DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. 96–CE–01–AD; Amendment 39–9587; AD 96–09–11]

RIN 2120–AA64

Airworthiness Directives; de Havilland, Inc. DHC–6 Series Airplanes

AGENCY: Federal Aviation Administration, DOT.

ACTION: Final rule.

SUMMARY: This amendment adopts a new airworthiness directive (AD) that applies to de Havilland DHC–6 series airplanes. This action requires revising the Airplane Flight Manual (AFM) to provide the flight crew with recognition cues for, and procedures for exiting from, severe icing conditions, and to limit or prohibit the use of various flight control devices. This amendment is prompted by results of a review of the requirements for certification of the airplane in icing conditions, new information on the icing environment, and icing data provided currently to the flight crews. The actions specified by this AD are intended to minimize the potential hazards associated with operating the airplane in freezing rain or freezing drizzle conditions by providing more clearly defined procedures and limitations associated with such conditions.

EFFECTIVE DATE: June 11, 1996.

ADDRESSES: Information that relates to this AD may be examined at the Federal Aviation Administration (FAA), Central Region, Office of the Assistant Chief Counsel, Attention: Rules Docket 96–CE–01–AD, Room 1558, 601 E. 12th Street, Kansas City, Missouri 64106.

FOR FURTHER INFORMATION CONTACT: Mr. John Dow, Aerospace Engineer, FAA, Small Airplane Directorate, 1201 Walnut, suite 900, Kansas City, Missouri 64106; telephone (816) 426–6934; facsimile (816) 426–2169.

SUPPLEMENTARY INFORMATION: A proposal to amend part 39 of the Federal Aviation Regulations (14 CFR part 39) to include an AD that would apply to de Havilland DHC–6 series airplanes was published in the Federal Register on January 25, 1996 (61 FR 2175). The action proposed to require revising the Airplane Flight Manual (AFM) to specify procedures that would prohibit flight in freezing rain or freezing drizzle conditions (as determined by certain visual cues), limit or prohibit the use of various flight control devices, and provide the flight crew with recognition cues for, and procedures for exiting from, severe icing conditions.

Disposition of Comments

Interested persons have been afforded an opportunity to participate in the making of this amendment. Due consideration has been given to the comments received.

In addition to the proposed rule described previously, in January 1996, the FAA issued 17 other similar proposals that address the subject unsafe condition on various airplane models (see below for a listing of all 18 proposed rules). These 17 proposals also were published in the Federal Register on January 25, 1996. This final rule contains the FAA's responses to all public comments received for each of these proposed rules.

Docket No.	Manufacturer/airplane model	Federal Register citation
96–CE–01–AD	de Havilland DHC–6 Series	61 FR 2175
96–CE–02–AD	EMBRAER EMB–110P1/EMB–110P2	61 FR 2183
96–CE–03–AD	Beech 99/200/1900 Series	61 FR 2180
96–CE–04–AD	Dornier 228 Series	61 FR 2172
96–CE–05–AD	Cessna 208/208B	61 FR 2178
96–CE–06–AD	Fairchild Aircraft SA226/SA227 Series	61 FR 2189
96–CE–07–AD	Jetstream 3101/3201	61 FR 2186
96–NM–13–AD	Jetstream BAe ATP	61 FR 2144
96–NM–14–AD	Jetstream 4101	61 FR 2142
96–NM–15–AD	British Aerospace HS 748 Series	61 FR 2139
96–NM–16–AD	Saab SF340A/SAAB 340B/SAAB 2000 Series	61 FR 2169
96–NM–17–AD	CASA C–212/CN–235 Series	61 FR 2166
96–NM–18–AD	Dornier 328–100 Series	61 FR 2157
96–NM–19–AD	EMBRAER EMB–120 Series	61 FR 2163
96–NM–20–AD	de Havilland DHC–7/DHC–8 Series	61 FR 2154
96–NM–21–AD	Fokker F27 Mark 100/200/300/400/500/600/700/050 Series	61 FR 2160
96–NM–22–AD	Short Brothers SD3–30/SD3–60/SD3–SHERPA Series	61 FR 2151
95–NM–146–AD	Aerospatiale ATR–42/ATR–72 Series	61 FR 2147

Comment 1. Support for the Proposals

Numerous commenters support the FAA's intent to minimize the potential hazards associated with operating airplanes of any type design in severe icing conditions. One commenter states that the limitation prohibiting the use of flaps while enroute and during holding in icing conditions will be a positive contribution to safety. Additionally, several commenters support the requirement of the proposed AD for Aerospatiale airplanes for installation of modified deicing boots on the outer leading edges of the wings. One of these commenters states that the incorporation of AFM procedures, in addition to installation of the modified boots, provide a substantial margin of safety for the Aerospatiale fleet.

Comment 2. Requests Concerning References to ''Freezing Rain/Freezing Drizzle''

Raytheon requests that references to a class of meteorological conditions in the limitations described as ''freezing rain or freezing drizzle'' should be removed from the proposed rules. Raytheon contends that instructions for the flight crew should be restricted to hazardous conditions that are defined by the accumulation of ice. The commenter states that the term ''severe icing'' has a specific meaning as defined in the Aeronautical Information Manual: ''The rate of accumulation is such that the icing/anti-icing equipment fails to reduce or control the hazard. Immediate diversion is necessary.'' The commenter states that, although freezing rain or freezing drizzle may involve drops larger than those specified in Appendix C of part 25 (''Airworthiness Standards: Transport Category Airplanes'') of the Federal Aviation Regulations (14 CFR part 25), flight into those conditions does not always result in accumulation

of ice beyond the capability of the aircraft nor is severe icing always the result of freezing rain or freezing drizzle. Raytheon concludes that the limitation specified in paragraph (a)(1) of the proposals which reads, ''Flight in meteorological conditions described as freezing rain or freezing drizzle, as determined by the following visual cues, is prohibited,'' is an inference or conclusion that does not follow from the premises.

The European Regional Airlines (ERA) Association states that the proposals define visual cues to be used to identify ''freezing rain'' and ''freezing drizzle,'' but these criteria are inconsistent with the criteria defined by the International Civil Aviation Organization (ICAO) and used by weather observers in aviation meteorological support services. The FAA infers from this remark that ERA requests the use of ICAO terminology associated with the visual cues.

The FAA concurs partially. The FAA concurs that most of the references to ''freezing rain/freezing drizzle'' can be removed from the final rules. The FAA has revised the final rules to replace certain references to freezing rain and freezing drizzle with the words ''severe icing.'' The FAA finds that since the visual cues contained in paragraph (a)(1) of these final rules indicate that icing conditions have exceeded the limits of the ice protection equipment, the use of the terminology ''severe icing'' is appropriate. As stated by one commenter, ''severe icing'' is terminology used to describe icing conditions that exceed the capabilities of the ice protection equipment. The terminology ''severe icing'' is commonly used and understood within the aviation community. Additionally, there should be no confusion over the use of this term in the final rules because the AFM revisions required by these AD's define the terminology ''severe icing'' by specifying the visual cues that indicate when the capabilities of the ice protection equipment have been exceeded. However, the FAA would consider a request for approval of an alternative method of compliance to use terminology other than ''severe icing'' in an AFM, in accordance with the provisions of these AD's, provided that adequate justification is presented to support such a request.

Any inconsistencies that may exist between the criteria used by weather specialists to define ''severe icing'' and the criteria stated in these final rules are not relevant for these AD's because these AD's do not require the flight crew to take any action based on information provided by a weather observer. For these AD's, the flight crew must only take action if certain visual cues are present on the airplane.

The FAA has determined that reference to freezing rain and freezing drizzle should not be removed from the text of the ''Caution'' that appears in paragraph (a)(2) of the proposals. [Note: The ''Caution'' appears as the ''Warning'' in paragraph (a)(1) of the final rules. An explanation of this change is contained in the disposition of Comment 49 of these final rules.] Reference to freezing rain and freezing drizzle in that portion of text is made simply to provide a description of conditions that may result in ice build-up that exceeds the capabilities of the ice protection system.

Comment 3. Request for Review of ''Severe Icing'' Terminology

One commenter, the Civil Aviation Authority (CAA), which is the airworthiness authority for the United Kingdom, requests that use of the terminology ''severe icing'' be reviewed. The CAA does not believe it is appropriate that this terminology becomes accepted for supercooled large droplet (SLD) conditions. The CAA indicates that a common interpretation for ''severe icing'' is that beyond the limit specified in Appendix C of part 25 of the Federal Aviation Regulations (14 CFR part 25), which is at or just over the capability of the ice protection system.

