another possible countermeasure that the agency considered to prevent movement of the child restraint toward the vehicle side structure is tethering the bottom of a child restraint to the vehicle floor. Comments are requested on the effectiveness of this approach. Consumer acceptability of this approach is not known at this time.

c. Countermeasures That Reduce the Local Stiffness of Vehicle Components Areas Where Children Are Most Likely To Hit Their Heads

It may be that the best way of developing countermeasures that would be effective in protecting children in child restraints on the near side of a side impact would be to consider the child restraint and the vehicle as parts of a single system. Standard No. 201 is intended to provide impact protection in various crash modes, including side impact crashes, while Standard No. 214 focuses on side impact crashes. Standard No. 201, *Occupant Protection in Interior Impact* (49 CFR 571.201), requires passenger vehicles to provide protection when an occupant's head strikes certain portions of target components, such as pillars, side rails, headers, and the roof. The components are subjected to in-vehicle component tests with a headform, and must limit HIC to 1000. The standard could be expanded to apply to the areas of the vehicle interior that are identified as likely to be struck by a child's head in a side impact crash. However, our data files do not clearly identify where head strikes are occurring in vehicles. Since significant work would have to be done to identify the appropriate target areas and assess suitable countermeasures, this approach was not considered responsive to the TREAD Act, given its time limitations.

Another potential countermeasure to reduce the local stiffness of vehicle side structures would be side impact air bags (SIABs). The agency has done considerable research on SIABs.[10] A crucial part of the agency's current research concerns their effectiveness, cost, and any possible harmful effects for in-position and out-of-position occupants. Despite the agency's research to date on SIABs, the agency did not consider SIABs as a countermeasure because of the time limitations of TREAD. However, comments on the potential effectiveness of this approach and suggestions on specific target locations are requested.

VI. Specific Issues on Side Impact on Which Comments Are Requested

There are a number of issues on which comments would be helpful in shaping NHTSA's decision in this rulemaking.

[8] (RTA refers to the LATCH system as the CAUSFIX system, because ''LATCH'' was a term developed subsequent to the RTA study, primarily by U.S. manufactures and retailers for a U.S. audience. Further, at the time of the RTA study, the rigid lower bars and top tether anchorage design of LATCH was then under development by Canada and Australia.)

[9] At present, we are not aware of any child restraint system that has rigid attachments that is available in the U.S.

[10] Prasad et al., ''Evaluation of Injury Risk from Side Impact Air Bags,'' 17th International Technical Conference on the Enhanced Safety of Vehicles, June 4–7, 2001, Amsterdam, Netherlands. This paper describes NHTSA's program for evaluation of side air bag systems for out-of-position occupants and provides a status report on the current research.

a. Crash Characteristics

The agency has been hampered by a lack of specific accident data on children in side impact crashes. There are few available data on how children are being injured and killed in side impacts (*e.g.,* to what degree injuries are caused by intrusion of an impacting vehicle or other object). Using 1999 FARS data, 55 percent of the 91 children between the ages of 0 and 12 that were killed in side impact crashes while restrained in child restraints were seated on the side nearest to the crash, with the remaining fatal injuries evenly distributed in middle and far-side seating positions. Is there any evidence that injuries and fatalities occur more often in compartment impacts than in non-compartment impacts? Is there additional information available to distinguish the contact location (vehicle or child restraint system) causing the most severe injury(ies)?

b. Child Injury Mechanisms

Given the agency's limited information regarding the side impact crash characteristics, it is similarly difficult to identify the specific injury mechanisms in children in these crashes. NHTSA researchers have opined that in the absence of autopsies, neck injuries may sometimes occur but be recorded as head injuries. What evidence is there that neck injuries may occur to CRS occupants in side impact crashes? What head injury mechanisms occur? Are they focal point injuries due to direct contact, or do they tend to be diffuse injuries resulting from inertial loadings? Are there other serious and fatal injury mechanisms occurring to children in side impact collisions when they are restrained in a CRS?

