

1000-cycle test program would have jeopardized that conclusion.

The question that the FAA considers to be more relevant is whether or not a greater benefit would come from a more thorough teardown inspection and analysis of the 3000-cycle test engine and propulsion system hardware than from this additional level of validation. In this regard, the FAA agrees with Boeing that other test articles may provide sufficient experience to uncover the majority of age-related problems independent of the additional exposure provided by the 1000-cycle test inflight exposure.

In consideration of the need to perform a detailed analysis of the 3000-cycle test engine and the extra expense of using a parallel 3000-cycle test engine as "another suitable aged engine," the FAA agrees that the requirement for installation of an aged engine on the ETOPS test airplane can be eliminated provided significantly improved processes are used to analyze the condition of the 3000-cycle test and airplane demonstration test engines at the conclusion of these tests, as reflected in the revised paragraphs (e)(6) and (e)(7).

Miscellaneous Revisions

We are also incorporating the following revisions to the special conditions.

Re-identification of paragraph (e)(7)(iii) as (e)(7)(iv) and revision of the requirement that the 1000-cycle test airplane be operated and maintained using the recommended operations and maintenance procedures to recognize that more than one test airplane may be used.

Replacement of the reference to the "1000-cycle ETOPS test" with "Airplane Demonstration Test" in paragraph (g)(2) in order to be consistent with the changes to paragraph (e)(7).

Replacement of the reference to the "1000-flight-cycle ETOPS test" with "Airplane Demonstration Test" in paragraph (h)(1) in order to be consistent with the changes to paragraph (e)(7).

Discussion of Comments

Notice of Proposed Special Conditions No. 25-03-04-SC for the Boeing Model 777 series airplanes was published in the **Federal Register** on June 13, 2003 (68 FR 35335), with a correction to the original publication issued on June 23, 2003 (68 FR 37205). Four comments were received, and all of them concur with the special conditions as proposed. Therefore, the special conditions are adopted as proposed.

Special Conditions Revisions

For clarity, the revised sections of the original Special Conditions No. 25-ANM-84 are printed below. The final special conditions are printed in their entirety, with revisions incorporated, at the end of this document. Portions of the special conditions that remain unchanged are discussed in the preamble to the original Special Conditions No. 25-ANM-84 (59 FR 28234).

Revisions to Special Conditions No. 25-ANM-84

(e)(6) Engine Demonstration Test. One engine of each type to be certificated with the airplane must complete 3000 equivalent airplane operational cycles. The engine must be configured with a complete airplane nacelle package for this demonstration, including engine-mounted equipment except for any configuration differences necessary to accommodate test instrumentation and test stand interfaces with the engine nacelle package. At completion of the engine demonstration test, the engine and airplane nacelle test hardware must undergo a complete teardown inspection. This inspection must be conducted in a manner to identify abnormal conditions that could become potential sources of engine inflight shutdown. An analysis of any abnormal conditions found must consider the possible consequences of similar occurrences in service to determine if they may become sources of engine inflight shutdowns, power loss, or inability to control engine thrust. Any potential sources of engine inflight shutdown identified must be corrected in accordance with paragraph (g)(2).

(e)(7) Airplane Demonstration Test. In addition to the function and reliability testing required by 14 CFR 21.35(b)(2), for each engine type to be certificated with the airplane, one or more airplanes must complete flight testing which demonstrates that the aircraft, its components, and equipment, are capable of and function properly during long range operations and airplane diversions, including engine-inoperative diversions.

(i) The flight conditions must expose the airplane to representative operational variations based on the airplane's system and equipment design and the intended use of the airplane including:

(A) Engine inoperative maximum length diversions to demonstrate the airplane and propulsion system's capability to safely conduct a diversion.

(B) Non-normal conditions to demonstrate the airplane's capability to

safely divert under worst case probable system failure conditions.

(C) Simulated airline operations including normal cruise altitudes, step climbs, and maximum expected flight durations out of and into a variety of departure and arrival airports.

(D) Diversions to worldwide airports representative of those intended as operational alternates.

(E) Repeated exposure to humid and inclement weather on the ground followed by long-range operation at normal cruise altitude.

(ii) The flight testing must validate expected airplane flying qualities and performance considering engine failure, electrical power losses, etc. The testing must demonstrate the adequacy of remaining airplane systems and performance and flightcrew ability to deal with an emergency considering remaining flight deck information following expected failure conditions.

(iii) The engine-inoperative diversions must be evenly distributed among the number of engines in the applicant's flight test program.

(iv) The test airplane(s) must be operated and maintained using the recommended operations and maintenance manual procedures during the airplane demonstration test.

(v) At completion of the airplane demonstration test, the test engines and engine-mounted equipment must undergo a complete external on-wing visual inspection. The engines must also undergo a complete internal visual inspection. These inspections must be conducted in a manner to identify abnormal conditions that could become potential sources of engine inflight shutdowns. An analysis of any abnormal conditions found must consider the possible consequences of similar occurrences in service to determine if they may become sources of engine inflight shutdowns. Any potential sources of engine inflight shutdown that are identified must be corrected in accordance with paragraph (g)(2).

(g)(2) The FAA Reliability Assessment Board will review and evaluate the data from the problem tracking and resolution system to establish compliance with the requirements of paragraph (h). The board will evaluate the overall type design for ETOPS suitability as demonstrated in flight test, and the Airplane Demonstration Test,

(h)(1) For the engine and airplane systems, the type and frequency of failures that occur during the airplane flight test program and the Airplane Demonstration Test must be consistent with the type and frequency of failures or malfunctions that would be expected