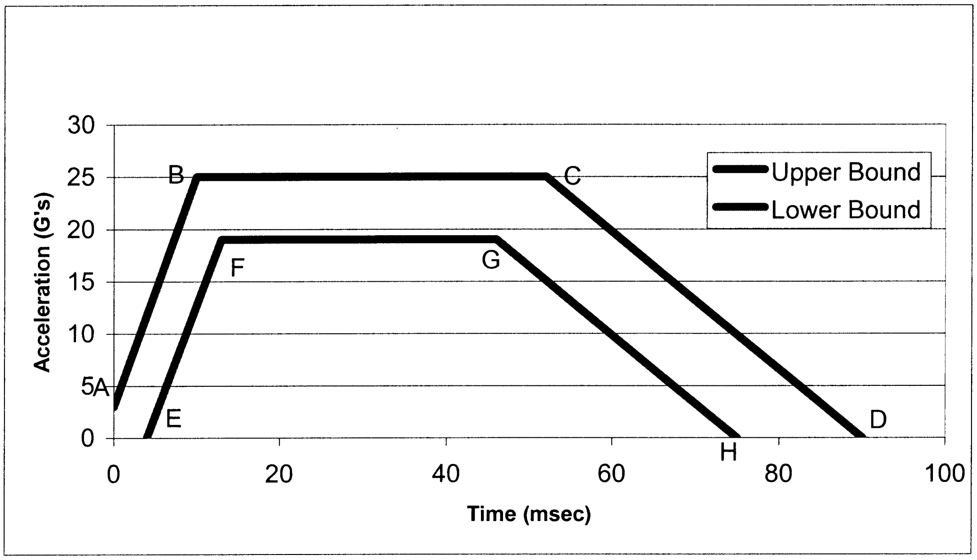
manufacturer provided under S5.6.1 or S5.6.2.

* * * * *



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 Compression	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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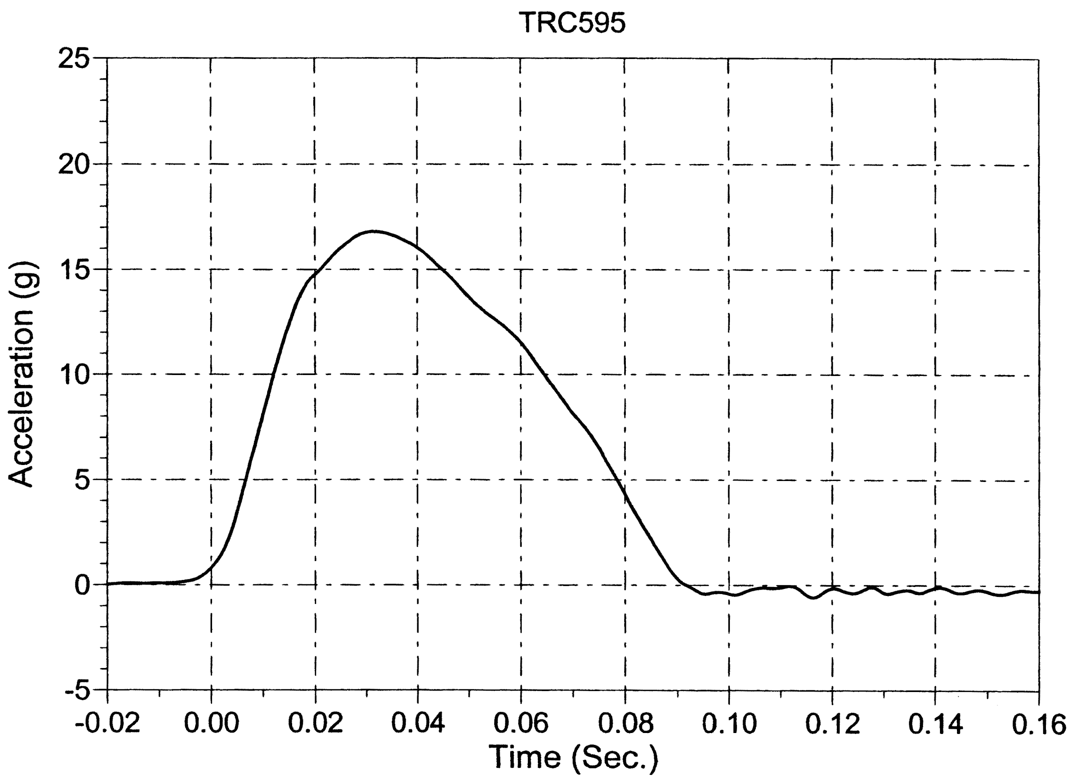
We are considering a test that would limit head excursion such that no portion of the head of the dummy could pass through a vertical plane that is parallel to the longitudinal plane of the test seat assembly, and measured relative to the centerline of the child restraint anchorage (LATCH) bar that is 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'')?

