STATEMENT OF ANTHONY J. BRODERICK, ASSOCIATE ADMINISTRATOR FOR AVIATION STANDARDS, BEFORE THE SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION, SUBCOMMITTEE ON AVIATION, CONCERNING AGING AIRCRAFT AND CERTIFICATION OF CHARTER OPERATORS. APRIL 15, 1986.

Madam Chairman and Members of the Subcommittee:

I welcome the opportunity to appear before the Subcommittee today to discuss both the FAA's process for certificating charter air carrier operators and the subject of aging aircraft in the air carrier fleet. These are important issues which warrant the continued interest of all within the aviation community.

The subject of aging aircraft in the Nation's air carrier fleet is one we have been concerned with and have aggressively been addressing for some time now in cooperation with both manufacturers and the airlines. It is readily apparent that, as the age of individual aircraft used in the fleet continues to increase, the opportunities for corrosion or fatigue of critical components of those aircraft likewise increase. Therefore, the challenge which has faced us, along with manufacturers and operators, has been to develop design standards which reduce the likelihood of catastrophic failure, prescribe inspection intervals which will enable cracks or corrosion to be detected prior to the onset of failures of critical components, and monitor service history of aircraft not only as a means of improving our design

standards and refining inspection intervals but to permit the timely correction of potential problems by the issuance of regulatory airworthiness directives (AD's). We have continued to improve upon our ability to achieve these important objectives.

In the early 1950's, the standards relied upon careful detail design to prevent the failure of key aircraft components by fatigue. Under this approach, we depended upon a maintenance program developed on the basis of previous transport service experience. "Hard time" inspection programs were used.

Before the advent of the jet age in the late 1950's, the FAA developed standards which permitted either a "safe-life" or a "fail safe" approach to design for fatigue. Under the safe-life approach, there was a required scheduled replacement of a part in accordance with the expected life of the part. The aircraft was simply retired from service when it became impractical to replace a part such as a wing or fuselage. Starting with the B-707, the fail safe approach was applied in the design of all U.S. commercial jets. Parts were constructed with a built-in redundancy under the premise that the aircraft could operate safely with an undetected flaw until the next scheduled inspection could correct it. Under this philosophy, aircraft are designed so that the rate of crack propagation will not reach a critical stage prior to the next scheduled inspection or maintenance.

Manufacturers were called upon to recommend maintenance/inspection schedules, based on test data, at the time a new aircraft was introduced into service. Changes to the maintenance/inspection schedules could be approved for individual airlines if they could demonstrate that the changes to the maintenance program would also provide a comparable level of safety. In that respect, I would note that the fatigue life expectancy of a structure can only be finally determined after exposure to a variety of environmental conditions over many years of operation, so service history is a critical aspect of validating assumptions made during the design process and in assuring the continued airworthiness of an aircraft.

In 1978, the FAA introduced a newer design concept for newly certificated aircraft which is called "damage tolerance." A damage tolerant structure is one which has been designed to tolerate damage due to fatigue, corrosion, or accidental damage and continue to carry expected operational loads until detected either by the problem becoming evident or during a scheduled inspection. Scheduled inspections of such components are based on the fracture mechanics characteristics of the part, and are designed to detect any crack before it reaches unsafe proportions. In other words, under the damage tolerance approach, we assume that damage will occur to a part from any of a number of possible conditions, including poor maintenance practices. That part must then be designed to safely accommodate that damage,

until it can be corrected. The safe life approach could continue to be used for aircraft components on newly certificated aircraft to the extent that damage tolerance was not appropriate. One example where the safe life approach is used (i.e., a specific life use is placed on the component) is for landing gear.

We believe damage tolerance will provide improvements in aircraft design for future aircraft, but it does not apply directly to the vast majority of the aircraft in the current air carrier fleet because they were certificated prior to our adoption of the damage tolerance rule in 1978. Therefore, to address on a more current basis the need to assure that fatigue and corrosion were detected on aircraft in the fleet, the FAA issued guidance information to industry which outlines methods (including fracture mechanics assessment) to assure safety of older airplanes through additional structural inspections.

The number and extent of these additional structural inspections are based on an engineering analysis that assumes the existence of a crack at all critical locations and determines its growth rate and the point at which it would become unsafe. This approach, which we finalized in concert with industry in 1981, is called the "Supplemental Structural Inspection Documents" (SSID) program. Under SSID, manufacturers are asked to identify all structural components whose failure could affect the safety of the aircraft,

and to establish a special inspection program for these components. To date, SSID's have been developed for the B-707, 727, 737, and 747. The FAA has taken regulatory action to require the airlines to adhere to the schedules called for in these SSID's. We expect to see SSID's developed for the DC-9-10, 9-30, 9-40, 9-50, the DC-10, and the L1011 within approximately the next two years, and would anticipate appropriate regulatory action to require compliance with their terms as well. The DC-8 and BAC 1-11 have SSID's, which have not yet been established as mandatory by the FAA.

In terms of the issue of aging aircraft, I believe it is important to note that we are not experiencing a degradation of safety in commercial aviation, and that there is not cause for alarm. Clearly, the situation is one that merits attention and continued action on our parts. Significantly, we have established an overall system in which all parties have an important role, and in which all parties must fulfill their functions responsibly and with the safety of the travelling public foremost in their minds. The FAA, in addition to prescribing the appropriate regulatory framework and developing pertinent guidance material for use by industry, will continue to monitor the way in which all elements of this cooperative system are meeting their obligations.