c. Test Procedures

1. Are the Approaches Reasonable?

We request comments on all aspects of the test procedures, including general methodology; sled test orientation; test speed and pulse; and positioning of the rigid structure (Wall Test). Should LATCH be the sole means of attaching a child restraint for the purposes of testing? (Currently, the LATCH anchorages are in the center seating position on the standard seat assembly described in Standard No. 213. We would consider moving the LATCH anchorages to an outboard seating position.) All passenger vehicles manufactured on or after September 1, 2002 will be equipped with LATCH systems, and all child restraints manufactured on or after September 1, 2002 will have components that attach to the LATCH anchors in vehicles. However, it will be years before the LATCH-equipped vehicles replace the vehicles on the road today. Given these considerations, comments are requested on whether child restraints should also be required to meet the side impact performance requirements when attached to the standard seat assembly by a lap and shoulder belt (and top tether). What practicability problems, if any, would be associated with achieving compliance while using the latter type of attachment?

Comments are requested from manufacturers and researchers as to how they have sought to better protect children in side impacts. To what extent have manufacturers considered side impact protection in designing child restraints and vehicles? What measures have been used thus far in child restraint and vehicle designs to improve side impact performance to children?

2. ISO

The International Organization for Standardization (ISO) has embarked on what has become a comprehensive, long-term endeavor to develop a dynamic side impact test procedure.[11] NHTSA has been monitoring that undertaking. Currently, the Working Group has developed a draft side impact test method that addresses ''near side'' impact conditions. A copy of the draft test method has been placed in the docket. The Working Group will address non-struck side test requirements at a later date. The draft standard has been developed through consideration of a progression of tests from full-scale vehicle impacts to a sled with a hinged door. In the latter procedure, the intruding door is represented by a pivoted door structure that is rotated in relation to the test seat, at a relative velocity within a band of velocities measured in full-scale tests. The movement represents the deformation of the door inner panel relative to the rear seat structure.

During a side impact collision, the compartment undergoes a lateral acceleration and velocity change of the chassis. Furthermore, if a compartment strike occurs, the struck side of that vehicle may intrude rapidly into the passenger compartment, impacting occupants seated on the struck side adjacent to the impact. With respect to a child restraint, the chassis acceleration affects the reaction of the anchorages and the inertial displacement of the child restraint system, while the side intrusion affects the direct loading on the child restraint system.

This complex interaction cannot be replicated entirely in a simple sled test procedure. For the draft ISO test procedure, the chassis acceleration and door intrusion have been specified independently. The chassis acceleration is reproduced by the sled deceleration. The door intrusion is simulated by the motion of a hinged door mounted on the sled. An alternative method using a non-hinged door has also been evaluated. For the evaluation of the performance of a child restraint system on the non-struck side, only the chassis (sled) acceleration is relevant.

The ISO Working Group has recognized that, although a test method and installation procedure has been developed, there are no dummies available at the present time whose construction is designed for side impact validation. Accordingly, the Working Group will conduct method validation tests using dummies recognized as being of limited capability until new dummies are available. Such validation will be conducted in Europe using modified P series dummies.

The ISO working group's draft side impact test method has been circulated within the group for review and comment. However, given the lack of an approved test device, and corresponding injury criteria, a final version of an ISO test procedure is not expected in the near future. The level and amount of effort needed to further develop and validate the ISO side impact test procedure far exceeds what can be accomplished within the time constraints of the TREAD Act. It is not known when ISO will adopt the draft standard for a dynamic side impact test procedure.

