DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 121

[Docket No. FAA–2002–13464–2; Amendment No. 121–315]

RIN 2120–AC84

Improved Seats in Air Carrier Transport Category Airplanes

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: This final rule amends the FAA's regulations on the crashworthiness of passenger and flight attendant seats on transport category airplanes used in part 121 passenger-carrying operations. This final rule requires those transport category airplanes type-certificated after January 1, 1958 which have not yet been manufactured that are used in part 121 passenger-carrying operations to have passenger and flight attendant seats that meet the current improved crashworthiness standards. This action is necessary because research, accident data, and analysis show that these improvements provide increased occupant protection in airplanes involved in impact-survivable accidents.

DATES: This amendment becomes effective October 27, 2005. Transport category airplanes manufactured on and after October 27, 2009 used in part 121 passenger carrying operations must comply with this final rule.

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Authority for This Rulemaking

This rulemaking is promulgated under the authority described in Title 49, Subtitle VII, Part A, Subpart III, Section 44701, General requirements, and Section 44705, Air carrier operating certificates. Under section 44701(b), the FAA may prescribe minimum safety standards for an air carrier to which the agency issues a certificate under section 44705. Under section 44705, the FAA issues an operating certificate to a person desiring to operate as an air carrier if the FAA finds, after investigation, that the person properly and adequately is equipped and able to operate safely under Part A and the regulations and standards prescribed under it.

This regulation is within the scope of section 44701 because it establishes new minimum safety standards that the seats in transport category airplanes that are used in part 121 passenger-carrying operations must meet to protect occupants of that airplane if it is involved in an impact-survivable accident. The regulation also is within the scope of section 44705 since the section requires that the person to whom the FAA issues an air carrier operating certificate be properly and adequately equipped to operate safely. The improved seats mandated by this regulation will increase the safety of air carrier operations.

SUPPLEMENTARY INFORMATION:

Availability of Rulemaking Documents

You can get an electronic copy of this final rule using the Internet by:

(1) Searching the Department of Transportation's electronic Docket Management System (DMS) Web page (*http://dms.dot.gov/search*);

(2) Visiting the Office of Rulemaking's Web page at *http://www.faa.gov/regulations_policies/*; or

(3) Accessing the Government Printing Office's Web page at *http://www.access.gpo.gov/su_docs/aces/aces140.html.*

You can also get a copy by filing a request with the Federal Aviation Administration, Office of Rulemaking, ARM–1, 800 Independence Avenue, SW., Washington, DC 20591, or by calling (202) 267–9680. To facilitate a prompt response, please make sure to identify the amendment number, notice number or docket number of this rulemaking in your request.

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Background

A. History

1. Pre-SNPRM

This final rule is in response to Section 303(b) of the Airport and Airway Safety and Capacity Expansion Act of 1987 (Pub. L. 100–223) (the Act of 1987) and follows a notice of proposed rulemaking published in 1988 and a supplemental notice of proposed rulemaking published in 2002 (SNPRM). The Act of 1987 directed the Secretary of Transportation to:

> ''* * * initiate a rulemaking proceeding to consider requiring all seats onboard all air carrier aircraft to meet improved crashworthiness standards based upon the best available testing standards for crashworthiness.''

In 1988 the FAA concurrently published a final rule, ''Improved Seat Safety Standards'' (53 FR 17640, May 17, 1988)(Amendment 25–64) and a notice of proposed rulemaking, ''Retrofit of Improved Seats In Air Carrier Transport Category Airplanes'' (53 FR 17650, May 17, 1988) (Notice 88–8). Amendment 25–64 upgraded the certification standards for occupant protection during emergency landing conditions in transport category airplanes from only a 9g static standard to an upgraded 9g static standard and a new 16g dynamic standard. Notice 88–8 proposed to prohibit, after June 16, 1995, the operation of transport category airplanes under parts 121 and 135 that were type-certificated after January 1, 1958 unless all seats onboard met the certification requirements of § 25.785 in effect on June 16, 1988. These certification requirements include the 16g standard created by Amendment 25–64.

The FAA received 70 comments to Notice 88–8. Based on these comments, we decided that we needed more information to determine the impact of Notice 88–8 on the aviation community. Even though much research and development on the dynamic testing of seats had been done to support the 16g standard, the process of certifying seats to the 16g standard was still new. The dynamic testing requirements for 16g seats represented an increase in sophistication and complexity over the simpler static testing used for 9g seats. Industry needed time to work out the technical problems of meeting the 16g seat standard, and we needed time to evaluate specific problems presented by industry and to develop proper guidance material for obtaining 16g seat certification.

As these issues were addressed by industry and the FAA, our standards

and guidance material evolved. This helped the aircraft seat manufacturing industry transition from producing 9g seats to 16g seats that could meet the new requirements. During this time, we never lost sight of the goal of improving the crashworthiness of seats in transport category airplanes. The significant actions taken during this time included:

• On March 6, 1990, we published an advisory circular (AC) to provide industry guidance on the dynamic test process. This was AC 25.562–1, ''Dynamic Evaluation of Seat Restraint Systems & Occupant Protection on Transport Airplanes.'' AC 25.562–1A superseded AC 25.562–1 on January 19, 1996.

• We worked with industry through the Society of Automotive Engineers SEAT Committee to develop a standard that would detail the requirements for dynamic testing of a 16g seat. That standard (Aerospace Standard (AS) 8049, Performance Standard for Seats in Civil Rotorcraft, Transport Aircraft and General Aviation Aircraft) was incorporated in Technical Standard Order (TSO)–C127 (Rotorcraft, Transport Airplane, and Normal and Utility Airplane Seating Systems) in 1992 and revised in 1998 (TSO–C127a).

• We held a public meeting on October 23 and 24, 1995, in Seattle, Washington, to gather information on challenges the industry had in meeting our 16g dynamic seat certification requirements for new programs and for existing airplanes that would be affected by the proposed rulemaking. We presented our views and listened to comments from the aviation industry at that meeting. The information gained during this public meeting led us to reconsider the original rule proposed in Notice 88–8.

From the mid-to-late 1990s, although industry and the FAA continued to address significant 16g seat issues primarily related to occupant protection, enough progress had been made that 16g seats were being produced and approved regularly. Therefore, we determined it was suitable to move forward with our proposed rulemaking to improve seats on transport category airplanes. As a result, we held a public meeting on December 8 and 9, 1998. The goals of this meeting were to discuss our proposed revisions to Notice 88–8 and to get current information and viewpoints. In addition to seeking comments at the public meeting, we reopened the docket for comments. We received approximately 40 additional comments by the close of this comment period.

The above is a summary of the events leading up to the publication of the SNPRM. For a more detailed discussion, please read the ''Background'' section of the SNPRM.

2. SNPRM

On October 4, 2002, the FAA published a supplemental notice of proposed rulemaking (SNPRM), ''Improved Seats in Air Carrier Transport Category Airplanes'' (67 FR 62294, October 4, 2002). The SNPRM proposed the following:

• For all airplanes manufactured on or after four years after the effective date of the final rule, all passenger and flight attendant seats on the airplane must meet the requirements of § 25.562 in effect on June 16, 1988 (proposed § 121.311(j)(1));

• For all airplanes manufactured before four years after the effective date of the final rule, all passenger and flight attendant seats on the airplane must meet the requirements of § 25.562 in effect on June 16, 1988, after any passenger seat or any flight attendant seat in that airplane is replaced (proposed § 121.311(j)(2)); and

• On or after fourteen years after the effective date of the final rule, no person could operate a transport category airplane type-certificated after January 1, 1958, in passenger-carrying operations under this part unless all passenger and all flight attendant seats on the airplane meet the requirements of § 25.562 in effect on June 16, 1988 (proposed § 121.311(k)).

In preparing the SNPRM, the FAA hired a consultant to conduct an analysis of the benefits of 16g seats over 9g seats in transport category airplanes. This consultant, R.G.W. Cherry & Associates Limited (Cherry), performed this analysis and produced a report entitled ''A Benefit Analysis for Aircraft 16g Dynamic Seats'' (Report DOT/FAA/AR–00/13/April 2000)(the Cherry Report).

The Cherry Report studied those transport category airplane accidents that occurred from 1984 to 1998 and predicted the benefits to the occupants if 16g seats had been installed in those airplanes. It predicted:

• A range in the reduction of serious injuries to occupants in impact-survivable accidents if they were in 16g seats instead of 9g seats; and

• A range in the reduction of fatalities to occupants in impact-survivable accidents if they were in 16g seats instead of 9g seats.

Since publication of the SNPRM, Cherry completed an addendum report entitled ''A Benefit Analysis for Aircraft 16-g Dynamic Seats Configured Without Enhancements to Head Injury Criteria'' (DOT/FAA/AR–04/27, March 2003)(the Cherry Report Addendum). The Cherry Report Addendum assessed the incremental benefits resulting from the enhanced Head Injury Criteria.

B. Seat Classifications—9g/16g/16g ''Compatible''

Currently, there are several classifications of seats in transport category airplanes used in part 121 operations. They are as follows:

1.9g Seats

a. What is a 9g seat?

A 9g seat is tested to different load factors in different directions. The highest load factor is in the forward direction at 9g's. This is why these seats are commonly referred to as 9g seats. The testing procedure is typically accomplished by applying a force to the seat through the safety belt by means of a cable and winch system. The minimum force that the seat must be capable of reacting in the forward direction without structural failure is 9 times the combined weight of the seat and a 170 pound occupant in each seat place. As an example, if a seat had three places and the seat weighs 100 pounds, then the seat must be capable of reacting 5490 pounds ((170 pounds per occupant times 3 seat places plus 100 pounds of seat weight) times 9).

b. Regulations and the TSO for 9g Seats

In 1952, the regulations for transport category airplane seats were revised to increase the emergency landing condition forward load factor from 6g's to 9g's. Five years later, the FAA issued TSO–C39 (''Aircraft Seats and Berths'') that included guidance on static testing to 9g's for seats that would be used in transport category airplanes. It is important to note that obtaining TSO C39 approval for a seat does not mean that the seat is approved for installation in an airplane. A separate approval, known as an installation approval, is necessary to show the seat's compliance with all the applicable regulations of the FAA. However, because TSO C39 was closely aligned with the other applicable regulations then in effect, installation approval was easy to attain if the seat had TSO C39 approval. This was generally the process for getting a 9g seat approved for use in an airplane until 1988.

2.16g Seats

a. What is a 16g seat?

For transport category airplanes, a 16g seat is one that meets the 9g requirements of § 25.561 and the

dynamic requirements of § 25.562. A 16g seat is tested in a manner that simulates the loads that could be expected in an impact-survivable accident. Two separate dynamic tests are conducted to simulate two different accident scenarios: one in which the forces are predominantly in the vertical downward direction and one in which the forces are predominantly in the longitudinal forward direction. The highest load factor is in the forward direction at 16 g's. This is why these seats are commonly referred to as 16g seats. The test procedure requires ''crash testing'' the seat (*i.e.*, rapidly decelerating the seat in accordance with the criteria in § 25.562(b)). For the 16g test, this means deceleration must go from a minimum of 44ft/sec to 0 ft/sec in not more than 0.09 seconds with a peak deceleration of at least 16g's. The seats are tested with seat floor tracks that are representative of those that will be used in the airplane installation.

The seats are also tested with test dummies in each seat position. The reaction of the test dummies during the dynamic test imparts loads into the seat restraints and seat structure more accurately than the cable and winch system used in the 9g seat static pull test. The test dummies are instrumented to measure data like forces and accelerations that are then used for evaluating occupant protection criteria. As an example, accelerometers in the heads of the test dummies measure accelerations that are used in calculating the Head Injury Criteria (HIC). Limitations on an acceptable level of HIC serve to protect the occupant from serious head injury where head contact with seats or other structure can occur. 16g seats also:

- Protect the occupant from debilitating leg and spine injuries;
- Improve the attachment to the airframe;
- Protect crewmembers from serious chest injury when upper torso restraints are used; and
- Ensure occupants do not become trapped in their seats due to excessive seat deformation.

b. Regulations and the TSO for 16g Seats

In 1988, the emergency landing conditions were revised to include dynamic landing conditions to improve occupant protection. Four years later, TSO–C127 (''Rotorcraft, Transport Airplane, Normal and Utility Airplane Seating Systems'') was issued and included guidance on dynamic testing of 16 g's for seats that would be used in transport category airplanes. As previously stated, TSO seat approval is not installation approval. Although TSO C127 is the basis for getting most 16g seats approved for use in transport category airplanes, installation approval is not as easy as it is for a 9g seat.