In terms of the certification of new charter air carriers, we go through a detailed process of assuring ourselves that a proposed

applicant meets the stringent requirements of Part 121 of the Federal Aviation Regulations, which govern the safety certification of new air carriers. I would like to take a few moments now to describe this process to you.

An applicant for an air carrier operating certificate applies for safety certification through our flight standards field offices. Typically, informal meetings are held to inform the applicant of the requirements and procedures for certification and for the FAA to make initial assessments of the applicant's potential capabilities. The action which more formally begins the process is a "Pre-Application Statement of Intent" to start operations, which the applicant would provide to the field office. This material outlines the applicant's proposed scope and type of operations, type of equipment, areas of operations, and airports to be used, etc.

The next step would be for the carrier to flesh out the details of its proposed enterprise by submitting a formal application in letter form. Accompanying the formal application, or to be followed shortly thereafter, would be the carrier's proposed general operations, maintenance and training manuals along with checklists, Approved Airplane Flight Manuals, Minimum Equipment List, and other documents needed to evaluate its readiness to conduct air transportation in compliance with the regulations and

safe operating practices. We would be looking to evaluate such factors as whether the carrier had the capability to maintain aircraft in an airworthy condition, properly train crewmembers, dispatchers and maintenance personnel, or safely turn around aircraft and crews from one flight to the next flight.

As part of the formal application, the new carrier would be required to submit an initial compliance statement, which lists all regulations appropriate to its proposed operations and how it intends to meet those regulations. Typically, the compliance statement would cite appropriate provisions in its required manuals which spell out in detail how these functions will be carried out. FAA, of course, reviews this document to make sure that all pertinent regulations have been listed, and that the proposed means of compliance are adequate.

As these "paper" reviews are being conducted, we move into the next phase of our examination of the carrier, that is field inspections. FAA inspectors monitor the performance of such tasks as the training and checking of personnel and the inspection of proposed maintenance facilities. We examine the aircraft to be used to see if they meet certification and operational requirements. As this process evolves, we look at the proposed management personnel to see if they have the knowledge and experience needed to operate an airline. We also look at the

compliance history of the people who will be involved in the management of the company.

At some point, usually in the later phases of the process, the carrier applicant would be required to submit to the FAA a plan for "proving flights" which, as the name suggests, are flights in which the applicant proves to FAA's satisfaction that it has the capability to actually run an airline in compliance with the regulations and consistent with safe operating practices. While a carrier may receive credit for ferry flights and FAA-observed training flights, it must also make plans to conduct flights which would be representative of their proposed operation--a dress rehearsal, so to speak. A carrier may request a reduction in the hours of proving flights required, based on the capabilities and past experience of its personnel. Despite any reduction which may be granted when FAA accepts the plan, the key factor is that the carrier must prove to the FAA's satisfaction, through the proving flights, that it can safely run an airline. Thus, if the FAA discovers any deficiencies in the carrier applicant's procedures, that applicant will have to correct the problems and demonstrate that it has done so, even if this results in having to fly more hours of proving flights than called for in the plan. Likewise, if a carrier demonstrates its capabilities to FAA's satisfaction prior to the completion of the number of hours of proving flights called for by the plan, no further flights would be required. In

short, the carrier applicant must demonstrate its ability to comply with the applicable regulations and the procedures and programs contained in its manuals irrespective of the number of hours of proving flights in its plan.

Once the plan for proving flights is accepted, FAA begins more intensive surveillance of the applicant. An emergency evacuation demonstration is conducted, which tests the emergency equipment as well as the applicant's ability to maintain such equipment. The evacuation demonstration also verifies in a practical manner the quality of training given to the cockpit and cabin crewmembers on the use of the emergency equipment and the procedures to be used during an emergency evacuation. During ferry or training flights, the applicant's maintenance programs, procedures and capabilities are examined. As previously mentioned, the carrier applicant would be required to fly into a number of the airports that are representative of those it proposes to serve. During these flights, FAA inspectors examine the competence of flight crews, flight dispatchers, flight attendants, and ground personnel; the adequacy of maintenance programs and fueling procedures; and management's capabilities in the exercise of operational control. We also pose hypothetical problems for the crews and the company's operational control systems to see how they would react in unusual situations such as weather diversions and/or equipment failures. In essence, the proving flights are used by the FAA to verify that

the carrier applicant can actually conduct its operations in accordance with the proposed methods and conditions set forth in its compliance statement.

After each proving flight, an FAA inspector briefs the applicant's management on any deficiencies detected during the flight or during ground operations, and the applicant must take action to correct these deficiencies. If they are major, the applicant must demonstrate the effectiveness of the corrective action by conducting additional flights. Once the FAA is satisfied that the carrier applicant's programs and systems adequately provide for compliance with the regulations and safe operating practices, the proving flights are terminated. Only after a successful demonstration by way of proving flights is an Air Carrier Operating Certificate granted to the carrier, along with operations specifications, which detail the conditions under which the carrier may operate.

The flight standards field office is required to prepare a certification report and forward it to the region, which in turn forwards a copy to headquarters. The field office also notifies OST that we have granted the certificate. Once the carrier has also obtained the necessary approval of economic authority from OST, the carrier may begin to operate.

As you can see, the certification process for any carrier is quite exhaustive. And our involvement with that carrier does not, of course, end there. We continue to oversee that carrier's operations in accordance with our ongoing surveillance program in order to assure the continued compliance with our regulatory requirements.

That completes my prepared statement, Madam Chairman. I would be pleased to respond to questions you may have at this time.