NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: April 1, 1976

Forwarded to:

Honorable John L. McLucas
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)

A-76-59 through 64

On March 11, 1976, the National Transportation Safety Board completed its public hearing into the Overseas National Airways, Inc., accident of November 12, 1975. During that accident, the crew of a McDonnell Douglas DC-10-30F rejected takeoff from John F. Kennedy International Airport after a number of large birds were ingested into the No. 3 engine. One of the basic issues in the accident was the catastrophic disintegration of the engine.

Based on the Safety Board's evaluation of the testimony given by witnesses representing the Federal Aviation Administration, General Electric Co., and McDonnell Douglas Aircraft Corp., the Safety Board concludes that, as configured, the General Electric CF6 engine cannot safely tolerate foreign object damage of the magnitude represented by massive bird ingestion. To date, there have been three air carrier accidents or incidents in which the compressor case assembly separated.

We are fully cognizant of the joint efforts by your Engineering and Manufacturing Staff, the General Electric Co., and McDonnell Douglas Aircraft Corp., to develop remedies for this potentially hazardous condition and would appreciate being kept apprised of the developments in this area. However, until such a remedy is developed, the Safety Board is concerned that the CF6 engine is being operated worldwide, not only on DC-10 aircraft, but also on the A-300 and some 747 aircraft, in an environment that may at any time initiate conditions leading to another catastrophic engine failure.

On March 25, 1975, in its Safety Recommendation A-75-24, the Safety Board expressed concern regarding the adequacy of the bird ingestion certification criteria for large turbofan engines. In that recommendation,

the Board noted that during actual operations, large turbofan engines have ingested more birds and heavier birds than those currently required during engine certification tests.

The Safety Board now concludes that the bird ingestion test procedures of Advisory Circular 33-1A, as they were used for the certification of the CF6, were inadequate. For example, testimony at the public hearing established that only 6 birds weighing 1 1/2 lbs. each were used during the CF6 certification tests instead of the maximum of 10 birds specified in the Advisory Circular. Furthermore, these six birds were not fired as a group as stipulated in the Advisory Circular, but were fired singly, and the engine was shut down and inspected between bird ingestions. The Board also noted that based on the number of birds per unit of inlet area specified in the Advisory Circular, as many as 39 birds should have been used.

The Safety Board, therefore, believes that the approach used in the tests to demonstrate compliance with Advisory Circular 33-1A meets neither the spirit nor the intent of the Advisory Circular. Moreover, we believe that the current provisions of 14 CFR 33.77 do not provide adequate safeguards against the ingestion potentials of future large turbofan engines.

In view of the above, the National Transportation Safety Board recommends that the FAA:

1. Require immediate retest of the General Electric CF6 engine to demonstrate its compliance with the complete bird ingestion criteria of AC 33-1A. (Class I--Urgent Followup.)

2. Require that any engine modifications necessary to comply with the bird ingestion criteria of AC 33-1A be incorporated into all newly manufactured CF6 engines. (Class II--Priority Followup.)

3. Require that any engine modifications necessary to comply with the bird ingestion criteria of AC 33-1A be incorporated into all CF6 engines in service. (Class II--Priority Followup.)

4. Until the CF6 engine is modified, require that a bird patrol sweep runways at all airports which have recognized bird problems and are served by CF6-powered aircraft. The sweep should be made before a runway is put into operation for CF6-powered aircraft and at sufficient intervals thereafter to assure that a bird hazard does not exist. (Class I--Urgent Followup.)

5. Advise all operators, domestic and foreign, of CF-6 engines of the catastrophic consequences of foreign object damage and the need for appropriate caution to avoid such damage. (Class I--Urgent Followup.)

6. Amend 14 CFR 33.77 to increase the maximum number of birds in the various size categories required to be ingested into turbine engines with large inlets. These increased numbers and sizes should be consistent with the birds ingested during service experience of these engines. (Class III--Longer-Term Followup.)

TODD, Chairman, McADAMS, THAYER, BURGESS, and HALEY, Members, concurred in the above recommendations.

By: Webster B. Todd, Jr.
Chairman