The 16g seat installation approval process is more complicated than the 9g seat installation approval process because the dynamic standard includes several occupant protection criteria not required for the 9g seat. These occupant protection criteria can only be completely evaluated when the seat is considered in relationship to how and where it is installed in the airplane. For example, the dynamic test will cause a test dummy's upper torso and head to swing forward in an arcing motion since the test dummy is constrained only at the pelvis by the safety belt. A record of the motion of the test dummy's head through the arc, called a headpath trace, can be recorded during the testing for the TSO approval. The headpath trace is used during the installation approval process to ensure there is enough clearance from objects, like bulkheads or equipment mounted to partitions, to reduce the possibility of a head strike. Because airplane interior arrangements differ by airplane model—and even from operator to operator for the same airplane model—the headpath trace must be evaluated for each unique installation. This illustrates one reason why installation approval cannot rely solely on the TSO approval.

3. 16g ''Compatible'' Seats

Transport category airplanes designed between 1952 and 1988 were required to have seats that met the 9g emergency landing conditions in § 25.561. These standards were met by the static testing described above in the section entitled ''Regulations and TSO for 9g seats.'' Typically, the seats approved in those airplanes were also approved to TSO–C39. When Amendment 25–64 went into effect in 1988, any transport category airplane design submitted for approval was required to have seats that met both the 9g static standard in § 25.561 and the 16g dynamic standard in § 25.562.

However, Amendment 25–64 applied only to new airplane designs like the Boeing B–777. Airframe manufacturers occasionally redesign an existing airplane design to meet marketing demands rather than develop a new design from scratch. These redesigned airplanes are referred to as derivative models, since they are based largely on a previously approved airplane design. An example of this is the Boeing B–737NG models (737–600, –700, –800, –900), which are based on the previously approved B–737 airplane design. The basis for a derivative model design approval is the regulations in place at the time of the original design approval. However, for a variety of reasons, the derivative model design will be approved to regulations more current than those in existence when the original design was approved, but not quite to the level of the regulations current at the time of application for a derivative model design approval.

There are numerous derivative transport category airplane models approved after 1988 whose original design was approved before 1988. These airplane models' seats do not meet all the requirements of § 25.562 (16g seats), but meet more than the requirements of § 25.561 (9g seats). The dynamic standard in § 25.562 includes criteria to evaluate the seat's structural integrity and occupant protection during dynamic testing. Most of the derivative models meet the seat structural integrity requirements in § 25.562 but none or only a few of the occupant protection requirements in § 25.562. Seats that have been approved to meet the 9g requirements in § 25.561 and the seat structural integrity requirements in § 25.562 are commonly called 16g ''compatible'' seats.

Discussion of Comments

A. Request for Extension

Based on requests for an extension of the comment period from the Aerospace Industries Association, Airbus, the Aviation Technical and Safety Committee Cabin Safety Working Group, The Boeing Company, the General Aviation Manufacturers Association and the Regional Airline Association, the FAA extended the SNPRM's comment period from December 3, 2002 to March 3, 2003.

B. General Summary

In addition to the requests for extension, the FAA received forty-six comment submissions in response to the SNPRM. Two of these comment submissions are duplicates and one is an attachment from another comment, from which it had been separated. In addition, two individual commenters address issues about passengers with disabilities and are directed at other rulemaking initiatives. We will not address these two comment submissions in this discussion of comments.

Of the remaining forty-one comment submissions, twelve commenters either express support for the proposed rule or their support can be implied from their comments. Another ten commenters generally support the proposed rule, but suggest changes. These twenty-two commenters are mostly individuals and

companies that provide aircraft interior components. Among the reasons given for their support:

- The results of the cost-benefit analysis are reasonable and the amortized cost of seat upgrades will be offset by increased ticket prices;
- Any safety increase justifies any rise in ticket prices;
- Economies of scale will make safety improvements economical;
- The deaths and injuries being avoided far outweigh the issue of cost to conform to the proposed rule; and
- The safety of passengers and their ability to survive an impact-survivable accident is very important.

Six of these commenters also favor shorter implementation periods than those proposed in the SNPRM.

Fourteen commenters oppose the proposed rule. These commenters are mostly air carriers and airframe manufacturers. These commenters base their opposition on a belief that:

- The cost-benefit analysis is flawed because it fails to adequately address issues like how the costs would impact an industry struggling in a post-9/11 travel economy or whether the industry's limited resources would be better spent on other safety initiatives that would result in bigger dividends;
- The proposed rule is contrary to the Safer Skies and Commercial Aviation Safety Team (CAST) initiatives; and/or
- No convincing accident data exists to support the need for 16g seats and, therefore, a convincing safety benefit case cannot be made for requiring 16g seats.

The remaining five commenters recommend one or more of the following actions in addition, or as alternatives, to the proposed rule:

- Requiring the use of rearward facing seats;
- Making child restraint improvements and setting up regulatory changes that would mandate securing all children in safety seats;
- Requiring the use of three-point harness restraints or shoulder harnesses;
- Requiring the use of air bags;
- Requiring the use of a standardized seat belt latching mechanism or, without such standardization, telling passengers of any variations among seat belt latching mechanisms;
- Improving seat belt security, using fewer seats or changing seating configuration; and
- Focusing the FAA's attention on flight crew safety and health issues.

Some of those commenters expressing support or opposition for the proposed rule also recommend some of the above actions as possible alternatives.

C. Acronyms

In this Discussion of Comments section, we use the following acronyms or abbreviated company names to identify the associated commenters:

- Air Transport Association (ATA)
- AMSAFE Aviation (AMSAFE)
- Association of Asia Pacific Airlines (AAPA)
- Association of European Airlines (AEA)
- Association of Flight Attendants (AFA)
- Association of Professional Flight Attendants (APFA)
- Aviation Technical and Safety Committee Cabin Safety Working Group (ATASCO)
- B/E Aerospace, Inc. (B/E)
- The Boeing Company (Boeing)
- The International Brotherhood of Teamsters (IBT)
- National Air Disaster Alliance/ Foundation (NADA/F)
- RECARO Aircraft Seating (RECARO)
- Regional Airline Association (RAA)
- Sicma Aero Seat Services (Sicma)

D. Removal of Retrofit Requirements

As stated in the regulatory evaluation supporting the SNPRM, the FAA believed there were two viable options to improve seats in transport category airplanes operating under part 121 at that time:

- Requiring full 16g seats in newly manufactured airplanes only (Option 2 in the SNPRM's regulatory evaluation); and
- Requiring full 16g seats in newly manufactured airplanes and replacement with full 16g seats for all other in-service airplanes (Option 5 in the SNPRM's regulatory evaluation).

While Option 2 was projected to have a benefit-to-cost ratio greater than 1.0 at that time, it also averted fewer fatalities and serious injuries than Option 5. Therefore, we decided to move forward with Option 5.

Based on the comments received to the SNPRM, we decided to re-evaluate the retrofit requirements of proposed §§ 121.311(j)(2) and 121.311(k). After detailed consideration, we now believe the final rule should not contain these retrofit requirements and that we should proceed with the requirement for newly manufactured airplanes only.

There are several reasons why the FAA's current analysis of Options 2 and 5 has resulted in a different conclusion from that in the SNPRM. All of these reasons are the result of the dramatic changes in the airline industry since the publication of the SNPRM.

1. Accelerated Retirement of Pre-1992 Manufactured Airplanes

Initially, the terrorist events of September 11, 2001 significantly impacted the airline industry because many people were less likely to fly. Rather than flying airplanes with empty seats, many airlines choose to ''park'' or ''retire'' their older airplanes. While the impact of the terrorist attacks on passenger boardings has passed, the industry remains in poor shape financially for reasons including, but not limited to, high fuel prices and increased competition from low-cost carriers. Therefore, those older airplanes that are inefficient to operate remain ''retired.''

Since 9/11, part 121 operators have ''retired'' over 1,360 airplanes. This represents 23.6% of the pre-9/11 part 121-fleet. The majority of these airplanes were manufactured before 1992 (for example, B–727, B–737–100/200/300, B–747–100/200, DC–9, F–100, DC–10, L–1011, MD–80) and were certified for 9g seats. Due to the high operating costs associated with these airplanes, it is unlikely that many of these ''retired'' airplanes will find their way back into the part-121 fleet.

The retirement of these pre-1992 manufactured airplanes has occurred at a rate far faster than that projected in the SNPRM's regulatory evaluation. In that regulatory evaluation, those seats installed on airplanes manufactured prior to 1992 fell into one of two categories: Group I or Group II seats.[1] In 1999, the seats in Groups I and II totaled 477,991 and comprised approximately 66% of the total seats in the part 121-fleet. For 2004, the projected seat total barely changed (477,707) and comprised approximately 54% of the part 121-fleet. The decrease from a projected 66% to a projected 54% was based on more airplanes with 16g seats entering the part 121-fleet. For the last forecast year in the SNPRM's regulatory evaluation (2020), these seats were projected to still make-up approximately 20% of all seats in the part 121-fleet. Therefore, with such a significant percentage of potential 9g seats projected to be in the part 121-fleet over the course of the forecast period (1999–2020), the need

[1] Group I covered those seats in airplanes manufactured before 1992 having seats installed before 1992. While 16g seats were being installed before this date, the majority of these seats are 9g. Group II covered those seats in airplanes manufactured before 1992 having replacement seats installed after 1991. Some (unknown) proportion of seats in this group may have partial 16g performance although no airplane model in this group is 16g certificated.

for the retrofit requirement was more apparent.

However, the accelerated retirement of so many pre-1992 manufactured airplanes alters this conclusion. These airplane retirements mean approximately 155,000 Group I and Group II seats were removed from the part-121 fleet. By comparison, for the last forecast year of the SNPRM's regulatory evaluation (2020), only 109,020 Group I and Group II seats were projected to have been removed from the part-121 fleet. The removal of these 155,000 seats also has a dramatic affect on the percentages discussed before. The percentage of Group I and Group II seats in the 2004 part-121 fleet drops from a projected 54% to an actual 36%. These seats are now at a level previously projected to occur in 2011.

Based on this accelerated retirement of pre-1992 manufactured airplanes, the FAA believes the level of occupant protection has increased dramatically over the past few years in the part-121 fleet. The FAA also believes the accelerated retirement of pre-1992 manufactured airplanes will continue to occur as airlines strive to increase the efficiency of their operations.

2. Increased Appeal and Use of Regional Jets

One factor that assisted in the accelerated retirement of pre-1992 manufactured airplanes is the continued appeal of regional jets and the new ways airlines are using these airplanes. As pointed out in the comment from RAA, within the last 10 years, the U.S. regional fleet has rapidly transitioned from a mostly turboprop fleet to a majority regional jet fleet. As of October, 2004, almost 1,600 regional jets were in operations with part 121 carriers, with over 600 more on firm order and options and conditional orders for over 1,700 more.[2]

Most of these regional jets are newer designs that must meet the requirements of Amendment 25–64. According to RAA, in 2004, about 77% of the entire regional fleet was capable of meeting at least the structural requirements of Amendment 25–64.

The effects of 9/11 on the airline industry have increased the appeal of the regional jet. Whereas, in the past, the regional jet was primarily used to replace turboprops or open new markets, several airlines are now using it as a tool to replace inefficient larger jets on certain routes. In addition, JetBlue and USAirways have placed large orders for regional jets that will be used in their own operations.