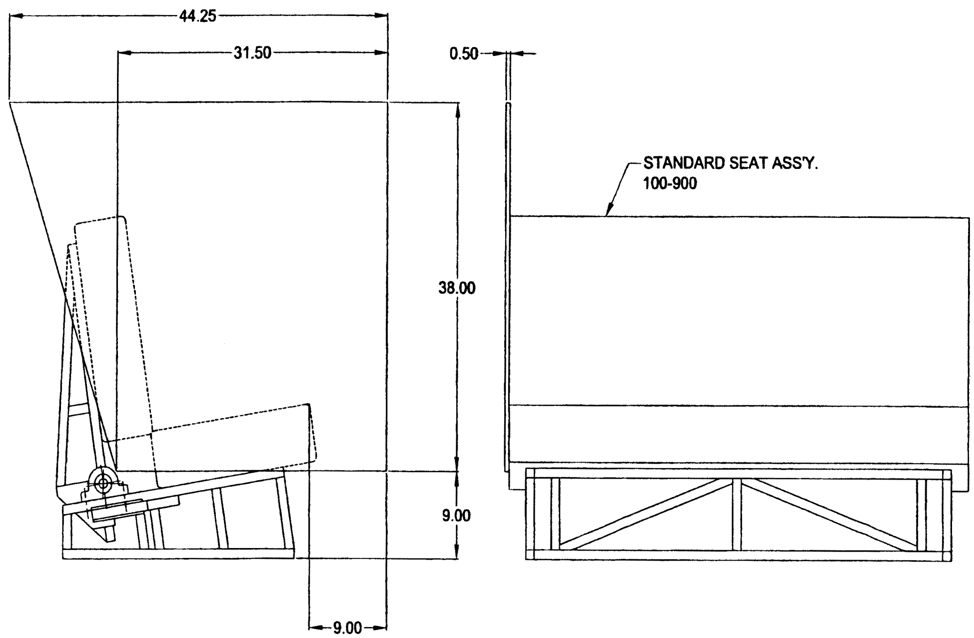
The second test under consideration also involves a simulated lateral impact on a sled, but the test would be conducted at 15 mph. NHTSA settled on a 15 mph test because head excursion sufficient to cause contact with the vehicle interior was found to occur at this speed. We also chose a 15 mph test 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.

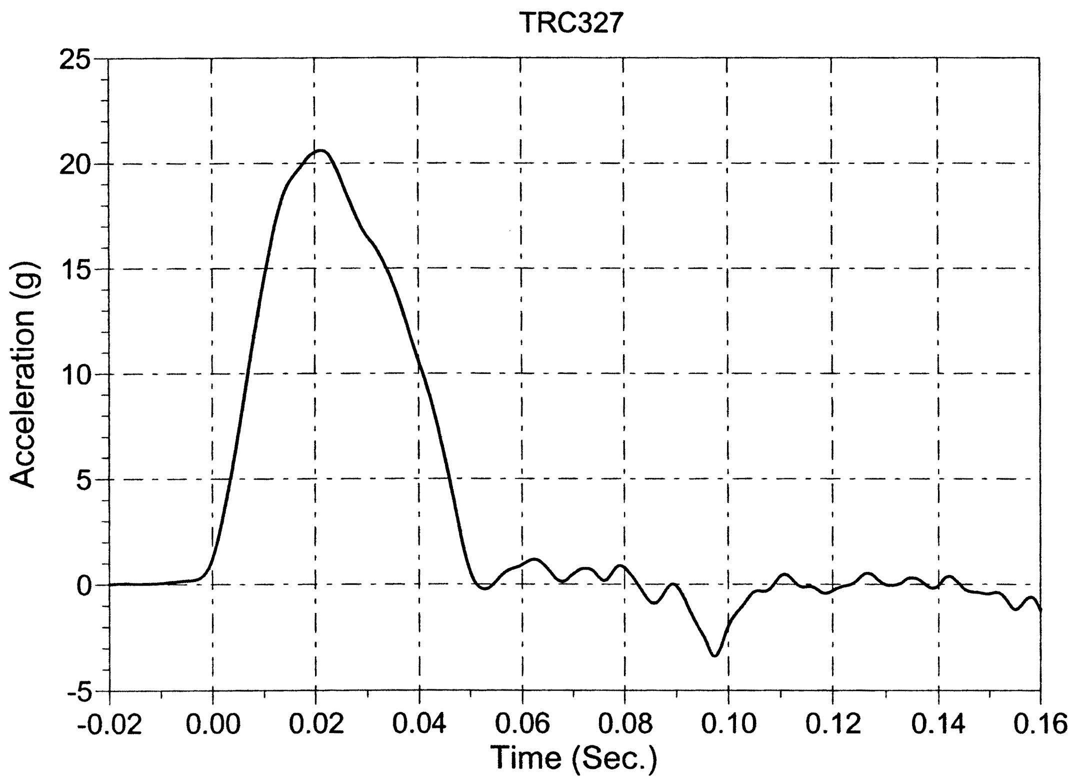
Figure 2: Seat Assembly with Wall (Dimensions in Inches)



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

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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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