Comments are requested on whether the ISO procedure would be appropriate for Standard No. 213. Should NHTSA wait for ISO to finalize it before proceeding with a proposal for side impact protection?

d. Performance Requirements

We are contemplating side impact requirements that would generally consist of the same limits on injury criteria as those proposed in the NPRM

[11] The International Organization for Standardization working group ISO TC22/SC12/WG1, ''Child Restraint Systems,'' has declared that the risk of side impacts to children in cars is an important working item, and established an ad-hoc group in 1993 to analyze this area. The ad-hoc group noted that, ''From different accident research units, it was reported that critical or fatal injuries of child restraint-protected children in side collisions show about the same importance as in frontal collisions.'' Therefore, the ISO working group noted that there is an interest in evaluating the risk of injuries to children in side impacts and in analyzing the side impact performance of child restraint systems. The ISO working group was given the task of developing an international standard of uniform test criteria for such evaluation. This work remains ongoing at this time.

published today for inclusion in Standard No. 213 for the frontal impact test. We would limit the forces that are imposed on a dummy's head in the side impact tests by specifying the head injury criteria (HIC) proposed in the pending NPRM on this subject (HIC_{15}570, when testing with the 3-year-old dummy, and HIC_{15}390, when testing with the CRABI 12-month-old). The purpose of the HIC limits in the No Wall and Wall Tests would be to ensure that (a) the dummy's head would be retained within the child restraint and (b) the child restraint structure surrounding the head would not transfer harmful loads from restraint-to-door impacts to the child, or would not contain stiff components.

We are considering the merits of using the same neck injury criteria in the side impact tests that are being proposed for frontal compliance tests of child restraints. Results from the limited testing that we have conducted show that, although difficult, existing child restraint designs may meet the specified neck injury parameters. Comments are requested on whether reducing head excursions could result in increased neck loading. Comments are also sought on the ability of deep wings to reduce injury. Would the enlarged side structure sufficiently retain the head within the shell of the child restraint system? If not, under what impact conditions might the head not be retained? In those cases in which the head would not be retained, would there be any potential for increased neck injury due to side wings?

We are considering a head excursion limit of 508 mm (20 inches) from the centerline of the child restraint anchorage (LATCH) bar that is furthest from the simulated impact (Point Z1). The 508 mm (20-inch) limit was based, in part, on the location of the LATCH anchorage bars and the distance we measured from the most inboard anchorage bar to the side door structure of a Pontiac Grand Am passenger car. Comments are requested on the reasonableness of basing the limit on the Grand Am interior. How representative is the Grand Am of passenger vehicles? Would the distance in smaller vehicles be significantly less? Would the 20-inch limit be sufficient to provide safety in vehicles with a smaller interior than the Grand Am (smaller distance between LATCH anchorage bar to the side door structure)? The 20-inch limit was also based on the results from two 90-degree side impact sled tests using a 3-year-old-dummy restrained in forward-facing LATCH child restraint systems. The head excursion values for the dummy in these tests were 19 and 20 inches.

Comments are requested on the practicability of a head excursion requirement less than 20 inches. Is there a practicable way of meeting a more stringent head excursion requirement in vehicles smaller than the Grand Am? Should a head excursion limit also be based on the potential for side structure intrusion in a side impact? Intruding side structure would reduce the amount of available space in a side impact. Comments are requested on how intrusion should be accounted for in setting an excursion limit and the practicability of meeting such a limit.

e. Test Dummies

We are considering the use of the CRABI and Hybrid III 3-year-old dummies to test child restraints. We are mindful that there is some question whether these dummies are appropriate for use in side impact testing. The Hybrid III 3-year-old has a shoulder and torso that are stiffer than the human's in the lateral direction, and probably would not fully replicate a child's kinematics in a side impact. The agency and the biomechanical community are developing more advanced side impact dummies, such as the Q series 3-year-old (Q3) test dummy, which is the product of a European dummy manufacturer. However, the Q3 dummy has yet to show whether it will prove to be suitable for lateral child restraint testing.