Based on developments such as these, the FAA expects that regional jets will play an even larger role in the part 121-fleet than considered for the SNPRM. As a result, this will further increase the percentage of 16g seats in the part 121-fleet.

3. Effect of Certification Costs

Based on the dramatic changes in the part-121 fleet over the past 3 years, which are expected to continue for the foreseeable future, the FAA believes the resource expenditure associated with retrofitting seats on existing airplanes would no longer be cost beneficial.

As stated before, the installation approval process for a 16g seat is more complicated than the installation approval process for a 9g seat because the dynamic standard includes occupant protection criteria not required for the 9g seat. The occupant criteria can only be completely evaluated when the seat is considered in relationship to how and where it is installed in the airplane's cabin. A seat's installation in relationship to other seats and other objects in the airplane affects the number of dynamic tests that must be successfully completed. If all seats were uniformly installed at the same distance from one row to the next in every airplane, only a few forward tests would be required: perhaps one to show structural adequacy and one or two to demonstrate occupant protection. However, this is not the case. Cabin configurations vary from airplane to airplane and also from operator to operator. Some operators even have different configurations within the same airplane model in their fleets.

Therefore, different tests are required to determine the effect of such things as seatback video monitors, bulkheads, partitions, seat pitch and seat angle (seats installed in tail sections where the fuselage tapers are frequently installed at an angle relative to the other rows). These examples represent some of the installation issues that result in numerous forward dynamic testing for a single airplane configuration. The testing and resultant seat approval can be used for other airplanes of the same model that have identical configurations. However, even if another operator uses the same seating configurations, if it uses seats from a different seat manufacturer or a different seat model from the same manufacturer, a new series of tests will be required.

Because approval to § 25.562 is largely dependent on the airplane's interior, considerable effort is expended by the seat manufacturer and the airframe manufacturer to ensure the seat design will work with the airplane design prior to any seat testing. If failure to meet § 25.562 becomes evident during testing, there are several options available to resolve the non-compliance: the seat can be redesigned, the seat can be reconfigured within the airplane, or the airplane can be redesigned. Usually redesigning the airplane is the last option chosen due to expense and time needed to integrate the change. But, if required, the design change can be accomplished at less expense in airplanes manufactured in the future than in existing airplanes. Upgrading existing airplanes to meet § 25.562 may require modification and substantiation of a range of seat pitches, changes to bulkheads to which flight attendant seats are mounted, increasing seat setbacks from bulkheads, partitions, and emergency exits, and removal of seats in some circumstances. All of these concerns can be handled more effectively when time is allowed for proper planning of the redesign and integration in airplanes manufactured in the future. Resolving the same non-compliances in existing airplanes require more costly modifications to the interiors and is more likely to result in the loss of revenue-generating seats.

4. Conclusion

Based on the above, the FAA decided to mandate improved seats for only those airplanes type-certificated after January 1, 1958 which have not yet been manufactured. While this requirement may require airframe manufacturers to make design modifications, we believe that the four-year compliance period provides sufficient time for them to develop efficient solutions.

The FAA still believes that this final rule is necessary to improve occupant protection in impact-survivable accidents. We believe that these types of accidents can still occur and this rule focuses on protecting occupants when these accidents do occur. Although we recognize that most of the seats in the current part-121 passenger carrying fleet are capable of meeting the dynamic testing structural criteria, we want to ensure that all occupant protection criteria '' including HIC '' are met. In addition, the airplanes covered by this final rule include several models that have hundreds of outstanding orders. These airplanes will remain in the part-121 passenger carrying fleet the longest and should, therefore, offer the best level of occupant protection available for seat certification. Finally, as we discuss below in more detail, this final rule is also cost-beneficial, with a benefits-to-costs ratio of 2.27 to 1 (or,

[2] Figures from the Regional Air Service Initiative (*http://www.regionalairservice.org*).

2.15 to 1 and 1.98 to 1 when underlying estimates are in present value at 3% and 7%. respectively).

We acknowledge that, for some yet-to-be manufactured airplanes, the requirement of this final rule will have no practical effect as 16g seats are already mandated as a result of the airplane's certification basis. Specifically, the requirements of Amendment 25–64 are applicable to those airplanes for which an application for a type certificate was made on or after June 16, 1988. Therefore, no action should be necessary to bring those airplanes into compliance with this final rule assuming that they comply fully with § 25.562. In general, this final rule will require compliance action for those new production airplane models that were type-certificated after January 1, 1958 and before June 16, 1988 and derivatives of such models for which an application for an amended type-certificate was made after January 1, 1958.

We do not believe that the removal of the retrofit requirement will cause an increase in the use of 9g seats. There is no incentive for seat manufacturers and operators to reverse the current trend away from 9g seats. Both domestic and foreign seat manufacturers have changed the way they manufacture seats in order to meet the requirements for 16g ''compatible'' and 16g seats. It currently does not make financial sense for them to run a separate 9g seat manufacturing line to meet a declining need. While some seats are sold with a 9g label, it is our belief that these seats are the same seats that are sold as 16g ''compatible.'' We see no reason why this situation would change. However, we will continue to monitor this issue. If we see an increase in the use of 9g seats, we will consider taking action to stop this development.

E. Discussion of Non-Retrofit Comments

Since the retrofit requirements have been removed from this final rule, the comments that address only those provisions (*i.e.*, proposed §§ 121.311(j)(2) and 121.311(k)) are no longer relevant to this rulemaking action and will not be addressed in detail in this final rule. We discuss the other comments received about the SNPRM in the following order:

- General comments about the cost-benefit analysis;
- Comments about the cost side of the cost-benefit analysis;
- Comments about the benefit side of the cost-benefit analysis;
- General comments about flight attendant seats;
- Comments about the cost-benefit analysis for flight attendant seats;
- General technical comments; and
- Other comments.

In the following discussion of comments, we use the term ''newly manufactured airplanes.'' This means those transport category airplanes type certificated after January 1, 1958 and manufactured on or after October 27, 2009, that are used in part 121 passenger-carrying operations.

Cost-Benefit Analysis—General

Proposed Rule Will Result in Increased Ticket Prices

A commenter states that the proposed rule would result in increased ticket prices. The commenter believes these higher prices would then force some of the traveling public to drive instead of fly, thereby increasing their risk of injury or death. This commenter suggests that we perform further analysis on this issue.

FAA Response: The FAA has greatly reduced the scope of this rulemaking from that proposed in the SNPRM. This change produces a reduction in predicted costs from $519 million to $34.7 million (or, $22.3 million and $13.3 million in present value at 3% and 7%, respectively).

Based on historical evidence and the vastly lower predicted costs of this rulemaking, we do not expect that this final rule will result in an increase in ticket prices.

Cost-Benefit Ratio Does Not Justify the Change

A commenter believes the cost-benefit ratio does not justify the proposed rule.

FAA Response: For the base case scenario presented in the regulatory evaluation supporting this final rule (*i.e.*, using accident rates for the 1984–1998 period), the total costs of this rulemaking, over the analysis period, are $34.7 million (or, $22.3 million and $13.3 million in present value at 3% and 7%, respectively). The total benefits of installing fully compliant 16g seats are $78.9 million (or, $47.9 million and $26.4 million in present value at 3% and 7%, respectively). Therefore, this rulemaking is cost-beneficial, with a benefit-to-cost ratio of 2.27 to 1 (or, 2.15 to 1 and 1.98 to 1 when underlying estimates are in present value at 3% and 7%, respectively).

While the final rule in its entirety is cost-beneficial, the FAA notes that, separately, the requirements for passenger seats and flight attendant seats are each cost-beneficial. For passenger seats, the benefits of installing fully compliant 16g seats are approximately $76.3 million (or, $46.4 million and $25.5 million in present value at 3% and 7%, respectively), as compared to the costs of $33.7 million (or, $21.5 million and $12.8 million in present value at 3% and 7%, respectively).

For flight attendant seats, the benefits of installing fully compliant 16g seats are $2.5 million (or, $1.5 million and $850,000 million in present value at 3% and 7%, respectively), as compared to the costs of approximately $954,000 ($731,000 and $529,000 in present value at 3% and 7%, respectively).

A copy of this regulatory evaluation is in the docket for this final rule. You can get a copy of this analysis by using any of the methods listed above in the ''Availability of Rulemaking Documents'' section of this final rule.

Analysis Fails to Accurately Account for Impact on Small Businesses

RAA states that the FAA fails to accurately account for the proposal's impact on small business operators.

FAA Response: The FAA performed a regulatory flexibility analysis for both the proposed rule and this final rule. Both assessments showed no significant impact on small businesses. A detailed discussion of this determination is located later in this document in the section entitled ''Regulatory Flexibility Analysis'' and in the regulatory evaluation supporting this final rule.

Analysis Fails to Consider Differences Between Regional Transport Category Airplanes and Very Large Transport Category Aircraft

RAA believes the cost-benefit analysis does not consider the differences between regional transport category airplanes and very large transport category airplanes. RAA argues that the benefit methodology assumes there will be 100 occupants per accident, while the average number of seats on regional transport category airplanes is well below 50 occupants.

FAA Response: The Cherry Report does not assume there will be 100 occupants per accident. The methodology in the Cherry Report used 100 occupants as an example to explain the concept of ''survivability chains.'' Of the 25 accidents that provided enough information for analysis, the number of passenger and flight attendant seats ranged from 38 to about 350.

Analysis Fails to Account for Fewer Flight Attendants in Regional Transport Category Airplanes

RAA states that regional transport category airplanes typically have only one flight attendant, not two. According

to RAA, this difference further skews the cost-benefit analysis.

FAA Response: Based on the FAA's flight attendant requirements as specified in § 121.391, the SNPRM's regulatory evaluation assumed one flight attendant per 50 passengers regardless of the aircraft size. Therefore, the cost and benefit calculations were normalized between regional transport category airplanes and larger transport category airplanes. This assumption remains in the regulatory evaluation supporting this final rule. We believe this assumption is conservative as air carriers often provide more flight attendants than the number required by regulation.

Rulemaking Does Not Provide the Most Safety Value for the Economic Investment

Boeing states the proposed rule does not provide the most safety value for the economic investment. Boeing states that since the aircraft manufacturing and airline industries have been reeling from some of the worst economic conditions in their histories, it is now more important than ever to invest in the safety initiatives that provide the best return. Therefore, Boeing believes we should reexamine the cost-benefit analysis.

FAA Response: As discussed above, based, in part, on comments received, the FAA reconsidered the proposed rule and removed requirements from the final rule to upgrade seats in existing airplanes. However, it still requires improved seats in newly manufactured airplanes. As a result, the costs of this final rule are substantially less than those of the proposed rule (from $519 million to $34.7 million). As noted above, this rulemaking is now cost beneficial with a benefits to costs ratio of 2.27 to 1.

Cost-Benefit Analysis—Costs

Costs Too Low

ATA believes the FAA's cost-benefit analysis is faulty because we:

(1) Failed to consider the high costs of upgrading monument walls to support flight attendant seats;

(2) Failed to consider the high costs associated with removing seats to meet the front-row head injury criteria (HIC); and

(3) Failed to consider the cost of demonstrating compliance with the more complex requirements than were discussed in previous 16g seat retrofit comment periods (1998, 1988).

ATASCO agrees that the FAA's cost forecast is ''too low'' and ''far from the realistic cost.'' ATASCO would like the FAA to perform the cost-benefit analysis again based on the comments received.

FAA Response: As for the issue of removing seats to comply with front-row HIC, the FAA notes that reasonable solutions and alternatives, like air-bag technology, exist and/or can be developed to prevent the need for removing a row of seats. Since this final rule does not require compliance for four years from its effective date, we believe that this compliance date provides industry with enough time to carry out cost-effective solutions.

As for ATA's concerns about compliance costs, we have included estimates of compliance costs in our cost-benefit analysis for this final rule.

