

the decompression altitudes. This rule would require the applicant to demonstrate to the FAA that the anti-icing systems on the airplane will assure the airplane's capability to continue to operate during a worst-case diversion. The ARAC Working Group recommended a standard that would require the capability to safely divert if anti-icing cannot be shown available for all scenarios. This recommended standard tacitly assumes that airplane ice protection is not necessarily required during an ETOPS diversion. We disagree with this recommendation. Paragraph 8(b)(11) of AC 120-42A says that the airframe and propulsion ice protection should be shown to provide adequate capability for the intended operation. The AC says that this should account for prolonged exposure to lower altitudes associated with the engine-out diversion, cruise, holding, approach and landing. We do not interpret this paragraph as allowing circumstances where anti-icing would not normally be available during an ETOPS diversion. An applicant would have to address any failure conditions where the ice-protection systems would not be available during an ETOPS diversion as part of the safety analysis required by section 25.1309.

The preamble justification provided in the ARAC proposal stated that this rule "will also require the applicant to demonstrate that the non-heated (or "non-deiced") areas of the airplane will not pick up a load of ice that would make the airplane uncontrollable or create too much drag to complete the diversion." This statement is consistent with how the FAA has applied the criteria of AC 120-42A paragraph 8.(b)(11) for all airplanes certified using that policy. However, the ARAC recommendation did not include this specific provision. We have added this requirement into the proposed rule as a new paragraph I(a)(1)(iii). It is consistent with ARAC's recommendation and consistent with what has been standard ETOPS type certification practice to consider the accumulation of ice on the non-heated or non-deiced areas of the airplane.

The associated advisory material for this proposed requirement will describe the conditions and assumptions that an applicant may use in simulating a diversion icing environment for showing compliance with the proposed rule. The advisory material will also provide guidance for developing analyses or testing that would justify not having to assume that the entire diversion would be in icing conditions.

#### I(a)(2) Electrical Power Supply

##### I(a)(2)(i) and (ii)

These paragraphs would establish reliability requirements for the electrical power supply system on an ETOPS flight.

##### Explanation

Paragraphs I(a)(2)(i) and (ii) are basically a restatement of section 25.1309 for the electrical power supply system in consideration of the ETOPS mission. We agree with the ARAC's apparent intent that these paragraphs, in conjunction with the new sections 25.1535(a) and (b), codify paragraphs 8(b)(1), 8(b)(6), 8(b)(7) and 8(c)(4) of AC 120-42A for the electrically powered ETOPS significant systems. These paragraphs establish the overall system safety objectives for these systems in extended operations.

The proposed rule is not as explicit as AC 120-42A in stating the types of functions that an applicant would need to consider in applying the safety objectives of section 25.1309 for an ETOPS mission. The general philosophy of the proposed rule is to let the existing policy associated with section 25.1309 compliance determine the design analysis for ETOPS. This philosophy is consistent with paragraph (c)(1) of the Boeing Model 777 ETOPS special conditions, which requires the applicant to comply with part 25 with regards to the ETOPS mission. Although we discuss this regulatory philosophy here in reference to the specific electrical power supply system requirements, it also applies to other ETOPS significant systems that are not specifically addressed in the proposed rule.

The FAA's intent for paragraphs I(a)(2)(i) and (ii) is to assure that the applicant properly focuses on electrical power redundancy and reliability when considering ETOPS mission scenarios in showing compliance with section 25.1309. On a two-engine airplane, the potential lack of redundancy available for electrical power generation makes this requirement especially important. However, the new emphasis is in paragraph (ii). It will be up to the applicant to demonstrate which functions would reduce the capability of the airplane or the ability of the crew to cope with adverse operating conditions. It is not realistic, for instance, for an applicant to state that operating for an extended period of time on suction feed would not reduce the capability of the airplane to cope with adverse operating conditions (for example, negative g or turbulence). Additionally, the applicant would have to determine what navigation and communication systems

must be powered by emergency generation sources during a worst case ETOPS diversion.

##### I(a)(2)(iii)

This paragraph would require at least three independent electrical generation sources for airplanes being certified for greater than 180 minutes.

##### Explanation

Paragraph I(a)(2)(iii) would codify the three generator requirement of paragraph 8.(b)(8) in AC 120-42A. However, the ARAC recommendation only applies this requirement to airplanes being certified for greater than 180-minute ETOPS. The AC specifies three generators for any ETOPS approval. This specific requirement created much discussion within the ARAC ETOPS Working Group. Paragraph I(a)(2)(iii) as proposed in this notice represents the compromise position that allowed working group consensus. The following paragraphs are the ARAC's recommended justification for this requirement. The FAA is publishing them without comment.

This topic is inextricably linked to the discussion about MMELs. The MMEL or Master Minimum Equipment List allows an airplane operator to fly without equipment not on this fully functioning. There is concern that without a specific number of generators required in the rule, the MMEL could strip away some of the redundancy required for long-range flight. The arguments against a prescriptive number are generally as follows:

(1) Defining a number of generators would not assure proper system reliability (for example, is it better to have three generators with a Mean Time Between Failures (MTBF) of 20,000 hours each, or four generators with an MTBF of 3,000 each?)

(2) Defining a number of generators would either artificially constrain or give a "pass" to future airplane designs. For instance, if a new airplane had a system architectural need for 8 generating systems, requiring three in the ETOPS rule would not assure an adequately safe design.

(3) Trying to address the formation of the MMEL in part 25 is impractical and inconsistent with agreed-to policies for MMEL development.

"Nonetheless, it was agreed that there should be a tie-in between the analysis performed for Part 25 ETOPS approval and the analysis the Flight Operations Evaluation Review Board (FOEB), who develop the MMEL, used in determining dispatch criteria. This is almost always the case in today's process, but