The FAA has reviewed the use of the terminology ''severe icing'' as related to SLD. The FAA finds that ice resulting from SLD conditions may not always meet the criterion specified in the common interpretation of ''severe icing,'' as described by the commenter. The FAA notes that while SLD conditions may result in the formation of severe icing, severe icing also may accrue in conditions such as liquid water content, temperature, or extent of cloud, when those conditions exceed the limits specified in Appendix C of part 25 of the Federal Aviation Regulations (14 CFR part 25). As explained previously, most references to freezing rain and freezing drizzle have been replaced with the terminology ''severe icing.'' Additionally, the AFM's for the affected airplanes include a definition of severe icing.

Comment 4. Request To Withdraw the Proposals: Significant Economic Impact on Operating Community

A number of commenters request that the proposals be withdrawn because the effect of these proposed AD's will produce a significant economic impact on the operating community. The commenters indicate that many flights would need to be canceled in order to make all reasonable efforts to avoid encounters with freezing rain/freezing drizzle conditions—i.e., when these conditions are forecast, airplanes will be prohibited from flight into those conditions. One commenter remarks that, based on the actual weather in January 1996, nearly 75 percent of its scheduled flights would have been canceled due to forecast or actual freezing rain or freezing drizzle conditions if the AD's had been in effect. The commenters do not believe that the FAA has considered the economic factors affected by the proposed actions, such as the number of flights lost per day, crew costs, passenger compensation, misconnected baggage, etc.

If the FAA does not withdraw the proposals, one commenter states that the prohibition of flight in freezing rain or freezing drizzle, as specified in paragraph (a)(1) of the proposals, should be revised. The commenter suggests the following: ''The aircraft should be immediately flown clear of icing conditions if ice is seen forming on the upper surface of the wing behind the leading edge deice boots.'' The commenter believes that the current wording in the proposals would cause flight crews to cancel or delay departure not only when freezing rain or freezing drizzle exists, but also when those conditions are forecast.

The FAA concurs partially. The FAA finds that some misunderstanding exists among the commenters concerning the intent of these AD's. Many of the commenters believe that the AD's will prevent affected airplanes from flight in forecast freezing rain and freezing drizzle. This is not the case. The FAA agrees that certain language contained in the AD's must be clarified to reflect its intent. The FAA has evaluated the wording proposed by one of the commenters and agrees with it in principal. However, the FAA has determined that the first limitation in paragraph (a)(1) of the final rules must be revised in order to accommodate visual cues other than that specified by the commenter, to incorporate terminology familiar to the flight crew, and to emphasize that these AD's address only in-flight icing encounters. Additionally, in order to ensure that appropriate coordination with Air Traffic Control is accomplished, the FAA has revised the instruction following the visual cues in paragraph (a)(1), and has moved that instruction to the end of the first limitation in paragraph (a)(1) of the final rules. The entire limitation reads as follows: ''During flight, severe icing conditions

that exceed those for which the airplane is certificated shall be determined by the following visual cues. If one or more of these visual cues exists, immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the icing conditions.'' (Operators should note that, in the final rule for Aerospatiale airplanes, only one visual cue is specified. That cue involves ice on the side window of the airplane.)

Several commenters question certain issues related to dispatch of the airplane in severe icing conditions. One commenter states that the procedures specified in the proposed AD's fail to address the conditions that would prohibit takeoff in freezing rain and freezing drizzle. The commenter believes the visual cues provided in the proposals would only appear on an airplane during flight. Thus, allowable conditions for takeoff during times of forecast freezing rain or freezing drizzle are left to the individual operator's interpretation. Another commenter believes that the FAA has not established a basis for prohibiting flight in all reported freezing drizzle. The commenter contends that takeoff in freezing rain should always be prevented, but takeoff in freezing drizzle should be possible after applying appropriate deicing or anti-icing treatments. One commenter requests that the FAA clarify how the procedures for exiting freezing rain/freezing drizzle conditions would apply to takeoff and landing. The commenter states that landing during those conditions might, in many cases, be the most expeditious method of avoiding a hazardous condition. Another commenter suggests that the AFM for Aerospatiale airplanes should be revised to reflect standard dispatch rules; however, the commenter provides no justification for this request.

The FAA concurs that visual cues that would prohibit takeoff in freezing rain or freezing drizzle were not provided because the FAA's intent is that these AD's address only in-flight icing encounters. These AD's do not affect any existing regulations or FAA-approved operating procedures related to takeoff, dispatch, or release of an airplane in icing conditions. These AD's only prohibit remaining in icing conditions when certain visual cues are present on the airplane; these AD's do not prohibit flight into forecast or reported freezing drizzle. Operators must comply with existing rules that require an airplane to be free of ice prior to takeoff. Further, the FAA finds no need to revise the AFM for Aerospatiale airplanes to reflect standard dispatch rules. The FAA also considers that landing the airplane when freezing rain/freezing drizzle conditions are encountered would, in many cases, be the most expeditious method of exiting the conditions. Such landing would be in compliance with the limitation that requires the flight crew to exit the severe icing conditions.

Two commenters indicate that the first note that appears in paragraph (a)(1) of the proposed rules could be interpreted to mean that if freezing rain or freezing drizzle is forecast anywhere along the route of flight, the airplane could not be dispatched. One of the commenters concludes that forecasting methodologies are inadequate and would need to be improved. The other commenter suggests that the FAA remove the word ''purely'' from the note. The same commenter requests that the FAA clarify that the airplane may be dispatched if the forecast may indicate freezing rain/freezing drizzle conditions. Another commenter indicates that the wording of the same note is unclear as to how the FAA defines a ''purely'' inadvertent encounter. The commenter states that examples of such purely inadvertent encounters would be helpful.

One commenter asks the following questions in regard to the same note:

—What are ''reasonable efforts?''

—What does ''immediately exit'' mean? Are the procedures for immediately exiting listed in the Air Traffic Controller's Handbook or the Airman's Information Manual? Can a pilot operating the airplane in a holding pattern decide on his/her own to immediately descend below the freezing level without regard to other traffic?

One commenter states that the note should be placed in the Normal Procedures Section of the AFM, rather than in the Limitations Section. The commenter provides no justification for this request.

The FAA concurs that clarification of this note is necessary. The FAA originally included the note in the AD's to clarify the intent of the rules. Since the first instruction and the limitation that follows have been revised in these final rules, the FAA finds that inclusion of the clarifying note is no longer necessary. In order to avoid any possible misinterpretation of the intent of the limitation on flight in freezing rain or freezing drizzle, the FAA has removed the first note that appeared in paragraph (a)(1) of the proposals. These AD's do not prohibit flight into forecast or reported freezing rain or freezing drizzle. This means that the aircraft is not prohibited from takeoff, dispatch, or release simply because the forecast may indicate freezing rain or freezing drizzle, but is prohibited from continued flight in severe icing conditions.

Comment 5. Request To Withdraw the Proposals: No Unsafe Condition Has Been Established

Several commenters request that the proposals be withdrawn because no unsafe condition has been established with respect to airplane handling characteristics in severe icing conditions. One commenter states that the preamble of the proposals does not provide data that establish an unsafe condition; the preamble only indicates that there are inadequate data to represent all possible conditions. Another commenter remarks that the FAA's dismissal of the significance of the test results with the specious comment, ''such airplanes could develop ice shapes other than those tested,'' is wholly speculative, and is an invalid basis on which to issue an AD under the provisions of part 39 (''Airworthiness Directives'') of the Federal Aviation Regulations (14 CFR part 39).

The FAA does not concur that these AD's should be withdrawn. As stated in the preamble to the proposals, the FAA has not required that airplanes be shown to be capable of operating safely in icing conditions outside the icing certification envelope specified in Appendix C of part 25 of the Federal Aviation Regulations (14 CFR part 25). This means that any time an airplane is flown in icing conditions for which it is not certificated, there is a potential for an unsafe condition to exist or develop and the flight crew must take steps to exit those conditions expeditiously. Further, the FAA has determined that flight crews are not currently provided with adequate information necessary to determine when an airplane is operating in icing conditions for which it is not certificated or what action to take when such conditions are encountered. The absence of this information presents an unsafe condition because without that information, a pilot may remain in icing conditions for which the airplane has not been proven to be safe. These AD's correct the unsafe condition by requiring AFM revisions that provide the flight crews with visual cues to determine when icing conditions have been encountered for which the airplane is not certificated, and by providing procedures to safely exit those conditions.

Additionally, in the preamble to the proposed rules, the FAA discussed the investigation of roll control anomalies to explain that this investigation was not a

complete certification program. The testing was designed to examine only the roll handling characteristics of the airplane in certain droplets the size of freezing drizzle. The testing was not a certification test to approve the airplane for flight into freezing drizzle. The results of the tests were not used to determine if these final rules were required, but rather to determine if design changes were needed to prevent a catastrophic roll upset. The roll control testing and the AD's must be viewed as two unrelated actions.