We have also conducted preliminary evaluations of prototype neck designs with side impact capabilities for the Hybrid III 3-year-old dummy. During the limited series of side impact tests conducted by the agency at the Vehicle Research and Test Center (VRTC), the dummy appeared to rotate toward the point of impact in each case to yield a generally frontal kinematic response. The shoulder structure for adults—and its relevance to kinematic response—is not currently fully understood by the biomechanical community, let alone the shoulder structure for a child. Yet, given the initial forward rotation of the Hybrid III 3-year-old dummy in a lateral test, it is possible that the shoulder would have little influence on the overall kinematic response of the Hybrid III 3-year-old dummy in the side impact tests under consideration. Comments are requested on whether the existing Hybrid III 3-year-old is the best available dummy and sufficient for use in side impact testing. Has any dynamic side impact testing been performed with the CRABI, Hybrid III, Q- or P-series dummies? What problems, if any, have been experienced in testing with the P-series European dummy? What is the suitability of the P-series dummy relative to the Hybrid III and Q-series dummies?

f. Design Restriction

Comments are also requested on the appropriateness of proposing to amend Standard No. 213 to specify a particular design for child restraints, instead of a dynamic test requirement. For example, should S5.2.2.1(b) mandate side wings on child restraints and increase the height of the wings above the current requirement? We recognize that that approach would be more design restrictive and would not allow manufacturers the leeway to develop alternative designs that might better enhance safety and public acceptability. Would it be unnecessarily design restrictive? Further, at this point, we do not know how high the wings would need to be to retain the head in a dynamic environment. How high would they need to be?

Comments are also requested on whether, in lieu of a dynamic test requirement, we should propose specifying the type and amount of improved energy-absorbing material that should be used around the head area of the restrained child. What type of material should be specified? Would that approach be unnecessarily design restrictive? Would the addition of padding increase neck injuries by allowing pocketing of the head and thereby generating increased neck loads?

g. Consumer Acceptance

Comments are requested on the reduced ease of use of restraints that would have deep side wings. Deep side wings may make it somewhat more difficult to place a child in the restraint, especially an infant. Would the larger side structure make it significantly harder for parents to move children (especially infants) in and out of the restraint, or make it significantly more difficult to install the restraint in the vehicle? Would the larger side structure substantially reduce the ability of restrained children to see out of the restraint? Would increased inconvenience or lack of visibility lead to any significantly reduced use of the restraint? Are there advanced materials that could overcome these problems?

Comments are also requested on consumers' sensitivity to changes in the price of restraints. Is consumer demand sufficiently sensitive to new child restraint prices such that an increase in the price of a child restraint could lead to a decrease in demand for child restraints, notwithstanding that each of the States and the District of Columbia require the use of child restraints in motor vehicles? If so, could the resulting changes in child restraint usage partially or totally offset the benefits of a side impact protection rule? Would higher prices lead consumers generally to decide to use older model child restraints instead of purchasing new models? Would a cost increase result in fewer restraints being purchased for giveaway and loaner programs?

h. Potentially Affected Child Restraints

As to the possible application of the side impact protection requirements, we are considering only restraints recommended for children up to 40 lb. Comments are requested as to whether tethered convertible restraints with impact shields could meet side impact performance requirements.

Comments are also requested on applying side impact requirements to booster seats. Booster seats, as currently designed, are unlikely to be able to meet the requirements under consideration because, to fit older children, they typically have little or no side structure. (Side structure modification is one of the ways we anticipate manufacturers would be able to meet a side impact test requirement.) Booster seats also are not subject to the requirement in Standard No. 213 that makes it necessary for child restraints to have a tether, since they do not pose the same problems of compatibility with the vehicle as do the restraints for younger children, which have to be installed by the vehicle belt system. Yet, older children could benefit from improved side impact protection. A tether could be added relatively easily, but side structure might cause the restraints to be too large and bulky for use. Further, S5.4.3.2 of FMVSS No. 213 effectively limits the mass of current booster seats to 4.4 kg. Addition of a side structure would likely cause most existing booster designs to exceed this limit. There are a number of combination toddler/belt-positioning booster seats on the market. When used with younger children, these restraints have a full harness system for the child and attach to the vehicle seat by way of the vehicle's belt system or LATCH system. When the child grows to a certain size (typically over 40 lb), parents are instructed to remove the harness and to use the child restraint system as a belt-positioning booster. Because these restraints are used as booster seats when the child is over 40 lb, and since side structure on this type of restraint could impede its use as a booster seat, should these seats be excluded from a proposed side impact requirement? Should booster seat occupants rely on the vehicle structure for side impact protection, as do adult occupants? How could side impact protection best be improved for children in booster seats?

