

shutdown event rate at or below the target values.

Generally, early product service life reporting on a quarterly basis is adequate, especially considering the fact that the manufacturers report engine failure events as they occur under the requirements of section 21.3. Event rates may fluctuate considerably early in the product's service life cycle because, although the fleet is growing in numbers of engine-airplane combinations in service, the accumulation of engine flight hours is generally slow. Typically, event rates are not very stable when the fleet cumulative time is less than 1 or 2 million engine flight hours. Therefore the focus should be on event occurrences, not failure rates, with a small fleet typical of early service time.

After maturity (a stable engine shutdown event rate at or below the target values) with a large fleet, reporting intervals continue on a quarterly basis. Regardless of fleet size, fleet age, and state of maturity, engine failures are reported under the requirements of section 21.3.

3. Paragraph (b)(2) of the proposed section 21.4 identifies world fleet IFSD rate/reliability requirements. The standards in section 21.4(b)(2)(i) are the IFSD rates compatible with the current FAA ETOPS AC and Policy for operation up to 180 minutes (including North Pacific operation). The standard in section 21.4(b)(2)(ii) is an IFSD rate compatible with operation beyond 180 minutes to 240 minutes and beyond, as contained in the proposed Operational rule and guidance material.

As discussed in this proposed NPRM, an IFSD rate of 0.01/1,000 Engine Flight Hours (EFH) is consistent with an extremely improbable risk of a dual in-flight power loss from independent causes for a two-engine airplane, even assuming a decision of practically unlimited duration. The rates given are not operator specific, but rather apply across the fleet of a given airplane-engine combination.

The FAA expects implementation of corrective action will maintain an acceptable in-flight shutdown rate below the required levels. This is borne out by the current ETOPS fleet in-flight shutdown rates, which have achieved and consistently maintained rates at or below 0.01 per 1,000 engine-hours. If the normal airworthiness monitoring process is not sufficient by itself to maintain an acceptable propulsion system reliability for a particular airplane-engine combination, then the FAA may require additional corrective actions, or reduce or withdraw the ETOPS diversion authority as described in section 21.4(c), if the risk of dual

power loss is unacceptably high. Before such action is taken, however, the certificate holder and the FAA will assess the fleet-wide risk based upon the risk model developed for ETOPS presented in this preamble.

Part 25

Section by Section Discussion of the Proposed Changes to Part 25

Proposed Change to Paragraph 25.857(c)(2)—Cargo Fire Suppression

The proposed change to section 25.857(c)(2) would require that the applicant furnish the certified time capability of a Class C cargo fire suppression system in the Airplane Flight Manual (AFM) in accordance with section 25.1581(a)(2). The time capability of a system is the maximum length of time a system can suppress a fire.

Explanation

The proposed new section 121.633 and part 135, Appendix H, paragraph E would specify that the time that an operator needs to fly to a planned ETOPS alternate may not exceed the maximum time capability specified in the Airplane Flight Manual for the airplane's most time limited system. This change to section 25.857(c)(2) and a similar requirement in the new Appendix L, section I, paragraph (e)(4) will ensure that the Airplane Flight Manual provides the information that the operators will need regarding the fire suppression system to comply with the operating requirements. The justification for these changes is further discussed in the explanations for those proposed operating rules.

Proposed New Section 25.1535—ETOPS Approval

A proposed new section 25.1535 would prescribe the requirements for obtaining ETOPS type design approval.

Explanation

This new rule in the body of part 25 is effectively a pointer to a new Appendix L, which sets out additional design, analysis and test requirements for ETOPS type design approval. This rule also requires that in showing compliance with part 25 rules the applicant must consider the maximum length ETOPS mission. The applicant must also consider the effects of airplane system failure on crew workload and passenger physiological needs during a diversion of the maximum time considered. The system safety assessment required by section 25.1309 is an example of a rule where the ETOPS mission profile would be

considered in an analysis to determine compliance. The ETOPS mission profile (including the maximum diversion time) could also affect the compliance analysis for section 25.1011(b) concerning oil endurance, and section 25.571 governing structural fatigue and damage tolerance.

This proposed rule is crucial to ensure that throughout the airplane design, the ETOPS mission profile is properly considered, and the standard of compliance is high because of it. The "ETOPS Scenario" diagram and the ETOPS significant systems definition that would be provided in the associated advisory circular for this rule are good tools that system designers can use to assess all conditions although they are not regulatory. There are also additional requirements in Appendix L to provide focus on those airplane systems that have, historically, been important to ETOPS operations such as electrical power, APU, and fuel systems. The emphasis on these specific airplane systems does not mean that these are the only airplane systems that are important to ETOPS. The section 25.1535 and Appendix L requirements along with the advisory circular guidance for ETOPS significant systems and the ETOPS mission profile provide the basis for assessing other airplane systems for ETOPS approval.

Proposed New Part 25 Appendix L—Extended Operations

A proposed new appendix L to part 25 defines additional airworthiness requirements for ETOPS approval.

Explanation

Appendix L would codify the airworthiness standards unique to ETOPS from Advisory Circular 120-42A, the Boeing 777 ETOPS special conditions, and the 207-minute ETOPS Policy Letter EPL 20-01. The requirements of Appendix L would go beyond simply considering the ETOPS mission in applying the basic part 25 requirements.

Since we would not require an applicant to comply with these ETOPS requirements in order to receive a basic part 25 type certificate, we decided that a separate appendix to part 25 would be the best location for these additional requirements for ETOPS.

Appendix L Format

Appendix L is organized into three sections. Section I sets out design requirements that all airplanes must comply with for ETOPS approval. Section II prescribes specific requirements for two engine airplanes. Section III prescribes specific