Comment 6. Request To Withdraw the Proposals: Unsafe Condition Is Outside Certification Limits

One commenter states that the proposed AD's should be withdrawn because the issuance of AD's to address the problems of icing encounters outside of the limits for which the airplane is certificated is a completely inappropriate application of part 39 of the Federal Aviation Regulations (14 CFR part 39). Another commenter contends that since the Aerospatiale aircraft passed all present certification testing, what transpired beyond the limits of certification should not be held against that aircraft.

The FAA does not concur that the AD's should be withdrawn on the basis that the unsafe condition is outside the icing certification envelope. Flight in icing conditions that are outside the icing certification envelope occurs during the normal service life of an airplane. Apart from the visual cues provided in these final rules, there is no existing method provided to the flight crews to identify when the airplane is in a condition that exceeds the icing certification envelope. The appropriate vehicle for providing this method of identification is through issuance of an AD. The FAA acknowledges that the Aerospatiale airplane has been shown to comply with existing certification rules; however, no airplane is certificated for flight in icing conditions outside of Appendix C of part 25 of the Federal Aviation Regulations (14 CFR part 25).

Comment 7. Request To Withdraw the Proposals: Proposals Unfairly Discriminate Against Turbopropeller-Powered Aircraft

Several commenters state that the proposed AD's should be withdrawn because the AD's unfairly discriminate against turbopropeller-powered aircraft. The commenters contend that by issuing these proposed rules, the FAA is creating a public perception that turbopropeller-powered aircraft are less safe than other aircraft.

Numerous commenters oppose the statement contained in the preamble of the proposals which indicates that since turbopropeller-powered airplanes are more likely to operate at low altitudes and to make more frequent landings, they are more likely to encounter icing conditions that are outside the icing envelope. One commenter states that the mere fact that turbopropeller-powered airplanes make more frequent landings is irrelevant for the following reasons:

—Every flight encounters the same atmospheric conditions after takeoff and prior to landing, whether the airplane is powered by a turbopropeller or turbojet engine;

—There are numerous airplanes powered by turbojet engines that operate on segments equal in duration to those operated by many turbopropeller-powered aircraft; numerous airplanes powered by turbojet engines make just as frequent landings; and

—Even if turbopropeller-powered aircraft do make more frequent landings, there is no negative inference to be drawn from that fact; more opportunities are available to ensure that ice has not formed on the aircraft if the aircraft lands more frequently.

One commenter states that the altitudes where SLD conditions exist are the same altitudes at which jets would encounter those conditions during the departure and arrival phases of flight. Flight in SLD conditions that would have a negative effect on a turbopropeller-powered airplane would have the same effect on a jet, since both are certificated under the same rules with regard to flight into adverse weather, and both fly at about the same speeds during the departure and arrival phases of flight. Additionally, another commenter adds that no airplane, whether it is powered by a turbopropeller, turbojet, or turbofan engine, is certificated for operation in SLD conditions.

Another commenter indicates that icing encounters take place at altitudes below the cruising altitudes of most turbopropeller-powered aircraft used in scheduled service; this also occurs on airplanes powered by turbojet engines. Icing encounters occur during takeoff, climb, descent, holding, and landing phases of flight on both types of aircraft. The commenter adds that operating the airplane in a holding pattern for a prolonged period in severe icing conditions is hazardous for both turbojet and turbopropeller-powered aircraft. The commenter explains that, although the exposure time per flight hour of a long-haul jet aircraft is less, the exposure on a per flight basis is exactly the same. The commenter states that, like landing gear life limits, the proper measure of exposure to freezing rain/freezing drizzle should be the number of flights, not the number of flight hours.

Another commenter, Saab, states that Saab Model SAAB 2000 series airplanes have a unique power-to-weight ratio, which makes it comparable with airplanes of the same size and, in some relevant areas such as climb performance and single engine ceiling, even far superior. Operators of those airplanes can operate the aircraft over-the-weather at flight level (FL) 310. This means that these Saab airplanes operate on jet profiles and, therefore, are not exposed to the icing conditions that are outside the icing envelope any more than the airplanes that are excluded from the proposals.

The FAA does not concur that the proposals should be withdrawn. The FAA does not intend to imply through issuance of these AD's that turbopropeller-powered airplanes are less safe than airplanes having other types of propulsion systems. As stated in the preamble of the proposals, the FAA addressed certain airplanes as a higher priority for two reasons:

—Turbopropeller-powered airplanes are more likely to operate at low altitudes and to make more frequent landings; therefore, they are more likely to encounter icing conditions that are outside the icing envelope specified in Appendix C of part 25 of the Federal Aviation Regulations (14 CFR part 25); and

—The flight crew of an airplane having an unpowered roll control system must rely solely on physical strength to counteract roll control anomalies, whereas a roll control anomaly that occurs on an airplane having a powered roll control system need not be offset directly by the flight crew.

Since the issuance of the proposed rules, the FAA has reconsidered this reasoning. The FAA acknowledges that simply because an airplane is turbopropeller-powered and has a particular flight profile, that airplane should not be addressed as a higher priority. However, this does not diminish the significance of the necessity of the flight crew of an airplane having an unpowered roll control system to rely on physical strength to counteract roll control anomalies. The subject airplanes all have pneumatic deicing boots and unpowered aileron controls, which have been common denominators in the accident and incident history

concerning flight in icing conditions and, in particular, during conditions when SLD was believed to be present. Therefore, airplanes having those design features are of immediate concern to the FAA and were addressed as a higher priority. Additionally, these AD's primarily address airplanes used in regularly scheduled passenger service in the United States.

The FAA finds that the comment indicating that more frequent landings provides more opportunity to verify that ice has not formed is irrelevant. It also could be said that more frequent landings gives more opportunity for ice to form. The FAA agrees with the statement that holding for prolonged periods in severe icing conditions is hazardous for all aircraft types. The FAA is considering initiating an assessment of the need to prohibit all aircraft from continued flight in severe icing conditions as defined in these AD's.

Although Transport Canada Aviation does not request that the proposed AD's be withdrawn, the commenter indicates that roll control anomalies could exist for all aircraft whether they have powered or unpowered roll control systems. Transport Canada Aviation adds that some jet-powered aircraft have unpowered ailerons.

The FAA concurs that roll anomalies could exist for all aircraft whether they have powered or unpowered roll control systems. However, these AD's address airplanes having both deicing boots and unpowered aileron controls. The FAA acknowledges that other airplanes that have powered ailerons may be subject to roll problems in severe icing conditions due to loss of lift. However, the FAA is not aware of a mechanism that would allow ice to produce an uncommanded control deflection on airplanes having powered flight control systems. In addition, airplanes having powered roll control systems do not have direct feedback of aerodynamic forces to the pilot. However, the FAA is considering initiating an assessment of the need to apply similar limitations to other aircraft types.

Comment 8. Request To Withdraw the Proposals: Affected Airplanes Are Not Same Type Design as Accident Airplane

Several commenters contend that the proposals should be withdrawn because the FAA has not established clearly that the airplanes addressed in the proposed rules have the same type design as the Aerospatiale Model ATR–72 series airplane that was involved in an accident in October 1994 that occurred in severe icing conditions.

One commenter questions the words ''same type design,'' and asks if those words refer to high wing, low wing, T-tail, or aircraft of another type design.

Three commenters provide justification in support of a request that certain airplanes be exempt from these AD's:

- de Havilland Model DHC–7 and DHC–8 series airplanes: De Havilland states that the airplanes it manufactures share a conservative aerodynamic design philosophy that yields exceptional low-speed handling qualities and demonstrated benign handling qualities in icing conditions. De Havilland adds that two-thirds of the roll control authority of these airplanes is provided by hydraulically powered roll spoilers. A second commenter adds that increased testing has been conducted on these airplanes.
- Fokker F27 Mark 100, 200, 300, 400, 500, 600, 700, and 050 series airplanes: Fokker states that the leading edge boots on Fokker Model F27 series airplanes and Model F27 Mark 050 series airplanes extend to a chord wise position, 12.5 percent wing chord, which precludes all but the very largest droplets impinging on the unprotected surfaces. Fokker adds that since the accident airplane has unshielded horn balances and the affected Fokker airplanes do not have these unshielded horn balances, Fokker airplanes will not experience roll upset problems. Fokker indicates that aerodynamically balancing the control surfaces by means of unshielded horn balances was not applied because of the bad service experience of the Vickers Viking aircraft in 1946.
- Beech Model 200 and 200C airplanes: Raytheon states that these particular airplane models are not normally considered to be commuter aircraft, and that issuance of an AD would be contrary to the stated purpose of the proposals because most of these airplanes are used in non-revenue service. Raytheon states that these airplanes are all low wing aircraft. Aerospatiale Model ATR–72 series airplanes (the accident airplane) is 50 percent larger and carries over twice the number of passengers as these Beech aircraft. For these reasons, as well as other differences in the geometry of the airplanes (i.e., relative aileron span), Raytheon states that the supposition of an icing hazard in these aircraft is purely speculative.