i. Potential Cost

At this time, the agency has insufficient information about the particular methods of compliance (''countermeasures'') and their costs. The agency is uncertain what countermeasures manufacturers might use to meet the possible side impact requirements under consideration.

The estimated costs to comply with the contemplated side impact requirements vary, depending on the countermeasure used. For some infant restraints, the addition of one-inch thick padding could be sufficient to meet the requirements (the estimated additional cost per restraint is $2.50.) The total cost of this countermeasure for those restraints is estimated to be $1.750 million. For some forward-facing toddler restraints, the sides (wings) on the top portion of the restraint might be increased to prevent a child's head from passing the sides and contacting the vehicle side structure. We estimate that the larger sides and padding would add about $15.00 to the cost of a convertible child restraint (one that is used rear-facing with an infant and forward-facing with a toddler). A convertible child restraint now typically costs about $70.00. We estimate the total cost of the enlarged wings countermeasure to be $49.5 million.

Tethering the bottom of a forward-facing restraint to an anchor on the floor of the vehicle to impede the ability of the child restraint to rotate toward the side impact is estimated to cost $4.14 per child restraint, and $1.40 per vehicle (for two anchors). The total cost of the tether countermeasure is estimated to be $38.3 million.

Another possible countermeasure could be to use rigid components on child restraints for attaching them to the lower anchorage bars of a vehicle's child restraint anchorage system. We estimate that this countermeasure would add $25.15 per child restraint, for a total cost of $100.6 million.

The agency requests comments on these and other possible countermeasures. Given that some child restraints could meet the side excursion and injury limits in one test mode, and that child restraint manufacturers have never had to design for a side impact test, it is possible that relatively minor changes in design, without significant changes in the child restraints, could allow some manufacturers to pass the tests. We have not evaluated the countermeasures to determine their feasibility and benefit, although we will evaluate the increased padding and enlarged wings approaches in 2002, for rear-facing restraints. Information from that study will help us further evaluate the course of action we should pursue in this rulemaking.

NHTSA requests comments on the effect of additional costs on the number of restraint producers and on competition. The child restraint industry is a very fluid industry; manufacturers are continuously entering and leaving it for a variety of reasons. Would an increase in child restraint prices affect the viability of any of these manufacturers if the profit margins were reduced? If so, would the number of manufacturers decrease, and as a result, cause the competition in this market to decrease? Do retailers tend to dictate the wholesale end of this market by requiring that they be provided child restraints in specified price ranges? If so, would an increase in the cost of child restraints to the manufacturers result in reduced profit margins?

j. Potential Benefits

In 1999, 420 of the 1,317 children (about 32 percent) between the ages of 0 to 12 killed in motor vehicle crashes were killed in side impacts. Of these children, 91 were killed while restrained in child restraints. Children seated on the side nearest to the crash accounted for 55 percent of the fatalities. Children seated in a middle seating position, or on the far-side, accounted for 23 and 22 percent, respectively. We believe that limiting head excursion of the dummy in dynamic testing would result in fewer head impacts against the vehicle side structure in a side impact, and, correspondingly, fewer injuries and fatalities. Further, limiting head and chest acceleration would require better energy attenuation by the child restraint in a side impact, which could reduce fatalities and injuries resulting from impacts of the child's head against the child restraint side structure. However, it is difficult to quantify that reduction. We do not know whether the possible countermeasures we have identified are feasible or effective. Further, we do not know enough about how children are dying and getting injured in side impacts. Forty-five percent of the total fatalities for children who are in child restraints in side impact crashes occur when the child is seated in either the middle or far side (non-impacted side) seating positions. Would limiting the lateral excursion for these occupants result in improved protection? Comments are requested on these issues.

