STATEMENT OF WALTER S. LUFFSEY, ASSOCIATE ADMINISTRATOR FOR AVIATION STANDARDS, BEFORE THE HOUSE PUBLIC WORKS AND TRANSPORTATION COMMITTEE, SUBCOMMITTEE ON OVERSIGHT AND REVIEW, CONCERNING TRANSPORT CATEGORY AIRCRAFT SEATS. JUNE 5, 1980

Mr. Chairman and Members of the Subcommittee:

I welcome this opportunity to appear before you today for the first time in my capacity as Associate Administrator. I know from many years of past experience with the agency that our discussions with this Subcommittee have been extremely helpful. I look forward to the opportunity to continue what I hope may be characterized as a mutually beneficial dialogue in the best traditions of public service.

I am here today to discuss the adequacy of large commercial aircraft seats and occupant restraints. More specifically, we are talking about what the Federal Aviation Administration calls "transport category" seats, and restraints, and the requirements we impose on their performance in a crash environment. This subject is an extremely complex and technical one. My review of our past public statements on these matters has led me to conclude that we have not been effective in articulating the industry's record of performance and our supporting regulatory and research programs. I hope to do a better job today of placing our programs in perspective.

In that respect, I would like to point out that we recently completed a study concerning seat failures. We analyzed every available detail about 12 accidents which occurred between 1972 and 1976 and were, classified by the National Transportation Safety Board as survivable or partially survivable. These

accidents involved 204 fatalities. We could not establish that even a single one of the fatalities could be directly associated with seat or occupant restraint failure. We saw failures in structure and in floors, but--as you will graphically see later--few failures of seats themselves. It sounds logical to claim that stronger seats would save lives, but the data available to us simply doesn't back up such a contention. I will spend only a few more minutes providing a broad overview of our entire effort in this area. Following that, with the Subcommittee's concurrence, I will ask Mr. Jerry Chavkin, Chief of our Aircraft Engineering Division, to provide you with a brief technical discussion.

Through correspondence and discussions with the interested public, I believe the general subject matter of concern can be broken down into two basic issues:

- Should the current strength standards for seats and occupant restraints be increased now, and
- Should the FAA require "dynamic" as opposed to the current "static" testing of seats.

First, let me review the FAA's current standards for transport category aircraft seats. We require that the design of a seat be such that an occupant will not suffer serious injury in an "emergency landing" as a result of inertial forces experienced by the occupant of 9 g's in the forward direction, 4 1/2 g's downward, 2 g's upward, and 1 1/2 g's sidewards. The actual attachment of the seat or the occupant restraint system must be capable of withstanding one-third greater inertial loads in all of these directions. Let me put this in some perspective.

An airplane is designed to withstand structural loads imposed during flight. This sometimes involves quite severe turbulence. Decades of experience have shown that the basic structural criteria, which equate to 2 1/2 g's for occupant forces in the downward direction and 1 g in an upward direction, provide a safe flight structure, and those are what we require for the airplane as a whole. It is, therefore, immediately clear that the strength of the seats and the seat attachments is far beyond the fundamental structural strength built into an airplane. Some of you may be familiar with military fighter machines, the performance of which far exceeds commercial transports. It is of interest to me that the basic structural design criteria for these aircraft translate to only a little over 7 g's for occupant forces in the downward direction and 4 g's in the upward direction, despite these performance characteristics.

The issue of seat strength simply cannot be viewed by itself, but must be considered in the context of the basic aircraft structure. When an aircraft loses its structural integrity, the seat and seat attachment strength become relatively insignificant in terms of passenger safety. Despite the fact that the g levels during a given crash may be well below the design loads of the seats, terrain or obstacles in the crash path can create concentrated load points on the aircraft fuselage which can result in floor eruptions. When this happens, the aircraft's structure is unable to protect passengers from decelerative forces below the limit of human

tolerance. And it's axiomatic that, if the aircraft floor loses its structural integrity, the passenger loses the crash protections of the seat and seat restraint system.