The FAA does not concur that any of the addressed airplanes should be exempt from these AD's. The FAA has examined the accident and incident history in icing conditions and, in particular, those events believed to involve SLD conditions. Results of this examination revealed that the type design characteristics that appear to be common in these events are pneumatic deicing boots and unpowered aileron controls. Airplanes having those type design characteristics appear to be more susceptible to control problems in severe icing conditions. In response to Fokker's remark that its airplanes will not experience roll control problems since those airplanes do not have unshielded horn balances, the FAA has determined that horn balances on the accident airplane were not the source of the uncommanded aileron motion. Design similarities of the wing, tail, or ailerons do not appear to be a common denominator among airplanes involved in accidents or incidents where SLD conditions may have been present.

Saab asks for removal of the sentence that reads, ''Since an unsafe condition has been identified that is likely to exist or develop on other airplanes of the same type design * * *.'' Saab states that this sentence implies that Saab Model SF340A and SAAB 340B series airplanes have a problem and that this problem is ''likely to develop on other airplanes of the same type design.'' Yet, there have been no reported problems on those airplanes, which are not of the same type design as all other turbopropeller-powered airplanes. Transport Canada Aviation does not request that the proposals be withdrawn; however, the commenter requests that the FAA revise the same phrase discussed by Saab. Transport Canada Aviation requests that the phrase be reworded as follows: ''Since an unsafe condition has been identified where aircraft icing certification is not adequate to address the conditions that are outside of Appendix C of FAR part 25 * * *.''

The FAA does not concur with Saab's request. The FAA acknowledges that there have been no reported problems involving severe icing conditions on Saab airplanes. However, Saab Model SF340A and SAAB 340B series airplanes have pneumatic deicing boots and unpowered aileron controls, which have been determined to be the common denominators among the airplanes involved in accidents and incidents in severe icing conditions. Therefore, the FAA has determined that when severe icing conditions are encountered on these Saab airplanes, those conditions must be exited.

Although the FAA has no technical objection to the revised wording proposed by Transport Canada Aviation, this sentence does not reappear in the final rules. Therefore, no change to the final rule is necessary.

Comment 9. Request for Explanation of the Applicability of the AD's

One commenter requests an explanation of the methodology used by the FAA to determine that AD's should not be issued for Cessna and Piper multi-engine aircraft. The commenter also asks if an AD similar to the proposed rules exists for Boeing Model 737 series airplanes. The commenter indicates that Model 737 series airplanes have demonstrated abnormal and unexplained roll tendencies.

The FAA provides the following clarification for this commenter. No AD's have been issued for Piper airplanes or Boeing Model 737 series airplanes. However, as reflected in the table above, the FAA has issued an AD for Cessna Model 208 and 208B airplanes.

Most of the aircraft affected by these final rules are used primarily in regularly scheduled passenger service in the United States. However, there are some airplanes affected by the final rules that are not used in regularly scheduled passenger service. Two of these are Cessna Model 208 and 208B airplanes. Those airplanes were included in the final rules because of their accident and incident history in icing conditions. The FAA is considering an assessment of the need to prohibit all aircraft from continued flight in severe icing conditions.

Comment 10. Request To Withdraw the Proposals: Service Experience of Affected Airplanes Is Satisfactory

Several commenters indicate that the FAA should withdraw the proposed AD's in light of the satisfactory service experience of the airplanes addressed in the proposals. The commenters believe that the FAA is singling out turbopropeller-powered aircraft without any regard for the operational record of those aircraft.

Several commenters provide justification in support of this request:

- One commenter states that de Havilland airplanes have been successfully operated for over 30 years without one instance of roll upset or flight control problems.
- De Havilland indicates that de Havilland Model DHC–8 series airplanes have been in service for 11 years and have accumulated 6 million flights and 5 million flight hours without any incidents due to icing.
- De Havilland adds that de Havilland Model DHC–7 series airplanes have been in service for 18 years and have accumulated 3.7 million flights and 2.7 million flight hours without any incidents due to icing.
- Another commenter has not experienced any icing related upsets or control irregularities in its fleet of de Havilland Model DHC–8 series airplanes and Beech Model 1900 series airplanes.
- One commenter operates 21 Beech Model 1900D airplanes, 32 EMBRAER Model EMB–120 series airplanes, and 41 Aerospatiale Model ATR–42 and ATR–72 series airplanes; none of these airplanes have experienced any icing incidents this season.
- One commenter indicates that airplanes produced by Beech, EMBRAER, and Jetstream Aircraft Limited (JAL) have no record of uncommanded roll due to asymmetrical build-up of ice on surfaces beyond the deicing boots.
- One commenter notes that it has not experienced any unusual icing characteristics on its fleet of EMBRAER Model EMB–120 series airplanes and Aerospatiale Model ATR–72 series airplanes.
- Fairchild notes that in over 26 years and 15,000,000 flight hours in passenger service, there has never been a reported incident where the controllability of Fairchild Aircraft SA226 and SA227 series airplanes were in jeopardy as a result of any icing encounters (including SLD icing encounters).
- The Luftfartsverket (LFV), which is the airworthiness authority for Sweden, states that no ice build-up behind the wing boots has ever been reported on Saab Model SF340A, SAAB 340B, or SAAB 2000 series airplanes. Additionally, the leading edge on these airplanes can be inspected easily during flight.
- Saab remarks that no roll anomaly problems in icing conditions have occurred during the extensive service experience of Saab Model SF340A and SAAB 340B series airplanes.

The FAA does not concur that the AD's should be withdrawn. The fact that an airplane has a perfect safety record in icing does not negate the fact that no airplane has been certificated for flight into SLD. The FAA has determined that a need exists to provide the flight crew with useful safety-related information regarding the limitations of the airplane concerning flight in severe icing conditions. The purpose of issuing these final rules is to provide the flight crew with such information.

One commenter, Transport Canada Aviation, requests that the proposals apply only to those airplanes that have a demonstrated history of in-service problems as a priority. The commenter states that the hazards relating to operation in icing conditions exist for all types of aircraft. (The commenter does not request that the proposed rules be withdrawn.)

The FAA does not concur with this request. As explained previously, the FAA has issued AD's for airplanes having pneumatic deicing boots and unpowered aileron controls as a priority. Airplanes having these design features are of immediate concern to the FAA because these features have been common denominators in the accident and incident history concerning flight in icing conditions and, in particular, during conditions when SLD was believed to be present. The FAA is considering the need for rulemaking to impose similar limitations on other aircraft.

Comment 11. Request To Withdraw the Proposals: Extensive Testing Revealed No Icing Problems

Several commenters request that the proposals be withdrawn because extensive testing revealed no icing problems on many different turbopropeller-powered airplanes, even though those tests likely exceeded any icing certification tests ever performed on other civil aircraft types, including large jet-powered transport category airplanes. Fokker states that Fokker Model F27 series airplanes do not demonstrate unacceptable roll control characteristics in severe icing conditions; however, Fokker submits no data to substantiate this statement.

The FAA does not concur. The FAA finds that successful completion of the roll upset evaluation is not a valid reason for withdrawing the AD's. On the contrary, if the evaluation had demonstrated anomalies, the FAA may have concluded that action beyond that required by these AD's was necessary to address the demonstrated unsafe condition. The testing was designed to examine only the roll handling characteristics of the airplane in certain droplets the size of freezing drizzle to determine if any design changes are necessary to prevent catastrophic control surface deflection. The testing was not a certification test to approve the airplane for flight into freezing drizzle since many of the components and their functions were not tested (e.g., pitch control, engine and propeller, performance, stall warning, windshield, air data sensors and fuel system vents). Further, freezing rain was not tested. Satisfactory demonstration of those tests does not remove the FAA's responsibility to provide a safe operating environment for the passengers and crew.

JAL comments that its airplanes are not subject to the addressed unsafe condition, and that the FAA had

concurred with this contention. JAL states that the FAA agreed that, by the controllability evaluation process, all Jetstream aircraft types had been demonstrated to be not susceptible to roll control anomalies in freezing rain or freezing drizzle conditions.

The FAA does not concur with JAL's position concerning its airplanes. All Jetstream airplanes affected by these AD's successfully completed the roll upset evaluation. However, as stated previously, no airplanes were tested in freezing rain conditions. The roll upset evaluation only addressed conditions that were believed to have existed during an accident involving a transport category airplane that occurred in October 1994. Therefore, since no airplane has been tested in all freezing rain and freezing drizzle conditions, no airplane has been demonstrated to be safe for continued flight in these conditions.

