STATEMENT OF ANTHONY J. BRODERICK, ASSOCIATE ADMINISTRATOR FOR AVIATION STANDARDS, BEFORE THE HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY, SUBCOMMITTEE ON TRANSPORTATION, AVIATION, AND MATERIALS, CONCERNING AGING AIRCRAFT. JUNE 4, 1986.

Mr. Chairman and Members of the Subcommittee:

I welcome the opportunity to appear before the Subcommittee today to discuss the subject of aging aircraft in the air carrier fleet. This is an important issue which warrants 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 such as a crack 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.

The Subcommittee also expressed interest in current airline maintenance practices, so I would like to briefly turn to that subject for a moment. I am aware that there has been much focus on this issue recently, and that there is a general impression that airline maintenance practices have suffered as the result of an economically deregulated airline environment. I disagree with that assumption. What we have found is that the key requirement for a sound maintenance operation is not a company's financial success but rather whether there is a strong management focus on assuring the adequacy of the airline's maintenance system. This need for top level attention was evident before deregulation, and remains so today. The challenge which faces us in the FAA is to conduct our surveillance in such a way as to identify those operators who do not insist on strict compliance with the FAA's safety regulations, and for us to continue to watch them closely, taking strong enforcement action when called for.

Our prior surveillance of airline maintenance practices simply was not adequate to meet this challenge, either in terms of level or quality of effort. We reached this conclusion after comprehensive inspections of the industry, as well as critical self-examination of our own efforts. We have taken strong remedial action to address these deficiencies by increasing our inspector staffing and making a number of refinements in our surveillance program. For the first time, we now have in place national guidelines which

prescribe minimum levels of inspection activity for each segment of the industry. Further, we have instituted special in-depth inspections of all operators on a cyclical basis. These inspections are conducted by teams that evaluate a carrier's activities in a level of detail which is simply not feasible in our routine surveillance. Not only will this enable us to better determine compliance with our safety regulations, but we expect that it will serve as a important deterrent to those who might otherwise seek to evade their safety responsibilities. Moreover, the national programs we have established provide for an overall surveillance program which is more balanced than before, assuring that adequate maintenance surveillance is exercised over all operators.

The importance of maintenance to aviation safety cannot be overstated. The vast majority of airlines recognize this fact. We intend to continue our current efforts to tailor our surveillance programs so that deficiencies are identified at an early stage and corrected. We believe that our present approach of greater headquarters' oversight of our surveillance activities, supplemented by an increased inspector workforce, will demonstratively enhance the safety of our air transportation system.

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