Finally, our analysis includes estimates of the costs associated with strengthening monument walls to support 16g flight attendant seats. We based our estimates on data provided by an airframe manufacturer.

Analysis Fails to Consider Increase in Certification Costs

Boeing asserts that the FAA's cost analysis does not consider the added complexity of the new certification requirements. Boeing maintains that certification to the dynamic requirements of § 25.562 is more complex and time consuming than certification to the static testing requirements. This added complexity takes more time and resources for the airframe manufacturer, as well as the seat suppliers and the airlines. Boeing believes this ''complexity-factor'' is overlooked by our cost analysis.

ATA agrees with Boeing.

FAA Response: The FAA agrees that dynamic testing is more complex and time consuming than static testing. In addition, we acknowledge that we did not include this ''complexity-factor'' in the SNPRM's regulatory evaluation.

However, to ensure the accuracy of our estimates of the certification costs in the regulatory evaluation supporting this final rule, we obtained updated cost information from Boeing on this subject and have included it in our analysis. Since our estimates are now in-line with Boeing's cost information, we believe that the regulatory evaluation supporting the final rule does consider the complexity of certification to the dynamic requirements of § 25.562.

Cost-Benefit Analysis—Benefits

Analysis Fails to Consider Declining Accident Rate

Boeing believes the cost-benefit analysis fails to account for declining accident rates over the past decade. Boeing claims the accident statistics used by the FAA to support the proposed rule ignore impressive improvements made in aviation safety. Based on these improvements, Boeing maintains that the benefits analysis does not consider a declining future accident rate that is consistent with the Safer Skies goals. Boeing believes the FAA should revise the regulatory analysis to match FAA published safety goals.

RAA agrees with Boeing, stating that the Commercial Aviation Safety Team (CAST) projects an 80% reduction in accidents by 2007 through implementing a terrain awareness and warning system (TAWS) retrofit, implementing constant descent approach and other safety enhancement procedures. RAA states that the FAA's cost-benefit analysis should account for these safety improvements when forecasting the accident rate for the next 20 years.

ATA and AAPA agree with RAA and Boeing.

FAA Response: In the regulatory evaluation supporting this final rule, the FAA has performed sensitivity tests of our accident rate using multiple time periods. In each case, the predicted benefits exceed the predicted costs of this final rule.

Considerable progress has been made under CAST and Safer Skies to reduce the accident rate. However, we believe that impact-survivable accidents can still occur and this rule focuses on protecting occupants when these accidents do occur.

Analysis Fails to Consider Impact of September 11

Boeing comments that the FAA enplanement estimates do not account for the slowing world economy and the effects of the September 11, 2001 terrorist attacks. Boeing recommends that the FAA update the benefit analysis to reflect future estimated enplanements using 2001 or, preferably, 2002 data.

ATA agrees, stating that forecasts for future enplanements have decreased and this should impact the cost-benefit analysis.

FAA Response: The FAA acknowledges that we based the proposed rule's regulatory evaluation on pre-9/11 information. At that time, the long-term effects of 9/11 on enplanements were difficult to predict.

However, for the regulatory evaluation supporting this final rule, we based our enplanement estimates on the data in ''FAA Aerospace Forecasts for Fiscal Years 2003–2014'' (FAA–APO–03–1, March 2003). This forecast accounts for recent world events, including the events of September 11, 2001.

Analysis Fails to Consider U.S. Fleet Changes

Boeing states the benefit analysis does not account for changes in fleet capacity and fleet age resulting from recent world events. Boeing argues that the current part 121-fleet has changed dramatically since the terrorist attacks of September 11, 2001. Boeing states that many airlines are retiring their oldest aircraft because of system overcapacity and most of these retired aircraft have 9g seats. Boeing recommends that the FAA revise the benefit analysis to reflect this change.

FAA Response: Since, in the final rule, the FAA is no longer requiring existing seats to be retrofitted, changes in fleet capacity resulting from recent world events have only a negligible effect on the cost-benefit analysis. However, as we stated above, part 121-fleet changes since 9/11 are a factor in our decision to remove the retrofit provisions from the final rule. In particular, the retirement of old airplanes and the addition of new airplanes since 9/11 result in a younger fleet with more airplanes that are fully or partially compliant with § 25.562. We believe that newly manufactured seats used for replacement seats in existing airplanes—even when labeled as 9g seats—have, in general, the capability of meeting the 16g structural requirements. Based on this, when operators replace 9g seats with newly manufactured seats, the level of occupant protection improves. These factors support our decision for not going forward with rulemaking that affects the existing fleet.

''Double Counting'' of Benefits

Boeing believes the FAA gave credit to seat improvements for lives already saved by other safety initiatives. Boeing states that a subset of accident scenarios used to justify 16g seats includes accidents involving controlled flight into terrain (CFIT), wind shear, takeoff with improper flap/slat setting, and approach and landing accidents. Boeing believes we are ''double counting'' benefits already realized through other safety actions. Therefore, Boeing believes we should remove such accidents from the Cherry Report and recalculate the benefits.

FAA Response: Even though the accident rate has declined, impact-survivable (as well as non-survivable) accidents will still occur. For these impact-survivable accidents, installation of 16g seats in new airplanes will reduce the number of fatalities and serious injuries.

Further, the FAA reassessed the accidents used in the Cherry Report to determine if any of the accidents studied would not have happened today based on any regulatory change since their occurrence. We found that none of these regulatory changes would have directly affected the outcome of the accidents in the Cherry Report. Of further note, 10 of the 25 accidents studied yielded no reduction of fatalities or serious injuries due to using improved seats. This attests to the non-bias of the assessment.

Safety Analysis Inadequate

ATA states that the FAA's safety analysis is inadequate.

FAA Response: The FAA has continued to assess the merits of 16g seats since this rule was first proposed in 1988. During that time, we examined many options available to improve seats in transport category airplanes.

Based on this review, we believe there is a clear need to improve safety for passengers and flight attendants in the event of an impact-survivable accident. The Cherry Report demonstrates this need. Based on the predicted benefits of 16g seats over 9g seats in the Cherry Report and in the regulatory evaluation supporting this final rule, this final rule should achieve that goal.

Accidents Studied not Appropriate for this Analysis and No Proof 16g Seats Would Have Reduced Fatalities and Serious Injuries in Accidents Studied

Boeing states the benefit analysis was not well correlated with the types of accidents where 16g seats would have been an influence in saving lives. For example, Boeing claims the Cherry Report cited accidents where survival was a matter of chance. Boeing argues that such accidents are atypical of those used to justify part 25 standards. According to Boeing, it is inappropriate to use such accidents to justify the need for equipment that was not specifically designed to be effective in these severe events. Boeing believes that the FAA should not use these accidents in the benefit analysis.

In addition, Boeing believes the assessment of whether the use of 16g seats would have actually reduced the number of fatalities and serious injuries is ''inadequate.'' Boeing believes the Cherry Report's assessment approach is nothing more than ''guesswork.''

FAA Response: The FAA believes that the accidents studied were appropriate. The Cherry Report looked at only those impact-survivable accidents that had sufficient textural data from NTSB accident reports to make a determination whether a 16g seat would have made a difference in occupant survivability. The resulting 25 accidents were then studied to determine the difference in fatalities and serious injuries to occupants had 16g seats been in place. The assessment of these accidents was then used to make a more general assessment on similar impact-survivable accidents that lacked adequate textural information in the accident reports to make an individual finding.

The FAA also disagrees with Boeing's negative assertion about the Cherry Report's assessment approach. The Cherry Report used a logical three-stage assessment approach that eliminated any ''guesswork.'' First, as stated above, the Cherry Report determined which accidents were valid to study to evaluate the effect of 16g seats. The Cherry Report then looked at each space within the accident aircraft that exhibited a similar threat to the occupants. This prevented making gross assumptions about the effect of 16g seats on occupant survivability for the entire aircraft based on the worst-case area of the aircraft for each accident. Finally, for each space that posed a similar threat to the occupants, the Cherry Report then examined that space on a seat-by-seat basis to determine the effect a 16g seat would have made had it been in place. The FAA believes this assessment approach is the best analysis to date to predict the benefits of 16g seats. Nonetheless, as we stated before, we reevaluated the Cherry Report to see if any of the accidents studied would not have happened today based on any regulatory change since their occurrence. We found that none of these regulatory changes would have directly affected the outcome of the accidents in the Cherry Report. Therefore, we believe that these accidents remain valid candidates for evaluating the effect of 16g seats and provide sufficient proof of the benefits of such seats.

While survival for each occupant in an accident may be a matter of chance to some extent, the Cherry Report's analysis determined that the use of 16g seats would have increased those chances of survival for occupants in those accidents evaluated.

Analysis Overstates Benefits of Streamlined Seat Certification Process

ATA states the cost-benefit analysis is inaccurate and overstates the benefits of the FAA-Industry Seat Certification Streamlining activities. More importantly, ATA points out that this streamlining process does not yet exist. ATA believes we should not include efficiencies from streamlining the seat certification process in the cost-benefit analysis until they have been demonstrated.

AAPA agrees, claiming that our analysis takes credit for undemonstrated certification streamlining.

Boeing concurs, stating that the efforts to improve the seat certification process over the past several years have not materially improved the cost or flow time to certify seats. Therefore, Boeing argues that before the FAA can take the benefit from these activities, there must be demonstrated results.

FAA Response: The regulatory evaluation supporting the SNPRM did not quantify any benefits from the effects of the Seat Certification Streamlining efforts. The regulatory evaluation only stated that potential unclaimed benefits exist due to the efforts made by both industry and the FAA under the Seat Certification Streamlining program. This is the same approach used in the regulatory evaluation supporting this final rule.

To try to reduce certification costs and simplify the seat certification process, we will continue to work with industry under the Seat Certification Streamlining program. In the past, this cooperation has resulted in the FAA implementing many of industry's recommendations to improve the seat certification process and reduce costs.

Analysis Overestimates Performance of 16g Seats

Boeing states the benefits analysis vastly overestimates the expectation of 16g seat performance in past accident scenarios. Boeing believes we should recalculate the benefits to reflect this more accurately.

FAA Response: The performance expectation of 16g seats is based on long-standing FAA/industry-coordinated research. The genesis of the 16g seat standard came from recognition that many deaths or serious injuries in general aviation airplanes could be avoided if the crashworthiness of the airplane was improved. Additional research showed this also applied to transport category airplanes. Please refer to the ''Background'' section above for more information on the development of the 16g standard. The FAA viewed the new dynamic seat standards as a necessity and major improvement over existing static seat standards. While it is difficult to precisely quantify the improvements of seats that meet the dynamic standard over seats that meet only the static standard, we believe the estimates used to develop the regulatory evaluation are reasonable, justified and the best available data. No commenter provided data or expert opinion to dispute our assessment of 16g seat performance during the comment period.

Use of High Benefit Estimates in Error

Boeing is concerned that, in the FAA's benefit analysis, we used the Cherry Report's ''high'' benefit estimate of the decrease in fatalities and serious injuries because of the possible unmeasured benefits of ''better than 9g seats.'' Boeing believes that, of the accidents analyzed, it is likely that many of the accidents did not involve aircraft with ''better than 9g seats.'' According to Boeing, only five of the accidents studied definitely involved aircraft with ''better than 9g seats.'' Therefore, any unmeasured benefit of ''better than 9g'' seats should be specific to those 5 accidents.

ATA states that by using the ''high'' benefit estimate from the Cherry Report, we inaccurately stated the true costs/benefits of the proposed rule. ATA believes the use of the Cherry Report's ''high'' benefit estimate is not reasonable because of the number of 16g compatible seats in the fleet.

FAA Response: Based on our review of the comments received and a re-examination of the Cherry Report, the FAA agrees that the ''median'' benefit estimate from the Cherry Report represents a better estimate based on the available data. For the regulatory evaluation supporting this final rule, we have reassessed the benefits using the Cherry Report's ''median'' benefits estimate of the decrease in fatalities and serious injuries.