Comment 12. Request To Withdraw the Proposals: Publish Advisory Materials and Require Training

Several commenters request that, in lieu of issuing the proposed rules, the FAA publish appropriate advisory materials and require training for recognition, avoidance, and exit from severe icing encounters as part of the required severe weather training for pilots and dispatchers. Two commenters suggest that the FAA include such requirements in the operating rules specified in part 121 (''Certification and Operations: Domestic, Flag, and Supplemental Air Carriers and Commercial Operators of Large Aircraft'') of the Federal Aviation Regulations (14 CFR part 121). Another commenter indicates that, since jets and piston-engine aircraft also could develop ice shapes other than those tested, training should not be provided only to pilots of turbopropeller-powered airplanes, but to pilots of all aircraft. Some commenters also suggest that the FAA has successfully addressed other issues through increased awareness and training requirements, rather than by issuing AD's against every airplane type design to require revising the Limitations Section of the AFM. The commenters cite windshear, ground deicing, and clear air turbulence as examples of such issues. The commenters contend that, except where configuration changes are needed, such as in the case of windshear detection devices, improved awareness and training programs—not AD's—have been highly effective in achieving needed safety improvements.

The FAA does not concur. The FAA considers that substituting advisory material and mandatory training for issuance of an AD is not appropriate, nor would this adequately address the unsafe condition. The FAA fully supports the development of advisory materials and training. Part 121 (''Certification and Operations: Domestic, Flag, and Supplemental Air Carriers and Commercial Operators of Large Aircraft'') and part 135 (''Air Taxi Operators and Commercial Operators'') of the Federal Aviation Regulations (14 CFR parts 121 and 135) require that appropriate training concerning limitations such as those contained in these AD's be incorporated into air carriers' training programs. However, the FAA's position is that the development and use of such advisory materials and training alone are not adequate to address the subject unsafe condition. Currently, the AFM's specify that the affected airplanes are certificated for flight in icing conditions; however, the AFM's do not specify a method of determining whether the certification limits for those conditions have been exceeded. Consequently, the FAA finds that these AFM's must be revised to provide limitations for flight in icing conditions and to provide the flight crew with a method of determining when those limitations have been exceeded.

The FAA does not concur that amending part 121 of the Federal Aviation Regulations (14 CFR part 121) in lieu of issuing these AD's is appropriate. The FAA's position is that the appropriate place to inform the flight crew of the limitations of the airplane is in the AFM. The appropriate vehicle for mandating such AFM revisions is through issuance of an AD. In addition, an AD will ensure that the incorporation of such AFM revisions is not left to each operator's individual discretion and that flight crews receive pertinent information. The FAA may consider an assessment of the need to provide training to pilots of all aircraft types for flight in severe icing conditions.

The commenters reference windshear as an example of an issue that was handled successfully without issuance of an AD to revise the AFM's. In this case, the AFM's for all airplanes having an onboard windshear system were revised to provide the flight crew with procedures for responding when the system gives an alert. Although no AD was issued to mandate these AFM revisions, without revising the AFM, operators could not comply with the section of part 121 of the Federal Aviation Regulations (14 CFR part 121) that requires installation of the windshear detection devices. In conclusion, although AFM revisions were not required by an AD, AFM changes were mandated indirectly by a new part 121 regulation.

The commenters also reference ground deicing. Part 91 (''General Operating and Flight Rules'') of the Federal Aviation Regulations (14 CFR part 91) prohibits takeoff of an airplane unless the airframe is clear of ice; therefore, there is no need to provide additional limitations concerning the amount of ice that would be acceptable for takeoff. However, in the case of severe icing conditions addressed by these final rules, the AFM's currently allow flight in icing, but the AFM does not define when the limits of the certificated icing operation envelope have been exceeded.

Concerning the issue of clear air turbulence, issuance of an AD was not required because an airspeed limitation associated with turbulent air penetration was already in the AFM's. Therefore, in this case, the issue was addressed in the AFM as well as through awareness and training.

Comment 13. Request To Withdraw the Proposals: Incorporate Operational Issues Into a Training Curriculum

Two commenters request that the proposals be withdrawn because the proposed AD's address an operational issue that should be incorporated into an operator's training curriculum. One commenter states that pilots must be made aware of the hazards of icing and that extended operation of an airplane in any icing encounter that results in significant airframe accretion of ice is unacceptable.

The FAA does not concur that the AD's should be withdrawn based on the commenters' request. The FAA acknowledges that these AD's address an operational issue. When the requirements of these AD's are accomplished and the AFM limitations are revised, this material will be incorporated necessarily, as explained previously, into the training curriculum for the flight crews and dispatchers, if applicable, in the operator's approved training program. In this manner, pilots and dispatchers, if applicable, will be informed of the hazards of icing and that continued operation of an airplane in certain icing conditions is prohibited.

Comment 14. Request To Withdraw the Proposals: Require Training for Air Traffic Controllers and Weather Specialists

Two commenters request that the FAA implement additional policy to require training for air traffic controllers and weather specialists in the

recognition, avoidance, and procedures to exit severe icing conditions.

The FAA does not concur that these AD's should be withdrawn. However, the FAA acknowledges that implementation of these AD's may necessitate additional training beyond that which is already required for air traffic controllers and weather specialists. The FAA may consider the need to provide training concerning recognition, avoidance, and procedures for exiting severe icing conditions. However, the intent of these AD's is to provide the flight crew with recognition cues for, and procedures for exiting from, severe icing conditions. The appropriate vehicle for requiring that such information be included in the AFM's is through issuance of an AD.

Comment 15. Request To Withdraw the Proposals: Add a Caution to the AFM

One commenter requests that, in lieu of issuing the proposed AD's, a ''Caution'' should be added to the AFM to inform pilots to exit icing conditions if ice was observed to be forming aft of the protected surfaces of the wings. The commenter states that information regarding the use of flaps and the autopilot in icing conditions could also be incorporated into the AFM. The commenter does not indicate which section of the AFM should include this material.

The FAA does not concur. The FAA finds that the requirement to exit severe icing conditions and information concerning use of the autopilot during flight in those conditions must be included in the Limitations Section of the AFM. Additionally, information concerning use of the flaps during those conditions should be included in the Procedures Section of the AFM. The appropriate vehicle for requiring these changes to the AFM is through issuance of an AD.

Comment 16. Request To Withdraw the Proposals: Require Alternative AFM Limitation

One commenter requests that, in lieu of an AD, the FAA require an alternative AFM limitation that reads as follows: ''This aircraft is certified for flight into icing conditions as specified by Appendix C of Part 25. Actual icing encountered may be greater than Appendix C requirements.''

The FAA does not concur. The suggested limitation does not provide guidance as to how a pilot can identify and safely exit icing conditions that have exceeded those specified in the icing envelope in Appendix C of part 25 of the Federal Aviation Regulations (14 CFR part 25). These AD's are intended to provide the flight crew with visual cues which indicate that icing conditions have exceeded the capabilities of the ice protection equipment, and with procedures to safely exit those conditions. No change to the AD's is necessary.

Comment 17. Request To Withdraw the Proposals: AFM Revisions Already Are Required

One commenter requests that the proposals be withdrawn because section 121.133 (''Manual Requirements: 'Preparation' '') of the Federal Aviation Regulations (14 CFR 121.133) already requires that operators incorporate revisions into the AFM's; therefore, issuance of the proposed AD's is unnecessary.

The FAA does not concur. Section 121.133 of the Federal Aviation Regulations (14 CFR 121.133) does not specifically require that AFM's be updated to current revisions. Section 121.141 (''Airplane or Rotorcraft Flight Manual'') of the Federal Aviation Regulations (14 CFR 121.141) requires that the current AFM be carried on the aircraft, but does not require incorporation of the most current revisions. Additionally, the commenter does not address the need to change the AFM's for airplanes that operate under parts 135 (''Air Taxi Operators and Commercial Operators'') and 91 (''General Operating and Flight Rules'') of the Federal Aviation Regulations (14 CFR parts 135 and 91). The appropriate vehicle for ensuring that the Limitations Section of the AFM's is changed is through issuance of an AD.

Comment 18. Request To Withdraw the Proposals: Use Existing AFM Revisions

The General Aviation Manufacturers Association (GAMA), on behalf of its members, states that some of the affected manufacturers have prepared FAA-approved revisions for the AFM's for their products. GAMA indicates that those revisions incorporate specific information regarding cues for recognizing severe icing conditions and procedures for exiting such conditions, if encountered. Therefore, if the proposed AD's are adopted, the requirements of the AD's would supersede the information operators have already incorporated into the AFM's with less appropriate information that is not type design specific.