Moreover, you cannot mandate seat strength changes without considering the need for different passenger restraint devices. The FAA has operated on the premise that the public will not tolerate cumbersome additions to the currently required commercial aircraft occupant restraint system. That is, we do not believe the public would tolerate a requirement to use a 5-point restraint system, which has proven effective in automobile race cars, fighter planes, and in the cockpit of every airliner; or crash helmets, which are so clearly effective in reducing the severity of injuries to the head. I believe this assumption has been well borne out by recent experience. In May 1978, we proposed to reduce dramatically the number of inflight injuries which occur due to clear air turbulence by merely requiring that passengers must have their safety belts fastened during flight except for occasional trips to the washroom. The majority of comments received in response to that proposal have been strongly opposed to it. As one citizen who commented on that public rulemaking proposal said, "this is asinine to put it mildly....This seems to me to be an extreme example of overregulation and a rather unnecessary and irrational interference with the way in which people behave. I am coming to expect this from the Government but I don't have to like it!" A less agitated member of the public found our proposal "absolutely outrageous" and asked how far we might go

"in promulgation of rules for the purported safety of passengers." Even the Aviation Consumer Action Project disagreed with our proposal and urged that we not adopt it. Rather, they believed that we should act by encouraging passenger education and maximum voluntary compliance with the proposal.

With that as a starting point, let us examine the human tolerance level. Many of you have no doubt heard reports that transport category seat design requirements are not good enough, and that the human tolerance level in an airplane crash would be far greater than 9 g's. In a few minutes Mr. Chavkin will show that all the analyses we have seen completely refute this contention. Human tolerance levels are not significantly in excess of our current seat requirements, assuming only a lap belt is used. It is one thing to try and set a record for human tolerance to acceleration by strapping oneself into a specially designed rocket sled with full body restraints from head to toe; it is quite another to attempt to achieve the same goal in any reasonably comfortable seat with a lap belt fastened. The same holds true for acceleration in all other directions. Without going into technical details, let me state that proponents of increased seat strength have severely distorted results of scientific testing of human tolerance to acceleration as they might apply to an airplane situation. It is simply not true that the human body has been shown capable of withstanding significantly more acceleration than current seats are designed to withstand. In fact, our examination of accidents clearly

demonstrates that much of the time people are killed from impact forces which have not damaged their seats and seat belts.

It is also important to note that bending or crumpling of seats is frequently a life-saving event. A seat which is able to withstand several times the g force we presently require is likely to be much stiffer than current day seats. If this is so, such an overly strong seat could actually result in greater acceleration forces being transmitted to the passenger in a crash landing resulting in more, not less, severe injury.

You will see in a few minutes that the FAA and NASA are devoting considerable effort and public funds to improve the protection afforded passengers in a crash landing. We believe that the investment we have made will be worthwhile even if only a few injuries are avoided. But we do not look for a significant reduction in fatalities or injuries from this research alone.

We believe the research must be conducted with a true systems approach to the problem. It is essential to carefully define an appropriate crash environment against which designs may be tested. It is then essential to look at the interactions among details of this crash scenario, structural effects on the aircraft, and means to better absorb the crash energy. Finally, we must iterate this process in order to insure that the entire system is optimized from a protection standpoint. As was mentioned earlier, mere adoption of some arbitrary test procedure, or an arbitrarily increased strength standard, could actually make matters worse. The large percentage of survivors

in the few survivable crashes we have seen in past years is testimony to the quality of American aviation designs. It would be a real tragedy if arbitrary changes in these design criteria, just for the sake of "making them more current," were to blemish that record.

We shall shortly be soliciting comments from all interested parties on this subject, Mr. Chairman, through an open public hearing. We hope that those proponents of changes to our seat and restraint standards will participate. If we can be shown to have overlooked a practicable method for reducing transport aircraft accident injuries or fatalities by changing our seat and restraint standards, I can assure you we would move quickly to make those changes.

Before I close let me stress that my remarks have been confined, as you requested, to the subject of the transport category aircraft. The subject of general aviation seat strength and occupant restraint systems is completely different. The FAA has a substantial on-going program going to improve on that situation. We are working very closely with the Armed Forces and NASA in an agressive program designed to develop standards for practical and comfortable general aviation seats and restraint systems which offer greatly improved passenger protection.

With your permission, Mr. Chairman, I would now like to ask Mr. Chavkin to provide you further details on our efforts in this area. After his briefing, we would be pleased to answer any questions the Subcommittee has.