VII. Rear Impact Protection

Data from FARS for 1991–2000 show that 9580 passenger vehicle occupants between the ages of 0 and 8 years old were fatally injured. Of these, 662 (6.9 percent) were killed in rear impact crashes, while 3536 (36.9 percent) were killed in frontal crashes and 2759 (28.8 percent) were killed in side impact crashes. Of the 662 children killed in rear impact crashes between 1991–2000, 214 were restrained in a child restraint; 128 were restrained with a lap or lap/shoulder belt; 266 were unrestrained and 54 were of other or unknown restraint use. Further, of the 104 children under the age of 1 that were killed during this time period, 60 were in child restraints, 2 were in lap or lap/shoulder belts, 38 were unrestrained, and 4 were of other or unknown restraint use.

The breakdown of restraint use for children under the age of 1 is provided to identify the possible benefits associated with establishing a rear impact test for rear-facing restraints in FMVSS No. 213 which would be similar to that which is conducted under the European Regulation R44. In the European test, rear-facing restraints are subjected to a rear impact test conducted at 30 km/hr (18.6 mph), with peak deceleration between 14 g and 21 g over a 70 msec time period. Limits on the amount of allowable head excursion during the dynamic test are specified.

During recent dynamic sled testing in support of FMVSS No. 202 and FMVSS No. 207 research, a rear-facing child restraint with the CRABI 12-month-old dummy was added to three different tests. The tests were conducted using a 1999 Dodge Intrepid vehicle buck. An Evenflo On My Way child restraint, with the attached base, was positioned in the rear seat of the vehicle for each test. One test, simulating a dynamic FMVSS No. 202 condition, was conducted at approximately 17.5 km/h (11 mph). The other two tests were conducted at approximately 30.5 km/h (19 mph). Regardless of simulated impact speed, the CRABI 12-month-old in the rear-facing child restraint was able to easily meet the injury criteria that are proposed under FMVSS No. 208; however, compliance with the ECE Regulation R44 requirements were not verified.

Given the results of the above testing, in conjunction with the data showing that fatalities for children as a result of rear impact crashes constitute a much smaller percentage of the total than other crash modes, the agency is not certain whether the establishment of a rear impact test for rear-facing restraints is warranted. Is there any test data that would support the establishment of a test that would parallel the existing European requirement? Would existing restraints be able to meet the requirements with no modifications? If so, does it make sense to require the test as part of FMVSS No. 213? Are there particular requirements of ECE Regulation R44 for rear-facing child restraints in rear impacts that should be given greater consideration?

VIII. Rulemaking Analyses

Executive Order 12866 (Regulatory Planning and Review) and DOT Regulatory Policies and Procedures

The agency has considered the impact of this ANPRM under Executive Order (E.O.) 12866 and the Department of Transportation's regulatory policies and procedures and determined that it is "significant" because one means of meeting a dynamic side impact requirement could result in costs over $100 million and could therefore be economically significant under E.O. 12866, i.e., have an annual effect on the economy of $100 million or more. [12] This document was reviewed by OMB under E.O. 12866. At this point, NHTSA wants more information about the costs and benefits of this rulemaking before it will decide to issue a proposal that would be economically significant under E.O. 12866. A Preliminary Economic Assessment (PEA) discussing the costs and benefits of the ANPRM is available from the docket.[13]