Flight Attendant Seats—General

Inclusion in Rule—General—Support

Goodrich Aircraft Interior Products strongly supports the inclusion of the 16g standard for flight attendant seats in the proposed rule. This support is based on the potential for additional passenger lives being saved by flight attendants who would not be injured due to their being seated in 16g seats during an accident.

IBT concurs, stating that the FAA has recognized the critical role of cabin crews in evacuating airplanes in survivable accidents.

An individual commenter also supports the inclusion of flight attendant seats in the proposed rule, stating there is little value in increasing passenger survivability without providing an equal increase for flight attendants.

A second individual commenter agrees, stating that cabin crews should be afforded the best crash protection against incapacitating injuries that could prevent them from performing their role during emergency evacuations.

FAA Response: The FAA agrees and is requiring flight attendant seats and passenger seats in newly manufactured airplanes to meet all the requirements of § 25.562. In this manner, the requirements for passenger and flight attendant seats are the same.

Inclusion in Rule—General—Opposition

An individual commenter states that the link between flight attendants and passengers being safely evacuated seems very tenuous at best and does not justify the high cost of the proposed rule.

A second individual commenter believes we have not fully developed the argument for flight attendant seat upgrades. This individual states that this issue should be the subject of an independent proposal. This individual also points out that variations in seat mounting add complexity and expense to the proposal and that we need to recognize this in our analysis.

AAPA also recommends that we exempt cabin attendant seats from this final rule.

FAA Response: The FAA believes sufficient information exists to support how important flight attendants are in passenger evacuation. However, we acknowledge the decision to upgrade flight attendant seats was not based on an independent study. Historically, NTSB reports have not consistently addressed the role of flight attendants in passenger evacuation in every accident. Under the best of circumstances, this information can be subjective and difficult to assess accurately. In the qualitative assessment of the benefits gained by including flight attendant seats in the proposal, we recognized the effect that trained personnel have on the successful evacuation of passengers who survive an accident's impact because of improved seats. We carefully analyzed the Cherry Report's findings and determined there were sufficient accident cases where the flight attendant would have survived with a 16g seat. We believe the flight attendants who would have survived an accident as a result of being restrained in a 16g seat would have helped these passengers to safety, thereby avoiding these fatalities. Our regulatory evaluation shows that the final rule is cost-beneficial for the inclusion of both passenger and flight attendant seats.

Inclusion in Rule—Need Testing Specific to Flight Attendant Seats

APFA strongly opposes including flight attendant seats in the rule. APFA believes testing specific to cabin attendant seats should be undertaken to adequately determine the safety of these seats before changes are mandated.

APFA claims that the assumption cannot be made that such seats will perform in a manner similar to passenger seats. Therefore, APFA concludes that flight attendant seats should meet the 16g standard, but stresses the differences between different seat types and configurations.

FAA Response: The dynamic standard of § 25.562 is suitable for all seats used in transport category airplanes and the FAA does not intend to delay this rule by undertaking a new study. Although accident reports have shown that flight attendant seats typically withstand a crash better than passenger seats in the same area and we recognize that passenger seats and flight attendant seats are mounted differently, we do not believe that those differences warrant any further performance analysis.

Inclusion in Rule—Costs Too High

ATASCO asserts that we should exclude flight attendant seats because of the high costs required to make flight attendant seats comply with § 25.562.

FAA Response: One reason the FAA decided to proceed with this rulemaking for newly manufactured airplanes only was the high cost of mandating the upgrade of flight attendant seats on existing airplanes.

However, for newly manufactured airplanes, we contend that the incremental costs of changing current designs to address seat mounting issues is justified by the benefits (*i.e.*, lives saved by flight attendants in impact-survivable accidents). In addition, we believe that manufacturers will be able to accomplish and implement these design changes prior to October 27, 2009.

Rule Should Apply to Newly Manufactured Aircraft Only

With 55% ($285.7 million) of the overall undiscounted upgrade costs related to flight attendant seats, Airbus questions the need for their replacement. Airbus believes the accident data does not support the assumption that cabin attendants would be ''less safe'' in 9g seats than passengers in 16g seats. Airbus also states that, to justify this cost, it is assumed that each cabin attendant who does not suffer fatal or serious injuries due to the introduction of 16g seats would then take actions to avert further passenger fatalities. Airbus believes this assumption is an uncertain estimate. Airbus recommends that we apply the 16g standard of § 25.562 only to new aircraft programs.

FAA Response: The high costs associated with replacing flight attendant seats in existing airplanes was part of the reasoning that led the FAA to revise the proposal so that this final rule applies to newly manufactured airplanes only.

However, we disagree with Airbus' comment about the role of flight attendants during emergency evacuations. As we stated above, we contend that a review of aircraft accidents indicates that the presence of flight attendants during an evacuation after an impact survivable accident improve passenger survivability. The Cherry Report specifically refers to cases where flight attendants assisted passengers to safety. Therefore, we contend it is reasonable to expect that surviving flight attendants trained in emergency procedures will save lives in an impact survivable accident.

Allow for TSO–C127 Compliant Flight Attendant Seat Installation

Boeing states that this final rule should allow for the installation of TSO–C127 compliant flight attendant seats because full compliance with § 25.562 requires upgrades to the monuments on which flight attendant seats are mounted. Boeing believes this violates the assumption in the SNPRM about minimizing the impact to the aircraft structure. Therefore, Boeing recommends that any implementation of flight attendant seat upgrades should exclude upgrade requirements for galleys, lavatories, partitions, or other items on which these seats are mounted.

FAA Response: The FAA is requiring one level of safety for seats throughout the cabin of newly manufactured airplanes. How a seat is secured to the airframe is crucial to ensuring that flight attendants are adequately protected. Therefore, the mounting structures for flight attendant seats that have been dynamically tested must be capable of supporting the seats consistent with current airworthiness requirements. Dynamically tested flight attendant seats have been successfully certified on numerous aircraft with many different mounting configurations. We contend that providing industry with a four-year period in which to comply with this rule provides enough time for industry to develop cost-effective solutions for any unique installation issues that 16g flight attendant seats may present.

Separate Rulemaking for Flight Attendant Seats

An individual commenter recommends placing the provisions affecting flight attendant seats in a separate rulemaking project. In this way, the complications and costs associated with covering flight attendant seats can be thoroughly examined.

FAA Response: The FAA believes we have conducted a thorough examination of the costs and other implications associated with applying the 16g standard to flight attendant seats. This analysis supports our decision to include flight attendant seats in the final rule. A separate rulemaking would result in a delay in providing the same crash protection for flight attendants as would be afforded passengers under this rule.

Flight Attendant Seats—Cost-Benefit Analysis

Analysis Fails to Consider Impact on Aircraft Structure and Monuments

Boeing states that the FAA's cost analysis fails to consider the impact of including flight attendant seats on the aircraft structure and monument design. Boeing believes we did not include the costs resulting from increased monument weight needed to support seats with higher loading capability in the cost analysis. In addition, Boeing states that because windscreens, partitions, and flight attendant seats are tested as a system, a change to the seats will require added testing and certification costs. Boeing argues that we do not account for these costs in our analysis.

ATA agrees with Boeing and believes that we also did not include the high costs to upgrade monument walls for flight attendant seats in the cost analysis.

Airbus states we did not consider the cost to modify the support structure for wall-mounted seats or to replace their components if the new dynamic test criterion is applied.

Finally, ATASCO states that compliance with § 25.562 will require potential cabin interior re-design and additional certification activities.

FAA Response: While the regulatory analysis supporting the SNPRM did not specifically break down the costs for testing and certification of improved flight attendant seats, these costs were included in that analysis and considered the use of monuments, partitions and wind screens, consistent with current policy. The regulatory analysis for this final rule also includes such costs. However, to ensure the accuracy of our estimates of the certification costs in the regulatory evaluation supporting this final rule, we obtained updated cost information from Boeing on this subject and have included it in our analysis. Our estimates are now in-line with Boeing's cost information.

As for any increased aircraft weight associated with improving flight

attendant seats, the FAA expects that any changes that might be required of monuments will not significantly increase airplane weight. However, we did include weight increases of 13 pounds per airplane for flight attendant dynamic seats and 36 pounds per airplane for passenger seats in our analysis. We recalculated costs based on this new data supplied by Boeing.

Finally, as for other impacts associated with improving flight attendant seats, the FAA has provided industry with adequate time to develop cost effective solutions to this rule.

Impact on Seating at Monument Locations

Boeing comments that our cost analysis did not examine the impact on seating arrangements at monument locations and the cost of new technologies to mitigate this impact.

ATASCO agrees, stating that compliance with § 25.562 will require the possible loss of an entire seat row due to configuration changes.

FAA Response: The FAA believes that new technologies, like inflatable restraints, provide low-cost solutions that will prevent the loss of a seat row and the associated revenue. In fact, we re-evaluated the issue, and, in the final rule's regulatory evaluation, estimated the acquisition/installation costs for seat-belt air bags necessary to meet the front row HIC requirement. The regulatory evaluation for this final rule estimates that about four percent of all seats will require such restraints. Use of these restraints is less costly than removing a row of seats to meet front row HIC requirements.

Technical Comments

Structural Requirements of § 25.562 Sufficient

AEA believes the structural requirements of § 25.562 provide a significant increase in safety. However, the extra requirements for occupant protection (*e.g.*, HIC) would require costly recertification programs and changes in seat layout. AEA argues that a safety case is missing for those extra requirements since the cost-benefit analysis does not specify the percentage of fatalities and injuries because of unfulfilled HIC and front-row rules.

FAA Response: The FAA believes it is necessary to propose a rule that ensures one level of safety for all occupants. HIC is an important aspect of occupant protection criteria. Therefore, we believe that a rule that requires compliance with only the structural requirements of § 25.562 is not meeting the intent or gaining the maximum benefit of Amendment 25–64.

We acknowledge that the cost to ensure HIC is met increases the cost of seat certification. However, we believe that this cost increase is justified by the benefits of HIC compliance.

Exclusion of 16g Seat Compliance From § 25.785

IBT objects to the exclusion of 16g seat compliance from § 25.785, as was originally outlined in the 1988 NPRM. IBT believes this omission weakens the rule.

AMSAFE agrees, remarking that proposing compliance with § 25.562 while excluding the requirements of § 25.785 weakens the proposed rule.

FAA Response: The FAA does not agree that the exclusion of the requirements of § 25.785 weakens this final rule. We believe the intent of this final rule is to improve seats in transport category airplanes based on dynamic testing. We also believe that § 25.562 accomplishes that goal without creating the extra burden of requiring compliance with the provisions of § 25.785.

AC 25.562–1A ''Exemption'' From Head Injury Protection Requirements

IBT raises concerns over what it terms as an exemption from the head injury protection requirements of § 25.562(c)(5) afforded by AC 25.562–1A. IBT states that this AC permits the extension of seat pitch away from a vertical hazard as a method of compliance with § 25.562. IBT believes that such an extension of seat pitch introduces a potential head injury hazard from the occupant of such a seat striking his own legs and/or the aircraft floor. IBT concludes that requiring a 16g seat without requiring HIC testing and adherence to HIC standards does not promote an acceptable safety level.

AMSAFE agrees, recommending removal of what it terms as the AC 25.562–1A ''loophole'' that allows an applicant to move or extend seat pitch away from a vertical hazard. By so moving or extending the seat, the occupant can strike his or her own legs or the floor of the airplane. The resulting HIC from this impact is not considered in this process. AMSAFE believes that removing the ''loophole'' will also reduce the potential for liability losses.

FAA Response: The FAA disagrees with the comments of IBT and AMSAFE. AC 25.562–1A provides acceptable methods for complying with § 25.562. This can include avoidance of the hazard by locating the seat such that the occupant's head cannot strike an object. Also, we do not believe the measurements obtained when a test dummy strikes itself are accurate for use in calculating HIC and predicting injury. Without an accurate means of measuring this phenomenon, we do not believe this situation should be evaluated as part of the criteria for determining compliance with § 25.562. We also do not believe that a head strike with the airplane floor occurs to an extent that it should be added to the § 25.562 criteria or evaluated under § 25.785. We believe this phenomenon is rare, if it does occur. Testing of this nature would require a representative floor structure be included in the dynamic test and this would dramatically increase the test's complexity.