One commenter, JAL, requests that certain existing AFM revisions for the affected Jetstream airplanes be cited in the proposed AD's for those airplanes in lieu of the content of the proposed AD's. (However, JAL does not request that the proposals be withdrawn for this particular reason.) JAL indicates that the existing AFM revisions have already been FAA-approved.

The FAA does not concur with the commenters' requests. The FAA acknowledges that the AFM revisions required by these final rules will supersede previously approved AFM revisions. However, the FAA is unaware of any AFM that addresses all of the provisions specified in these final rules, nor of any AFM that contains specific visual cues that the FAA has not included in the final rules. Even if AFM material currently exists that does contain all of the provisions of the final rules, the FAA finds that issuance of an AD would still be necessary to mandate the provisions of the AFM revisions. However, the FAA would consider a request for approval of an alternative method of compliance, in accordance with the provisions of this AD, for those operators having AFM's that already contain all of the provisions of the final rules.

Another commenter requests that the FAA withdraw the proposal that applies to Fairchild Model SA226 and SA227 series airplanes. The commenter states that the AFM for those airplanes currently contains visual cues to aid the flight crew in recognition of weather conditions conducive to SLD. This AFM also provides procedures for avoidance of such conditions. The commenter adds that these AFM procedures result in additional operating limitations on the aircraft with regard to severe weather conditions. The commenter believes these AFM procedures address all current FAA requirements.

The FAA does not concur that the AFM for Fairchild Model SA226 and SA227 series airplanes addresses all of the proposed requirements of the proposed rule. For example, the Limitations section of the AFM for those airplanes does not require the flight crew to exit severe icing conditions. For this reason, the FAA does not consider the AFM for Fairchild Model SA226 and SA227 series airplanes to be equivalent to the information specified in these AD's.

Comment 19. Request To Withdraw the Proposals: Develop Rulemaking To Address Airplane Certification Outside of Appendix C

Three commenters suggest that instead of arbitrarily prohibiting operation of the airplane, the FAA should undertake a well-designed research program and, if warranted, devise a rulemaking plan for certification of airplanes outside of Appendix C of part 25 of the Federal

Aviation Regulations (14 CFR part 25). One commenter also suggests possible retroactive implementation of a new Appendix C.

The FAA does not concur because of the length of time that would be required to implement the commenters' suggestion. The FAA finds that action is required prior to the commencement of the next icing season to prohibit the continued flight of airplanes in icing conditions that have been shown to be unsafe and for which the airplanes have not been certificated. However, the FAA is currently considering initiating an assessment of the need to revise Appendix C and the possibility of its retroactive implementation.

Transport Canada Aviation states that the FAA has determined that there may be a problem with the certification requirements for icing on de Havilland Model DHC–6, DHC–7, and DHC–8 series airplanes, but not the specific approval or design features of those airplanes. However, the commenter does not specifically request that the proposals be withdrawn.

The FAA does not concur with the commenter's statement. The FAA has only determined that no adequate means exists for the flight crew to determine when the icing certification limits have been exceeded. The purpose of these AD's is to provide more clearly defined procedures and limitations associated with severe icing conditions. This does not imply that the certification requirements for icing are inadequate.

Comment 20. Request To Withdraw the Proposals: Issue a ''General AD'' for All Airplane Types

One commenter requests that a ''general AD'' be issued to prohibit all airplane types from inadvertent flight into hazardous SLD conditions. Another commenter adds that if encounters with freezing rain/freezing drizzle conditions must be reported to Air Traffic Control, such reporting also should apply to flight crews of all airplane types.

The FAA does not concur with the commenter's request. For the reasons discussed earlier in the preamble of this AD, the FAA has determined that airplanes having pneumatic deicing boots and unpowered aileron controls are of immediate concern and have been addressed as a higher priority. The FAA finds that action is required prior to the commencement of the next icing season to prohibit the operation of these airplanes in icing conditions that have been shown to be unsafe and for which the airplanes have not been certificated. However, the FAA is currently considering initiating an assessment of the potential adverse effects of SLD on all airplane types.

Comment 21. Request To Withdraw the Proposals: Establish a Detailed Reporting System

One commenter requests that the FAA establish a detailed reporting system for inadvertent encounters with severe SLD. The commenter envisions a system that would provide a database for better identification of controllability issues and visual indications related to these encounters.

The FAA does not concur with the commenter's request. The FAA has been advised that the Regional Airline Association (RAA) has already established an ''Unusual Icing Reporting Program'' for the purpose described by the commenter; therefore, establishing another reporting program would duplicate this benefit.

Comment 22. Request To Withdraw the Proposals: Revise the Master Minimum Equipment List (MMEL)

Two commenters request that, instead of addressing an MMEL item in an AD [i.e., the icing detection lights referenced in paragraph (a)(1) of the proposals], the FAA should require that the MMEL be revised. A third commenter adds that the decision to change the MMEL should be made by FAA Operations Inspectors based on local conditions. One commenter states that the prohibition of dispatch with any inoperative ice detection lights would preclude any efforts by an operator to enhance safety by installing a second set of bulbs. The commenter adds that under this proposed rule, this type of action would be penalized by simply doubling the chances of a burned out bulb grounding the aircraft. In practice, if one were to add a fully redundant set of bulbs, it would enhance safety by allowing the equivalent of the current illumination level even with a bulb burned out.

The FAA does not concur with these requests. FAA Operations Inspectors are not authorized to make MMEL revisions. The FAA has determined that it is prudent to address the icing detection lights in these final rules to ensure uniform and immediate application of the requirements of the AD's. Concerning the example provided by one of the commenters, if an operator chooses to add a fully redundant set of bulbs, that operator should request approval of an alternative method of compliance in accordance with the provisions of this final rule.

Although Transport Canada Aviation does not request that the proposals be withdrawn, it requests a revision to the requirement that all icing detection lights must be operative. For de Havilland Model DHC–7 and DHC–8 series airplanes, the commenter requests that the requirement be changed to mandate that at least one outboard and one inboard inspection light be operative prior to flight into known or forecast icing conditions at night. Since the MMEL contains a provision that a suitable lamp/light of adequate capacity be available, this is considered acceptable in conjunction with other indications of freezing rain or freezing drizzle. Similarly, for de Havilland DHC–6 series airplanes, the requirement should be revised to require a suitable lamp/light for dispatch at night with one wing inspection light inoperative.

The FAA does not concur. The FAA has determined that the justification provided by the commenter is not adequate to enable the FAA to determine if the proposed changes are acceptable. During severe icing conditions, the flight crew's workload may be high, and there may be no opportunity to use the portable lamp/light, which, in itself, may create disorientation in the cockpit due to adverse reflections from the glass. The FAA's intent in having all inspection lights be operative at night is to provide the flight crew the best possible visibility of the airframe. However, the FAA would consider a request for approval of an alternative method of compliance, in accordance with the provisions of these AD's, provided that adequate justification is presented to support such a request.

Comment 23. Request To Withdraw the Proposals: Certify Airplanes for Flight in Conditions Outside Appendix C

One commenter implies that the airplanes affected by the proposed rules must be rectified to a level beyond the present certification requirements for flight in icing.

The FAA does not concur. The final rules do not require certification of the airplane beyond the current certification requirements for flight in icing specified in Appendix C. These AD's simply provide the flight crew with visual cues which indicate that icing conditions have exceeded the capabilities of the ice protection equipment, and with procedures to safely exit those conditions.

One commenter requests that the proposal for de Havilland DHC–6 series airplanes be withdrawn because this airplane model is type certificated in Canada, which is a country with a higher standard than the United States for operating in icing conditions.

The FAA does not concur. This commenter did not submit data to the FAA to substantiate that the airplane has been shown to be safe for flight outside the icing certification envelope specified in Appendix C. Additionally, the FAA is unaware of any foreign civil aviation authority having certification requirements for icing conditions that are outside of the icing certification envelope used in the United States.

Comment 24. Request To Withdraw the Proposals: Proposals Prohibit Takeoff or Approach in ''Light Freezing Drizzle'' Conditions

One commenter requests the proposals be withdrawn because the proposed limitation would prohibit takeoff or approach when ''light freezing drizzle'' conditions that are caused by light precipitation falling through a thin layer of cold surface air below warmer air above are reported on the surface. The commenter maintains that with accomplishment of the appropriate ground deicing precautions prior to takeoff, no hazard to the operation of the airplane is posed.