As discussed in the PEA, the agency is uncertain at this time what countermeasures manufacturers would use to meet side impact requirements. We believe that the side impact tests under consideration could improve the protection afforded to children involved in side impact. In 1999, about 32 percent of the 1,317 children between the ages of 0 to 12 killed in motor vehicle crashes were in side impacts. Of these children, 91 were killed while restrained in child restraints. Children seated on the side nearest to the crash accounted for 55 percent of the fatalities. Children seated in a middle seating position, or on the far-side, accounted for 23 and 22 percent, respectively. Limiting head excursion of the dummy in dynamic testing could result in fewer head impacts against the vehicle side structure in a side impact, and, correspondingly, fewer injuries and fatalities. Limiting head and chest acceleration could lead to better energy attenuation by the child restraint in a side impact, which might reduce fatalities and injuries resulting from impacts of the child's head against the child restraint side structure. Given certain assumptions, the side impact tests under consideration could prevent 14 fatalities and 55 injuries annually.

The tests under consideration may only partially address the harm resulting from near-side (impacted side) crashes. However, comments are requested on whether benefits may result in some side impacts with lower degrees of intrusion (*e.g.,* lower speed crashes), because limits on head excursion and injury reference values may prevent children's heads from striking the vehicle side structure in such crashes, when head contact might have otherwise occurred in the absence of an excursion limit, or might attenuate crash forces on the child in lower speed crashes. Comments are also requested on whether limiting lateral head excursion and/or HIC may benefit children who are in child restraints seated in either the middle or far side (non-impacted side) seating positions.

The estimated costs to meet the side impact tests under consideration vary, depending on the countermeasures used. For some infant restraints, the addition of one-inch thick padding could be sufficient (the estimated cost per restraint is $2.50.) The total cost of this countermeasure is estimated to be $1.750 million. For some forward-facing toddler restraints, the sides (wings) on the top portion of the restraint might be increased to prevent a child's head from passing the sides and contacting the vehicle side structure. Larger sides and padding are estimated to add about $15.00 to the cost of a convertible child restraint (one that is used rear-facing with an infant and forward-facing with a toddler). A convertible child restraint now typically costs about $70.00. The total cost of the enlarged wings countermeasure is estimated to be $49.5 million. A third possible countermeasure involves impeding the ability of the child restraint to rotate toward the side impact. Tethering the bottom of a forward-facing restraint to an anchor on the floor of the vehicle might achieve this result. The cost of such a countermeasure is estimated to be $4.14 per child restraint, and $1.40

[12] This could be the case if the countermeasure involved using rigid components on child restraints that attach to the vehicle's rigid LATCH child restraint anchorage system.

[13] NHTSA's Preliminary Economic Assessment (PEA) discusses issues relating to the potential costs, benefits and other impacts of this regulatory action. The PEA is available in the docket for this rule and may be obtained by contacting Docket Management at the address or telephone number provided at the beginning of this document. You may also read the document via the Internet, by following the instructions in the section below entitled, "Viewing Docket Submissions." The PEA will be listed in the docket summary.

per vehicle (for two anchors). The total cost of the tether countermeasure is estimated to be $38.3 million. Another possible countermeasure could be to use rigid attachment components on child restraints that attach to the lower anchorage bars of a vehicle's child restraint anchorage system. This countermeasure is estimated to add $25.15 per child restraint, for a total cost of $100.6 million. NHTSA wants more information about the costs and benefits of this ANPRM before it will decide to issue a proposal that would be economically significant under E.O. 12866.

The agency requests comments on these and other possible countermeasures. The countermeasures have not been evaluated to determine their feasibility and benefit, although NHTSA will evaluate potential countermeasures in 2002, for rear-facing restraints. Information from that study will help us further evaluate the course of action the agency should pursue in this rulemaking.

IX. Submission of Comments

How Can I Influence NHTSA's Thinking on This Rulemaking?