Seat Track Failures

RECARO asks how we will handle situations in which a seat track fails, resulting in a failed 16g certification test.

FAA Response: Since seat track ''crowns'' are tested and approved under 16g dynamic standards, failures of the seat track crowns will be unacceptable. Traditionally, these types of failures require a redesign of the seat track fitting to lessen loads to the seat track crowns. This usually results in a change or replacement of the seat track fitting. Since the dynamic testing standard was developed in correlation with 9g static floors and seat tracks, the FAA does not expect this to be an issue in a 16g certification test.

Finally, we do not intend to provide new guidance on how seat tracks are evaluated under dynamic testing in this final rule.

Exemption for New Aircraft Configured With Either TSO–C127a Seats or Seats Partially Compliant With § 25.562

B/E recommends that FAA consider modifying the proposed rule to allow new aircraft configured with TSO–C127a seats or seats that are partially compliant with § 25.562 to be delivered as currently certified if the procurement time frame extends more than four years past the effective date of this final rule. B/E believes that it should be a goal not to interrupt existing aircraft procurement programs or add to the certification and logistical costs for upgrades. Therefore, B/E believes an airplane, such as a B737NG, should continue to be deliverable up to and beyond the effective date of the final rule, as long as seat part numbers and aircraft configuration remain unchanged. Beyond the four-year time frame, B/E recommends that 9g seats be upgraded to partial 16g compliance, similar to the seats on the B737NG.

FAA Response: The FAA disagrees with B/E's recommendation. We believe that seats in newly manufactured airplanes should meet all the requirements of § 25.562 by the compliance date. The four-year time frame after the effective date of this rule should allow industry enough time to set up cost-effective measures for meeting the rule and to adjust their procurement programs accordingly.

Nominally Compliant 16g Seats

B/E recommends that nominally compliant 16g seats keep the compliance baseline of their original certification.

FAA Response: The FAA believes that seats in newly manufactured airplanes should meet all the requirements of § 25.562 by the compliance date. This rule does not affect existing airplanes that already have ''nominally compliant 16g'' or partially compliant 16g seats since it applies only to newly manufactured airplanes. However, airplanes with those same certification bases that have not yet been manufactured must comply with all the requirements of § 25.562 by the compliance date.

''Full-up'' Amendment 25–64 Configurations

B/E recommends that for ''full-up'' Amendment 25–64 configurations, any new seat or cabin configuration be certified to the same requirements.

FAA Response: The FAA agrees that airplanes with Amendment 25–64 in their certification basis must be ''full-up'' (*i.e.*, meet all the requirements of § 25.562). We also contend that newly manufactured airplanes, regardless of their certification basis, should meet all the requirements of § 25.562 by October 27, 2009.

Pre-Amendment 25–64 Aircraft

Airbus states that requiring 16g seats on pre-Amendment 25–64 aircraft would force many changes in the surrounding cabin, as well as the supporting structure. Airbus states that, for aircraft not having § 25.562 in their certification basis, there is no easy ''take out'' and ''fit in a new part'' solution, as their cabin interiors are not designed to address the new requirement. Airbus recommends that FAA provide guidance on how installation criteria have to be considered for pre-Amendment 25–64 aircraft programs.

FAA Response: The FAA acknowledges that requiring 16g seats on pre-Amendment 25–64 airplanes will require airframe manufacturers to make changes to these airplanes. However, this rule provides enough time for airframe manufacturers to determine the best way to comply with this final rule, whether it be through the use of new seating arrangements, seat and/or cabin interior design modifications and/or new, cost-effective technologies (both for the seats and the cabin interior).

Certification Costs

Boeing states that seat certification streamlining activities have not materially improved the cost or time needed to certify seats. Boeing believes the use of a single seat track for dynamic testing would help.

FAA Response: The FAA received information from industry in June of 2003 that set forth practices that would result in considerable savings in both costs and time associated with certifying seats. This information was developed partly as a result of activities initiated under the seat certification streamlining efforts. However, in both the regulatory evaluation supporting the SNPRM and the regulatory evaluation supporting this final rule, we made no use of anticipated or realized reductions in cost from the results of the seat certification streamlining efforts.

As to Boeing's comment about the use of a single seat track for dynamic testing, this proposal can be addressed under the policy review process in Part 1 of the Seat Certification Streamlining Effort or discussed with the Transport Airplane Directorate outside the Streamlining Effort.

Compliant Installation Not Possible for Certain Seats

Airbus believes there might be cases where a compliant installation is not possible for a given seat. For example, swivel cabin attendant seats arranged in cabin zones restricted in space might not be certifiable to the new standard. This scenario would require Airbus to install fixed cabin attendant seats under the rule.

ATASCO agrees, stating that cabin interior re-design may decrease the number of passenger seats.

FAA Response: While the FAA acknowledges that some seats may present more difficulties than others to comply with this final rule, we believe that only one standard should apply to all seats in the passenger cabin. We also believe this rule provides enough time for airframe manufacturers to address this concern by using new seat arrangements, design modifications, and cost-effective new technologies, both for seats and the cabin interior.

Average/Standard Track Crown

Boeing states that we should define an average track crown. Boeing believes that this is consistent with other conventions used in the dynamic testing and certification of seats.

In addition, Boeing recommends that FAA allow a specific seat track crown section to be used as a ''standard track'' for all certification testing and compliance findings. Boeing states that this would reduce the number of required tests for certifying seats, while still allowing the seat to be fully substantiated for the dynamic loads.

ATA concurs, stating that, for streamlining seat approval, the FAA should allow the use of a new industry-standard seat track in the dynamic testing of seats in conjunction with TSO–C127 or § 25.562. The specific configuration of this standard track could be defined by a joint industry-FAA initiative.

FAA Response: The FAA disagrees that this rule should address the issue of allowing for the use of a generic track crown. The current dynamic standard requires that the seat remain attached to the floor throughout dynamic testing. This requires that a seat track representative of the one installed on the airplane be used for dynamic testing. As such a proposal would require a change to § 25.562, it is outside the scope of this rulemaking action.

We would welcome adoption by industry of a standardized seat track that meets all of the requirements for dynamic testing. Industry proposals of this nature can be submitted to the FAA and evaluated under the policy review process in Part 1 of the Seat Certification Streamlining Effort or discussed with the Transport Airplane Directorate outside the Streamlining Effort.

Full-Scale Dynamic Tests Preferable to Component Tests

AFA states that a migration from full-scale dynamic testing to component tests should be resisted, as it will likely lead to a proposal to eliminate the former. AFA's comments praise the virtue of full-scale dynamic tests, as they evaluate how the seat, restraint, occupant, and the near-vicinity aircraft interior interact.

FAA Response: The FAA does not see component testing as a substitute for full-scale dynamic testing for first time approvals. We have said that component testing can be accepted only for design changes to seats that have been previously approved using the full-scale dynamic tests required by § 25.562. We believe that component testing can be utilized effectively to integrate design changes that may improve safety but that would otherwise not be integrated

if full-scale testing were required for every change. We share AFA's concern about the fidelity of component testing and the extent that it could be used in the future for seat approvals. There are no current policies that allow component testing without confirmation of the original design using full-scale dynamic testing.

Track Failure During Testing

Sicma recommends that seats tested to a ''16g compatible'' standard be accepted and not subject to more testing. Sicma states that dynamic testing has already been accomplished, and it has never had a track failure on a 14g down test.

FAA Response: The FAA does not agree with Sicma's recommendation. We note that track failures are most likely to occur during the 16g longitudinal test and that track failures during a 14g down test are extremely rare. Also, we believe that, for newly manufactured airplanes, full compliance to § 25.562 is readily achievable due to the current knowledge and capabilities in dynamic seat design and certification. The four-year period before compliance with the rule is required provides enough time to develop feasible solutions to meeting all the occupant protection criteria of § 25.562.

Flawed Testing

An individual commenter states that flaws exist in the tests used to gather supporting data for the HIC portion of § 25.562. Based on these flaws, the HIC test can be proven to have no technical merit and could lead to designs with lower levels of safety. This individual recommends we remove the criterion from future regulations involving aircraft seating.

FAA Response: The commenter did not offer any specifics as to why he believes flaws exist in the tests. The FAA issued Amendment 25–64 based on the recommendations of GASP. These recommendations have been the foundation for technical standards developed by industry and guidance developed by us with public participation. We continue to review these standards and policies with industry groups and make appropriate changes, when necessary. So far, these standards and policies have served the aviation community well. We welcome any valid data to support the commenter's concerns.

TSO–C127

ATA and Boeing recommend that new seats installed on new production aircraft should meet TSO–C127, ensuring dynamic seat testing. They would like to see this requirement become effective four years from the rule's effective date. ATA and Boeing believe that installation limitations relative to seat dynamic testing should be consistent with the airplane's type certificate. For example, airplanes that have partial § 25.562 compliance as part of their certificate basis would continue to contain TSO–C127 compliant seats, while fully compliant airplanes would continue to contain fully compliant 16g seats.

FAA Response: For newly manufactured airplanes, the FAA believes that flight attendant and passenger seats should comply with all the requirements of § 25.562. Allowing installation limitations consistent with the airplane's original type certificate would undermine the intent of the rule and would result in only limited or no compliance with § 25.562. We seek to establish the highest level of safety for passenger and flight attendant seats that is currently practicable throughout the part 121-fleet. The commenters' proposal would do little more than allow partially compliant 16g seats to be accepted in newly manufactured airplanes and would not significantly alter the current configuration of seats in the existing fleet.

Ability of Tracks To Withstand Loads Imposed by 16g Seats

ATASCO questions the ability of existing seat tracks to withstand the loads imposed by 16g seats. The group goes on to recommend that FAA examine the strength of seat tracks in airplane models other than the B–777.

FAA Response: When the performance requirements currently in § 25.562 were developed, the strength of tracks then on airplanes was evaluated. Using analysis and testing, we determined that track strengths were satisfactory when coupled with a seat designed to meet the dynamic criteria. Based on this previous analysis and testing, we do not consider any further testing to be required.

General Comments

No Accident Data To Support Need for 16g Seats

Based on recent safety improvements, RAA believes it is reasonable to project that there will be no more than 2 or 3 impact-survivable accidents within the next 20 years. Since RAA also projects that 80% of the seats will be 16g compliant in the next three years without a rule mandate, RAA believes that the impact-survivable accident rate in regional airplanes without 16g compliant seats will be less than one accident in the next 20 years. Therefore, RAA believes that the proposed rule will not make any difference in reducing the fatalities or serious injuries that may occur in the regional fleet.

FAA Response: The FAA believes the Cherry Report accurately determines the fatalities and serious injuries that could have been averted had 16g seats been installed in those airplanes studied. Despite recent improvements made in accident prevention, we strongly believe that the potential for impact-survivable accidents still exists. The use of 16g seats will improve passenger survivability in such accidents in the future irrespective of the type of aircraft in which these seats are installed.

As for regional carriers who operate smaller transport category airplanes, these airplanes have less energy absorbing structure below the floor than larger transport category airplanes. Therefore, we believe that these carriers might benefit even more from the installation of seats that meet the dynamic testing requirements than their counterparts that operate larger transport category airplanes.

Lack of a Convincing Safety Argument

AEA believes that some aspects of the proposed rule have not been fully thought through since they are missing a convincing safety case and impact assessment. AEA also believes that the FAA does not give credit for investments in improved seats already made by airlines.

FAA Response: The FAA did consider and give credit for airplanes that used seats that complied with parts of § 25.562 or were simply later production seats believed to perform better than traditional early model 9g seats. The study, ''Improved Seats in Transport Category Airplanes: Analysis of Options,'' prepared by the FAA's Office of System Safety (ASY)(November 2000) grouped the current fleet into 5 categories. These categories included aircraft with seats ranging from early 9g seats to fully compliant 16g seats.