The FAA does not concur that the AD's should be withdrawn for this reason. These AD's do not affect any existing regulations or FAA-approved operating procedures related to takeoff, dispatch, or release of an airplane in icing conditions, nor do these AD's prohibit operation in specific meteorological conditions. These AD's only prohibit remaining in icing conditions when certain visual cues are present on the airplane. Operators must comply with existing rules that require an airplane to be free of ice prior to takeoff. Therefore, takeoff in ''light freezing drizzle'' would only be prohibited by existing regulations or FAA-approved operating procedures, not by these AD's. As explained previously, the FAA considers that landing the airplane when freezing rain/freezing drizzle conditions are encountered would, in many cases, be the most expeditious method of exiting the conditions. Such landing would be in compliance with the limitation that requires the flight crew to exit the severe icing conditions.

Comment 25. Request To Withdraw the Proposals: Proposals Leave Unanswered Questions

One commenter contends that the proposals leave unanswered questions. The commenter alleges that without the answers to those questions, affected parties are deprived of the ability to provide informed comments and, thereby, are ''denied their rights under the Administrative Procedures Act (APA) to comment on the proposed rules.'' Specifically, the commenter asks:

—What is unusual icing?
—Does the pilot, Air Traffic Control, dispatch, or the FAA determine when the conditions exist?
—What is splatter effect?
—Where are the operating instructions incorporated—in the AFM, training manuals, or some other document?

The FAA infers from the commenter's remarks that the commenter requests the proposed AD's be withdrawn because informed comments could not be provided.

The FAA does not concur that the AD's should be withdrawn on this basis. The FAA does not agree that the public has been deprived of the ability to provide informed comments, as required by the APA. In general, the APA requires that notice of the terms or substance of a proposed rule be published in the Federal Register. The purpose of this requirement is to ensure that federal agencies thoroughly consider all information and opinions submitted by the public before any requirements are imposed. Notice is intended to improve both the quality of the regulations and their acceptability to the public. The FAA finds that none of the questions raised by the commenter identify areas in which the commenter has not been provided a reasonable opportunity to comment. The fact that the commenter raises questions suggests that the commenter considers a need for further clarification. Even if the commenter is correct in that these questions require clarification, that fact in itself is a comment that can be addressed properly by simply clarifying terms. The fact that clarification is necessary does not mean that the public has been denied reasonable opportunity to comment.

In response to the commenter's questions, the FAA provides the following clarification. The term ''unusual icing'' did not appear in the proposed rules. However, the phrase ''unusually extensive ice'' is referenced in paragraph (a)(1) of the final rules. [This reference appears in paragraph (a)(2) of the final rule for Aerospatiale airplanes.] ''Unusually extensive ice'' accrued on the airframe in areas not normally observed to collect ice is a visual cue that is subject to interpretation by the flight crew; therefore, a specific definition of ''unusually extensive ice'' cannot be provided.

These AD's address changes to AFM limitations, which pertain to the pilot since the pilot is responsible to look for the visual cues defined in the AD's. Therefore, the pilot determines when severe icing conditions exist.

The terminology ''splatter effect'' did not appear in the proposed rules. The FAA infers from the commenter's question that the commenter is referencing terminology used in paragraph (a)(2) of the proposed AD's. ''Droplets that splash or splatter on impact at temperatures below +5 degrees Celsius OAT'' is a visual cue that was included in the proposed AD's as a method of identifying severe icing conditions.

Concerning incorporation of operating instructions, these final rules specify that the AFM's be revised. The AD's do not specify that any other manuals or documents be revised. However, information that is included in the AFM as a limitation is necessarily included in the training program.

Comment 26. Request To Clarify Scope of Icing Conditions Addressed

Transport Canada Aviation suggests that the proposals, which address only freezing rain/freezing drizzle conditions, are not adequate to cover all hazards related to operation of aircraft in icing conditions. The commenter makes no specific request.

The FAA concurs that these AD's do not address all icing related hazards. The FAA's intent is to minimize the potential hazards associated with operating the airplane in severe icing conditions by providing the flight crews with more clearly defined procedures and limitations associated with such conditions. However, no change to the final rules is necessary.

Comment 27. Request To Expand the Applicability of the AD's

One commenter, the CAA, suggests that the ''coverage'' of the proposals should be stated clearly. The CAA believes that a restriction to those operations in ''regularly scheduled passenger service'' is not warranted for a safety issue as it does not cover cargo, charter, or private operations. The commenter does not specify which airplane models should be addressed. The FAA infers from the commenter's remarks that it requests that the proposed AD's be applicable to other airplane models that are used in cargo, charter, or private operations that may have been excluded from the applicability of these AD's.

The FAA does not concur that the applicability of these AD's should be expanded to include additional airplane models used primarily in cargo, charter, or private operation. The FAA is currently considering the need for

additional rulemaking to address other airplane models having pneumatic deicing boots and unpowered aileron controls that are used in these types of service that were not addressed by these AD's. Additionally, the applicability of these final rules indicates that the AD's apply to ''all'' of the airplane models identified, certificated in any category. This means that the AD's apply to all of the affected airplanes, regardless of how those airplanes are operated (including passenger service, cargo, charter, or private operation).

Comment 28. Request for Design Changes to the Airplanes

One commenter requests that the FAA require design changes to the airplanes, which, when accomplished, will allow elimination of the AFM limitations. The commenter states that abnormal roll control anomalies could be eliminated by design changes that prevent any ice shapes from forming by using supplemental ice protection added to existing pneumatic boots or other ice protection installations. The commenter concludes that, given this added protection, restricting flight in freezing drizzle could be reduced to allow exposure to these atmospheric conditions for a reasonable time and would not require immediately exiting these conditions when encountered as presently stipulated.

The FAA does not concur that it should require design changes to airplanes in these AD's. Currently, the FAA is unaware of any design changes that would allow elimination or reduction of the AFM limitations specified in these AD's. However, if such design changes are developed, approved, and become available, the FAA would consider additional rulemaking to require such changes. The FAA finds that even if the ice protection system prevented the formation of ice shapes in front of the ailerons when the airframe is exposed to certain freezing drizzle conditions, other meteorological conditions still exist (e.g., freezing rain) for which the airplane would not be certificated.

Comment 29. Request for More Specific Visual Cues

One commenter requests that the FAA provide more specific visual cues for identification of freezing rain or freezing drizzle conditions. The commenter states that the generic visual cues provided in the proposed AD's are not adequate for aircraft types that frequently operate in and encounter SLD conditions. For example, ice could be forming on the upper wing and not the lower wing; therefore, looking at the lower wing would not be a reliable visual cue. Two commenters suggest that specific visual cues be provided for each airplane model. One of these commenters states that subjective cues may be of limited benefit if the pilot's experience with icing is inadequate. The other commenter adds that subjective visual cues will result in varying interpretations (i.e., some unnecessary course changes in altitudes or service interruptions caused by overly conservative interpretations). Transport Canada Aviation does not request more specific visual cues; but states that ''unusually extensive ice,'' ''normally observed,'' and ''farther back than normally observed'' are all variable terms that are largely dependent on flight crew experience. The commenter contends that limitations and procedures described using these terms will not be consistently interpreted. In addition, Transport Canada Aviation states that ice on the lower wing surface aft of the protected area, by itself, is unlikely to cause a hazard. Moreover, the presence or absence of such ice cannot be used as an indication of any hazardous accumulation on the upper wing surface or on the horizontal stabilizer.

The FAA does not concur with the commenters' request to provide more specific (or airplane-specific) visual cues. The FAA agrees with the commenters' assertion that, under certain circumstances, examination of the undersurface of a high wing may not be reliable. The FAA also agrees that other cues, such as unusually extensive ice accrued on the airframe in areas not normally observed to collect ice and accumulation of ice on the propeller spinner farther aft then normally observed, are subjective and that reliance on pilot judgment and experience is necessary in such cases. Additionally, the FAA fully supports the development and use of airplane-specific cues by operators and manufacturers. Unfortunately, no commenter provided airplane-specific cues during this comment period.

In summary, the FAA finds that the combined use of the generic cues provided and the effect of the final rules in increasing the awareness of pilots concerning the hazard of operating outside of the certification icing envelope will provide an acceptable level of safety. However, for those operators that elect to identify airplane-specific visual cues, the FAA would consider a request for approval of an alternative method of compliance, in accordance with the provisions of this AD.

Transport Canada Aviation states that the term ''protected area'' may not be readily recognizable by the flight crew; for example, not all of a deicing boot surface is ''protected area.'' [This terminology appears in the second visual cue (in the proposals for airplanes other than Aerospatiale airplanes) and in the autopilot limitation in paragraph (a)(1) of the proposals. For Aerospatiale airplanes, this terminology appears in the secondary indications in paragraph (a)(1) of the proposal.] The FAA infers that the commenter requests that more specific language than ''protected area'' be used.

The FAA does not concur that this terminology should be revised. The FAA considers that a pilot understands that a portion of the deicing boot would be considered to be unprotected. Therefore, no additional clarification or definition of the term ''protected area'' is necessary.