In developing this ANPRM, we tried to address the concerns of all our stakeholders. Your comments will help us improve this rulemaking. We invite you to provide different views on options we discuss, new approaches we have not considered, new data, descriptions of how this ANPRM may affect you, or other relevant information. We welcome your views on all aspects of this ANPRM, but request comments on specific issues throughout this document. Your comments will be most effective if you follow the suggestions below:

—Explain your views and reasoning as clearly as possible.
—Provide solid technical and cost data to support your views.
—If you estimate potential costs, explain how you arrived at the estimate.
—Tell us which parts of the ANPRM you support, as well as those with which you disagree.
—Provide specific examples to illustrate your concerns.
—Offer specific alternatives.
—Refer your comments to specific sections of the ANPRM, such as the units or page numbers of the preamble, or the regulatory sections.
—Be sure to include the name, date, and docket number with your comments.

How Do I Prepare and Submit Comments?

Your comments must be written and in English. To ensure that your comments are correctly filed in the Docket, please include the docket number of this document in your comments.

Your comments must not be more than 15 pages long (49 CFR 553.21). We established this limit to encourage you to write your primary comments in a concise fashion. However, you may attach necessary additional documents to your comments. There is no limit on the length of the attachments.

Please submit two copies of your comments, including the attachments, to Docket Management at the address given above under **ADDRESSES**.

Comments may also be submitted to the docket electronically by logging onto the Dockets Management System Web site at *http://dms.dot.gov.* Click on ''Help & Information'' or ''Help/Info'' to obtain instructions for filing the document electronically.

How Can I Be Sure That My Comments Were Received?

If you wish Docket Management to notify you upon its receipt of your comments, enclose a self-addressed, stamped postcard in the envelope containing your comments. Upon receiving your comments, Docket Management will return the postcard by mail.

How Do I Submit Confidential Business Information?

If you wish to submit any information under a claim of confidentiality, you should submit three copies of your complete submission, including the information you claim to be confidential business information, to the Chief Counsel, NHTSA, at the address given above under **FOR FURTHER INFORMATION CONTACT**. In addition, you should submit two copies, from which you have deleted the claimed confidential business information, to Docket Management at the address given above under **ADDRESSES**. When you send a comment containing information claimed to be confidential business information, you should include a cover letter setting forth the information specified in our confidential business information regulation. (49 CFR part 512.)

Will the Agency Consider Late Comments?

We will consider all comments that Docket Management receives before the close of business on the comment closing date indicated above under **DATES**. To the extent possible, we will also consider comments that Docket Management receives after that date. If Docket Management receives a comment too late for us to consider it in developing an NPRM (assuming that one is issued), we will consider that comment as an informal suggestion for future rulemaking action.

How Can I Read the Comments Submitted by Other People?

You may read the comments received by Docket Management at the address given above under **ADDRESSES**. The hours of the Docket are indicated above in the same location.

You may also see the comments on the Internet. To read the comments on the Internet, take the following steps:

(1) Go to the Docket Management System (DMS) Web page of the Department of Transportation (*http://dms.dot.gov/*).

(2) On that page, click on ''search.''

(3) On the next page (*http://dms.dot.gov/search/*), type in the four-digit docket number shown at the beginning of this document. Example: If the docket number were ''NHTSA–2001–1234,'' you would type ''1234.'' After typing the docket number, click on ''search.''

(4) On the next page, which contains docket summary information for the docket you selected, click on the desired comments. You may download the comments. However, since the comments are imaged documents, instead of word processing documents, the downloaded comments are not word searchable.

Please note that even after the comment closing date, we will continue to file relevant information in the Docket as it becomes available. Further, some people may submit late comments. Accordingly, we recommend that you periodically check the Docket for new material. Upon receiving the comments, the docket supervisor will return the postcard by mail.

Authority: 49 U.S.C. 322, 30111, 30115, 30117, 30166 and Pub. L. 106–414, 114 Stat. 1800; delegation of authority at 49 CFR 1.50.

Issued on April 24, 2002.

Stephen R. Kratzke,

Associate Administrator for Safety Performance Standards.

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