The 2003 Cherry Report Addendum updated their data and concludes that fully compliant 16g seats could have averted 45 fatalities and 40 serious injuries over the analysis period. HIC improvement accounts for 39% of the averted fatalities and 46% of the averted serious injuries.

Suggested Alternatives

Several commenters recommend the following in addition or as an alternative to the proposed rule to increase survivability in impact-survivable accidents:

(1) Using rearward facing seats (five commenters);

(2) Making child restraint improvements and regulatory changes that would mandate securing all children in safety seats (six commenters);

(3) Using three-point harness restraints (one commenters) or shoulder harnesses (one commenter);

(4) Using air bags (one commenter);

(5) Improving seat belt security, using fewer seats or changing seating configuration (one commenter); and

(6) Using standardized seat belt latching mechanisms or, without such standardization, telling passengers about any variations (one commenter).

Finally, one commenter states that the FAA should focus our attention on flight crew safety and health issues rather than on improving seats.

FAA Response: While the FAA accepts that some of these alternatives may improve accident survivability, these commenters do not offer any persuasive evidence why we should abandon the approach contained in the SNPRM to adopt a suggested alternative. We have performed extensive research on the subject of improving survivability in impact-survivable accidents and have explored many options. We believe the approach taken in this final rule is the most effective and efficient way to improve survivability in impact-survivable accidents.

As for the comment about flight crew safety and health issues, we believe our attention should be on both improving seats and flight crew safety and health issues. We have several offices that deal with flight crew safety and health issues and these offices are continuously analyzing ways to further improve these areas. However, improving seats in transport category aircraft is also an important issue. Our focus on this issue does not detract in any way from our continuing commitment to address flight crew safety and health issues.

Rule Not Consistent With Safer Skies Partnership or Commercial Aviation Safety Team (CAST) Objectives

Boeing and ATA believe the proposed rule is not consistent with the Safer Skies partnership or Commercial Aviation Safety Team (CAST) objectives, which are intended to direct safety investment where it has the most leverage.

FAA Response: The FAA started the 16g seat initiative in response to a directive from Congress before the existence of CAST. We believe that we need to complete the 16g seat initiative since the safety concerns that led to its initial development are still valid.

We also recognize that considerable progress has been made under CAST to reduce the accident rate. In fact, we used a lower accident rate in predicting the benefits of this final rule in addition to the rate used for the SNPRM. CAST goals are to dramatically reduce accidents through accident prevention. However, we recognize that impact-survivable accidents can still occur, and this rule focuses on protecting occupants when these accidents do occur.

Rule Will Not Influence Types of Accidents With Most Fatalities

Boeing states the proposed rule will not influence the types of accidents that have the most fatalities.

In addition, Boeing contends that other safety initiatives will serve to reduce the number of accidents, further reducing the benefits of the proposed rule.

FAA Response: While this rulemaking action does not necessarily address those accidents that result in the most fatalities, it does improve survivability for passengers and crewmembers when impact-survivable accidents occur. Regardless of improvements in accident prevention, there is still a need to improve passenger and crewmember survivability since other accident prevention measures have not eliminated all impact-survivable accidents.

HIC Compliance

AMSAFE recommends requiring HIC compliance in all situations, regardless of strike hazard fidelity.

FAA Response: The FAA is using existing policy for meeting HIC requirements and does not intend to expand the scope or definition of compliance with HIC.

Inclusion of HIC

ATA states that most of the benefits of improved seats are achieved through structural criteria, not HIC. Adding HIC only creates significant costs without commensurate benefits.

ATA also argues that the FAA has not accurately projected the cost of front row HIC. HIC requirements, especially front row HIC, are expensive and have not been proven to have a significantly higher value.

FAA Response: The FAA agrees that most of the benefits of improved seats come from compliance with the structural requirements. While the Cherry Report (upon which the SNPRM's benefits were based) does not assess the specific safety benefits from HIC improvements, the Cherry Report Addendum concludes that 39% of the fatalities and 46% of the serious injuries averted by installing fully compliant 16g seats can be attributed to HIC improvements.

In our regulatory evaluation supporting this final rule, the cost of seat certification included HIC for all seats, front row as well as row-to-row. The FAA recognizes that front row HIC requirements can lead to compliance alternatives that cost the operator more than row-to-row HIC compliance alternatives. However, we do not agree that the value for the front row alternative must be commensurate with the row-to-row alternative. To do so implies that passengers in the front row should be given a lower protection level than passengers in the following rows simply because it may cost more to protect those passengers in the front row. We do not agree with this reasoning.

Quarterly Reports

NADA/F supports the proposed rule. It also recommends that airlines file quarterly public reports updating their progress in complying with the rule.

FAA Response: The FAA believes NADA/F was directing this comment at seat replacement on existing airplanes. Because the final rule will not require seats on the existing fleet to be upgraded, the comment is no longer relevant. When mandating actions similar to that set forth in this rule, we typically mandate only compliance time frames and do not require progress reports.

Applicability to Part 135 Operators, Flight Deck Seats, and Cargo-Only Airplanes

IBT states that the rule should address part 135 operators, flight deck seats and seats on cargo-only aircraft. IBT states that the omission of these seats is not consistent with our stated philosophy of ''one level of safety'' and should be remedied.

NADA/F also recommends that part 121 air cargo aircraft meet the new standards within three years of this final rule.

FAA Response: Regarding flight deck seats, the FAA's review of the accidents studied showed that the existing seats performed well in impact-survivable accidents. Therefore, we do not see any need to mandate any crashworthiness improvements to these seats.

As for cargo-only airplanes, the final rule does not apply to these airplanes because they do not carry passengers for compensation or hire. However, transport category aircraft manufactured

four (4) years after the effective date of this final rule that have convertible or combination configurations will have to meet the same standards required for all-passenger carrying transport category airplanes operated under part 121 because those airplanes carry passengers.

As for transport category airplanes operated under part 135, at the time Notice No. 88–8 was published, a significant number of transport category airplanes were operated under part 135. Accordingly, Notice 88–8 proposed that seats on transport category airplanes operated under part 135 in air carrier operations or scheduled intrastate common carriage meet the same standards as seats on transport category airplanes operated under part 121. In 1995, we issued Amendment Nos. 119, 121–251, and 135–58, ''Commuter Operations and General Certification and Operations Requirements;'' Final Rule (60 FR 65832; December 20, 1995)(the Commuter Rule). The Commuter Rule requires all operators conducting scheduled passenger-carrying operations in airplanes that have passenger-seating configurations of 10 through 30 seats (excluding crewmember seats) and in turbojet airplanes regardless of seating configuration that formerly conducted operations under part 135, to conduct those operations under part 121. As a consequence of the Commuter Rule, the operation of virtually all transport category airplanes previously operated under part 135 now comes under part 121. Only nonscheduled, on-demand operations remain in part 135. Since the scope of this final rule is limited to transport category airplanes, it is no longer necessary to apply to this rule to part 135 operations.

Expedited Final Rule Issuance

NADA/F recommends that we issue the final rule by January 31, 2003.

FAA Response: Because the comment period did not close until March 3, 2003, the FAA was unable to meet the commenter's requested issue date. Also, after a comment period closes, we must analyze and address each comment. Other considerations, such as reviewing alternatives based on public comments, can further lengthen that process. Although we understand the commenter's intent, we must develop a final rule in accordance with all statutory and procedural requirements.

Rule Should Not Apply to Certain Aircraft

ATA recommends this rule not apply to aircraft that do not have § 25.562(c)(5) in their original certification basis.

FAA Response: The FAA contends that all flight attendant and passenger seats in newly manufactured airplanes should meet the requirements of § 25.562, including § 25.562(c)(5). Occupants must be protected from head trauma as accident investigations have shown it to be a primary cause of serious injuries and fatalities in impact-survivable aviation accidents. In addition, in developing the recommendation that led to § 25.562(c)(5), GASP made it a primary goal to reduce the likelihood of fatal or serious head trauma, concussion, and unconsciousness to airplane occupants. We found this goal to be appropriate for all of civil aircraft, and it has therefore been addressed in the new emergency landing dynamic conditions applicable to aircraft certificated under parts 23, 25, 27 and 29.

Expedited Compliance Date

Several commenters recommend an expedited compliance date:

(1) NADA/F recommends that all newly constructed aircraft be equipped with ''safer'' seats by June 30, 2003, or sooner;

(2) RECARO recommends a shortened compliance period of two years to replace the proposed four-year period for newly manufactured airplanes;

(3) IBT believes the four-year compliance period for newly manufactured aircraft is problematic considering the industry's current economic situation.

FAA Response: For newly manufactured airplanes, we believe the current compliance time frame of four years after the effective date of the final rule is reasonable. We believe this time frame provides enough time for industry to adjust to this new requirement while still ensuring that an improved safety level is reached in the near future. Although we would like to see the improved seats installed as quickly as possible, shortening that compliance time frame will drive costs up disproportionate to the benefits.

Concept of 16g Compatible Seats

ATA believes the proposed rule ignores 16g compatible seats.

FAA Response: Although the concept of 16g compatible seats was recognized in the 1998 Public Meeting, it applied only to the existing fleet. Since the final rule will not apply to the existing fleet, the commenters' concerns no longer apply. However, the FAA wants to clarify that the 1988 rulemaking initiative did not recognize the concept of 16g compatible seats. The 1988 NPRM would have required seats to meet all the requirements of § 25.562 for part 121 and part 135 operations, including all cargo operations. Additionally, the SNPRM and the Options Study did give credit for having partially compliant seats installed.

Joint Aviation Authorities Technical Standard Order (JTSO) Approval

Sicma recommends that the FAA consider accepting JTSO approval for determining compliance with the proposed rule. Sicma believes that this would streamline the certification process, as the requirement to have an FAA Technical Standard Order (TSO) in addition to the JTSO approval is redundant.

FAA Response: The FAA does not recognize a JTSO or a European Aviation Safety Agency Technical Standard Order (ETSO) approval on its own. A separate FAA Letter of TSO Design Approval is required. When the JTSO/ETSO is identical to the FAA TSO, the FAA Letter of TSO Design Approval can be issued with a minimum of review. Also, an approval to TSO–C127a is only an approval to a standard. It is not approval for installation. Installation approval is based on an airplane's type design and can vary depending on the specific airplane model. This rule serves to make one standard, that contained in § 25.562, applicable to all newly manufactured airplanes. TSO approval of a seat does not necessarily ensure compliance with § 25.562, although it is generally the basis for that certification.

Harmonization

ATASCO CSWG asks the FAA to consider issues of worldwide harmonization when moving forward with these regulatory changes.

NADA/F agrees, recommending that we do all that is possible to promote the safest seats as a harmonization standard with the JAA.

FAA Response: Although the FAA supports harmonization when appropriate, we believe that aviation safety will improve significantly by issuing this final rule and, therefore, do not want to further delay its implementation while undertaking harmonization efforts. We also note that the seat certification streamlining effort is addressing harmonization issues.

Impact on Seating

Airbus comments that applying § 25.562 to all passenger seats would compel changes in aircraft seating configurations. For example, it may create one row of seating without the ability to recline. Airbus believes that FAA has not considered the economic impact of these changes.

FAA Response: The FAA acknowledges that this is a possibility. However, we believe there is enough time from the effective date of the rule for industry to develop cost-effective solutions that will not require changes in aircraft seating configurations, or actions such as installing seat belt air bags.

As for the comment about the ability of seats to recline, we are aware that, as of today, many seats located at or near overwing exits do not recline. Airbus did not present any data to show that this has created an economic impact.

Tax Incentives

A commenter proposes tax incentives to accelerate compliance with the proposed rule.

FAA Response: It is beyond the scope of the FAA's authority to effectuate such changes.

Inclusion of Military Aircraft

NADA/F recommends that the military be directed by Executive Order, or whatever rulemaking is available, to have all military aircraft upgraded with safer seats. NADA/F believes the compliance standards should be as high as, or higher than, those for commercial aircraft.

FAA Response: This request is outside the scope of this proposal.

Expedited Testing

NADA/F recommends that we expedite any testing needed to proceed with safer seats for all aircraft.

FAA Response: The FAA believes the standards set forth in current emergency landing dynamic conditions adequately improve seat safety over 9g static seats. These standards were developed after extensive research and testing by the FAA, NASA, and industry. The standards were developed to provide improved safety for passenger and crewmembers based on the seat technology of the day. Because we consider these standards to be adequate, no additional testing is needed at this time.

Air Bag TSO

AMSAFE recommends the timely issuance of an air bag TSO as an acceptable means of compliance with § 25.562.

FAA Response: Currently, the Society of Automotive Engineers (SAE) Seat Committee is working on an Aerospace Standard for inflatable restraint systems. Once the SAE issues that document, the FAA may consider issuing a TSO for inflatable restraint systems that incorporates that document.

Paperwork Reduction Act

There are no current or new requirements for information collection associated with this amendment.

International Compatibility

In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to comply with International Civil Aviation Organization (ICAO) Standards and Recommended Practices to the maximum extent practicable. The FAA has determined that there are no ICAO Standards and Recommended Practices that correspond to these regulations.

Economic Assessment, Regulatory Flexibility Determination, Trade Impact Assessment, and Unfunded Mandates Assessment

Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs each Federal agency to propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act (19 U.S.C. 2531–2533) prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, this Trade Act also requires agencies to consider international standards and, where appropriate, use them as the basis of U.S. standards. Fourth, the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) requires 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 $100 million or more annually (adjusted for inflation).

In conducting these analyses, FAA has determined this rule (1) has benefits that justify its costs, is a ''significant regulatory action'' as defined in section 3(f) of Executive Order 12866 and is ''significant'' as defined in DOT's Regulatory Policies and Procedures; (2) will not have a significant economic impact on a substantial number of small entities; (3) will not reduce barriers to international trade; and (4) does not impose an unfunded mandate on state, local, or tribal governments, or on the private sector. These analyses, available in the docket, are summarized below.

Total Costs and Benefits of This Rulemaking

This final rule amends FAA regulations dealing with improved crashworthiness standards for passenger and flight attendant seats on new transport category airplanes used in part 121 passenger-carrying operations. The rule requires all such airplanes type-certificated after January 1, 1958 (starting with those manufactured four years after this rule's effective date) to comply with all the requirements of 14 CFR 25.562, which is applicable to airplane models for which an application for a type-certificate is made on or after June 16, 1988. Therefore, no action should be necessary to bring those airplanes into compliance with this final rule assuming that they comply fully with § 25.562. Essentially, from an incremental cost/benefit standpoint, the new production airplanes to be affected by this rule are those models that were type-certificated after January 1, 1958 and before June 16, 1988 and derivatives of such models for which an application for an amended type-certificate was made after January 1, 1958.

Total Costs of This Rulemaking

The total costs of this rulemaking, over the analysis period, are $34.7 million (or, $22.3 million and $13.3 million in present value at 3% and 7%, respectively). These costs are composed of seat belt air bags costs of $19.3 million (or, $12.4 million and $7.5 million in present value at 3% and 7%, respectively), additional fuel burn costs of $12.6 million (or, $7.7 million and $4.2 million in present value at 3% and 7%, respectively), and certification and testing of the improved seats of $2.7 million (or $2.2 million and $1.6 million in present value at 3% and 7%, respectively).

Total Benefits of This Rulemaking

The total benefits of this rulemaking are $78.9 million (or, $47.9 million and $26.4 million in present value at 3% and 7%, respectively). The benefits were calculated by estimating the number of fatalities and serious injuries that could be averted as a result of installing the improved seats beginning in 2009; averted casualties are based on estimated future enplanements of new-production airplanes now to be covered by improved seat standards.

Total Costs and Benefits of This Rulemaking

In summary, the total costs of this rulemaking, over the analysis period are $34.7 million (or, $22.3 million and $13.3 million in present value at 3%

and 7%, respectively). The total benefits of installing fully compliant 16g seats are $78.9 million (or, $47.9 million and $26.4 million in present value at 3% and 7%, respectively). This rulemaking is cost-beneficial with a benefits to cost ratio of 2.27 to 1 (or, 2.15 to 1 and 1.98 to 1, when underlying estimates are in present value at 3% and 7%, respectively). Therefore, the FAA contends that the quantifiable benefits of the rule adequately justify the costs of the rule.

Who Is Potentially Affected by This Rulemaking?

This rulemaking affects anyone who operates transport category airplanes used in part 121 passenger-carrying operations on or after October 27, 2009.

Our Cost Assumptions and Sources of Information

- Discount rate—3% and 7%.
- Period of Analysis 2005–2034.
- Monetary values expressed in 2004 dollars.
- Cost of certificating and installing a fully compliant 16g passenger seat instead of a 9g passenger seat, $212.
- Cost of certificating and installing a fully compliant 16g passenger seat instead of a partially compliant 16g (*i.e.*, without HIC) passenger seat, $126 ($32 non-recurring and $94 recurring).
- Cost of certificating and installing a fully compliant 16g flight attendant seat instead of a partially compliant flight attendant seat, $302 ($135 non-recurring, and $167 recurring).
- Acquisition cost of installing a seat belt air bag, for front-row HIC requirement, $722 ($700 seat belt, $22 certification).[3]
- Annual maintenance cost and one-time overhaul cost of seat belt air bag, $150, and $388, respectively.
- Increased weight per aircraft, for passenger seat requirements, 36 pounds.
- Increased weight per aircraft, for flight attendant seat requirements, 13 pounds.
- Fuel costs are based on FAA's forecast data.

[3] We have assumed the cost associated with this rule based on the cost of installing a seat belt equipped with an air bag (inflatable restraints). Other options, such as shoulder harnesses, y-belts, padding to the bulkhead or increasing the distance between the bulkhead and the seat back, may also be sufficient to meet the HIC requirements of this rule and may be less costly. We believe the costs of this rule could be much lower when a combination of options is used. For a complete explanation of the estimated costs of this rule, please read the final regulatory evaluation located in the docket.

Final Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (RFA) establishes ''as a principle of regulatory issuance that agencies shall endeavor, consistent with the objective of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the business, organizations, and governmental jurisdictions subject to regulation.'' To achieve that principle, the Act requires agencies to solicit and consider flexible regulatory proposals and to explain the rationale for their actions. The Act covers a wide-range of small entities, including small businesses, not-for-profit organizations, and small governmental jurisdictions.

Agencies must perform a review to determine whether a proposed or final rule will have a significant economic impact on a substantial number of small entities. If the determination is that it will, the agency must prepare a regulatory flexibility analysis as described in the Act. However, if an agency determines that a proposed or final rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the 1980 act provides that the head of the agency may so certify and a regulatory flexibility analysis is not required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear.

The rule will affect manufacturers of part 25 transport category airplanes type-certificated after January 1, 1958 and manufactured after four years following the effective date of this final rule. It will also affect air carriers conducting operations under part 121. For manufacturers and part 121 operators, a small entity is one with 1,500 or fewer employees. No part 25 airframe manufacturer has 1,500 or fewer employees. Consequently, the rule will not have a ''significant economic impact on a substantial number'' of small part 25 manufacturers.

There are approximately 100 part 121 operators in the potential pool of small entities. In the regulatory evaluation for the SNPRM, the FAA performed a detailed analysis of the economic impacts on 33 of these operators who clearly: (1) Had less than 1,500 employees (the size threshold for classification as a small entity); (2) were not subsidiaries of larger organizations; and, (3) reported operating revenue to the Department of Transportation. The FAA believed these 33 were representative of the affected small firms. The FAA performed a detailed analysis of potential small-entity impacts on the small operators and determined that the proposed rule would not have a significant economic impact on a substantial number of small entities. The FAA invited comments on this assessment from interested and affected parties. Though no comments were received on FAA's small-entity-impact methodology, the FAA did receive comments on the significant costs for all operators (whether small or not) to retrofit the existing fleet—especially in light of the difficult financial condition of operators in recent years. The FAA removed the SNPRM's retrofit requirement, therefore eliminating improved seat costs for the existing fleet.

Consequently, the Administrator certifies that the rule will not have a significant economic impact on a substantial number of small entities (manufacturers or operators).

International Trade Impact Assessment

The Trade Agreement Act of 1979 prohibits Federal agencies from establishing any standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. Legitimate domestic objectives, such as safety, are not considered unnecessary obstacles. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards. The FAA has assessed the potential effect of this final rule and determined that it will impose the same costs on domestic and international entities and thus have a neutral trade impact.

Unfunded Mandates Assessment

The Unfunded Mandates Reform Act of 1995 (the Act) is intended, among other things, to curb the practice of imposing unfunded Federal mandates on State, local, and tribal governments. Title II of the Act requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in an expenditure of $100 million or more (adjusted annually for inflation) in any one year by State, local, and tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a ''significant regulatory action.'' The FAA currently uses an inflation-adjusted value of $120.7 million in lieu of $100 million.

This final rule does not contain such a mandate. The requirements of Title II do not apply.

Executive Order 13132, Federalism

The FAA has analyzed this final rule under the principles and criteria of Executive Order 13132, Federalism. We determined that this action will not have a substantial direct effect on the States, or the relationship between the national Government and the States, or on the distribution of power and responsibilities among the various levels of government, and therefore does not have federalism implications.

Regulations Affecting Intrastate Aviation in Alaska

Section 1205 of the FAA Reauthorization Act of 1996 (110 Stat. 3213) requires the FAA, when modifying its regulations in a manner affecting intrastate aviation in Alaska, to consider the extent to which Alaska is not served by transportation modes other than aviation, and to establish appropriate regulatory distinctions. In the NPRM, we requested comments on whether the proposed rule should apply differently to intrastate operations in Alaska. We didn't receive any comments, and we have determined, based on the administrative record of this rulemaking, that there is no need to make any regulatory distinctions applicable to intrastate aviation in Alaska.

Environmental Analysis

FAA Order 1050.1E identifies FAA actions that are categorically excluded from preparation of an environmental assessment or environmental impact statement under the National Environmental Policy Act in the absence of extraordinary circumstances. The FAA has determined this rulemaking action qualifies for the categorical exclusion identified in paragraph 312d and involves no extraordinary circumstances.

Regulations That Significantly Affect Energy Supply, Distribution, or Use

The FAA has analyzed this final rule under Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use (May 18, 2001). We have determined that it is not a ''significant energy action'' under the executive order because it is not a ''significant regulatory action'' under Executive Order 12866, and it is not likely to have a significant adverse effect on the supply, distribution, or use of energy.

List of Subjects in 14 CFR Part 121

Air carriers, Aircraft, Aviation safety, Safety, Transportation.

The Amendment

■ In consideration of the foregoing, the Federal Aviation Administration amends Part 121 of Chapter I of Title 14, Code of Federal Regulations as follows:

PART 121—OPERATING REQUIREMENTS: DOMESTIC, FLAG, AND SUPPLEMENTAL OPERATIONS

■ 1. The authority citation for part 121 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 40119, 44101, 44701–44702, 44705, 44709–44711, 44713, 44716–44717, 44722, 44901, 44903–44904, 44912, 46105.

■ 2. Amend § 121.311 by adding paragraph (j) to read as follows:

§ 121.311 Seats, safety belts, and shoulder harnesses.

* * * * *

(j) After October 27, 2009, no person may operate a transport category airplane type certificated after January 1, 1958 and manufactured on or after October 27, 2009 in passenger-carrying operations under this part unless all passenger and flight attendant seats on the airplane meet the requirements of § 25.562 in effect on or after June 16, 1988.

Issued in Washington, DC, on September 20, 2005.

Marion C. Blakey,

Administrator.

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