Comment 30. Request To Reference Clear Icing Conditions and Clear Component of Mixed Icing Conditions

One commenter also asks that all references to freezing rain and freezing drizzle environments and visual cue identification reference clear icing conditions and the clear component of mixed icing conditions. According to the commenter, mixed icing conditions can contain areas of freezing rain and/or freezing drizzle. The commenter notes that mixed icing has taken on two different definitions within the aviation community—the ''engineering'' definition (which is defined in an FAA icing handbook) and the definition pilots use (which includes areas of clear and rime ice). The commenter states that a clear definition of these conditions is needed. The commenter adds that only pilot reports can show that freezing rain/freezing drizzle exists because forecasting of these conditions is inadequate. The commenter indicates that while the Aerospatiale airplanes have side window cues that will accurately identify freezing rain or freezing drizzle, pilots of other airplanes without such a sophisticated cue may erroneously report mixed icing.

The FAA does not concur. The FAA acknowledges that freezing rain and freezing drizzle may be reported as clear/mixed icing conditions. However, the flight crew must exit icing conditions that produce the visual cues specified in the final rules. Exiting the icing conditions is not dependent upon the terminology used to describe the conditions. Therefore, the FAA has determined that it is not necessary to include references to clear icing

conditions and the clear component of mixed icing conditions. In addition, the FAA has determined that including a discussion in these AD's of the phenomenon of mixed icing conditions as it relates to the current state-of-the-art weather forecasting would be premature because no clear definition of this phenomenon has been agreed upon among the aviation community. The FAA is currently considering an assessment during which various icing-related subjects, including mixed icing conditions, would be addressed.

Comment 31. Request for Research and Use of Wing-Mounted Ice Detectors

One commenter requests that wing-mounted ice detectors, which provide real-time icing severity information (or immediate feedback) to flight crews, continue to be researched and used throughout the fleet. The FAA infers from this commenter's request that the commenter asks that installation of these ice detectors be mandated by the FAA.

While the FAA supports the development of such ice detectors, the FAA does not concur that installation of these ice detectors should be required. The specifications for automatic detectors having the capabilities to differentiate among freezing rain, freezing drizzle, and other icing conditions have not been determined. However, if such ice detectors are developed, approved, and become available, the FAA may consider further rulemaking action to require installation of such equipment.

Comment 32. Request to Limit the Applicability of the AD's

One commenter requests that the applicability of the proposals be limited to airplanes having NACA 430xx airfoils. The commenter asserts that the unusual pressure peak on the NACA 430xx airfoils at 9 percent chord caused the ice ridge to form at that point, which resulted in the accident involving a Aerospatiale Model ATR–72 series airplane. The commenter states that ''the accident was caused by the poorly designed, unusual, and fortunately rarely used NACA 430xx airfoils used on this airplane.''

The FAA does not concur with the commenter's request to limit the applicability of the AD's. First, the National Transportation Safety Board (NTSB) has not yet made an official finding of the probable cause of the accident referenced by the commenter. Therefore, the FAA cannot assume that airplanes having NACA 430xx airfoils are more susceptible to the addressed unsafe condition than those airplanes that do not have this type of airfoil. Second, the FAA has examined the data submitted by the commenter, and disagrees with the commenter's assertion concerning the formation of ice ridges. The formation of ice ridges depends on many factors. Ice ridges have been observed to form in areas where there is no pressure (commonly, ''suction'') peak. However, the impingement location of large droplets is more relevant to the development of ice ridges than the particular pressure distribution. The commenter does not address the fact that, regardless of the type of airfoil on an airplane, a substantial sharp edge protuberance in the vicinity of the suction peak can have adverse consequences to the aerodynamic performance of the airfoil. Regardless of the cause of location of ice formations, prevention or removal of the ice is certainly an acceptable remedy for such conditions, should those conditions occur. For example, Aerospatiale extended the deicing boots to prevent the formation of adverse ice ridges.

Comment 33. Request for Approval of Improved Deicing Equipment for Aerospatiale Airplanes

ATR requests that paragraph (b) of the proposed rule for Aerospatiale airplanes be revised to indicate that installation of any improved version of deicing equipment that is approved by the FAA is acceptable for compliance with the requirements of that paragraph. The commenter provides no justification for its request.

The FAA does not concur with the commenter's request to revise the AD. However, if an improved version of deicing equipment is developed, approved, and available, the FAA would consider a request for approval of an alternative method of compliance, in accordance with the provisions of the AD.

Comment 34. Request for Re-Evaluation of Modified Deicing Boots on Aerospatiale Airplanes

In response to the proposal for Aerospatiale airplanes, one commenter requests that the new, enlarged deicing boots that are required to be installed on these airplanes must be re-evaluated before total confidence in the modified boots is warranted. The commenter asserts that no test data exist to show that the modified boots will preclude the problem of large droplets outside of Appendix C. The area of exposure outside of Appendix C is essentially open-ended, and only limited testing within a narrow range of droplet diameters was conducted. Additionally, the test conditions that existed during the tanker testing conducted at Edwards Air Force Base, which was intended to be a ''before modification/after modification'' validation program, were not identical. The commenter adds that no modification will ensure that any airplane is safe while flying in icing conditions outside those specified in Appendix C.

The FAA does not concur with the commenter's request for a re-evaluation of the modified deicing boots. The modified deicing boots for these airplanes were subjected to an extensive certification program by both the FAA and the Direction Générale de l'Aviation Civile (DGAC), which is the airworthiness authority for France. FAA approval of the modified boots was based on engineering analyses, wind tunnel testing, flight testing in natural icing conditions, and a validation program involving a United States Air Force icing tanker. This testing verified that the modified boots continue to perform the intended function within the Appendix C icing envelope. In addition, the extended deicing boots were shown to adequately protect the airplane from the larger, supercooled water droplets that are believed to have existed in the area at the time of the accident in October 1994.

It should be noted, however, that it is not intended that the modified boots provide protection in all possible icing conditions, including freezing rain/freezing drizzle. However, the FAA considers that the combination of the enlarged deicing boots, the AFM operational procedures and restrictions, and the visual cues which indicate entry into freezing rain/freezing drizzle conditions provides for an enhanced level of safety during inadvertent flight in these conditions.

Comment 35. Request for Formal Weather Forecasting System for Freezing Rain/Freezing Drizzle

One commenter supports a requirement to establish a formal system to provide forecasts of freezing rain/freezing drizzle conditions, as proposed in paragraphs (b) and (c) of the original proposed rule for Aerospatiale airplanes. [This proposed requirement was removed from the subsequent supplemental notice of proposed rulemaking (NPRM) issued for these airplanes in January 1996.] The commenter states that such a requirement should remain in effect until forecasting tools are developed or detection methods are established to prevent dispatch or operations in conditions outside those specified in Appendix C. The commenter states that

the efficacy of the deicing boots has not been shown completely nor documented; therefore, avoidance of freezing rain/freezing drizzle is paramount to safety of flight.

The FAA does not concur that such a requirement is necessary. The FAA agrees that such a system would enhance the safety of flight operations. However, there is no evidence that lack of a system with such specialized features would lead to an unsafe condition. Forecasts of freezing rain/freezing drizzle are a normal part of pre-flight weather briefings. The FAA is aware, however, of serious limitations for such a system to provide accurate and timely forecasts of these conditions during flight in areas that are removed from weather reporting stations. Quite often, the only indication of the existence of severe icing conditions is from pilot reports or other direct observations.

Research is underway currently in industry and the academic community to address shortcomings in the forecasting of severe icing conditions. The FAA may consider further rulemaking if advancements in weather forecasting provide for a reliable method to predict the occurrence of freezing rain/freezing drizzle conditions during flight or in areas removed from direct observations.

Comment 36. Request To Approve Earlier Service Bulletin Revisions

One commenter to the proposed rule for Aerospatiale airplanes requests that the proposed AD be revised to specify that earlier revisions of service bulletins are acceptable for compliance with the requirements of the proposed rule. The commenter makes this request so as to eliminate the need to apply for approval of alternative methods of compliance when accomplishing service bulletin revisions other than those specified in the proposed rule.

The FAA does not concur that earlier revisions of the referenced service bulletins should be cited in the final rule for Aerospatiale airplanes. However, the FAA would consider a request for approval of an alternative method of compliance, in accordance with the provisions of the AD, provided that adequate justification is presented to support such a request.

Additionally, the FAA has revised the revision levels specified for certain service bulletins because those revision levels were omitted inadvertently from paragraph (b) of the proposed rule for Aerospatiale airplanes. That final rule has been revised to indicate that certain modifications are to be accomplished in accordance with Revision 1 of Aerospatiale Service Bulletins ATR42–57–0043, ATR72–57–1015, and ATR72–57–1016. The correct date for Revision 1 of those service bulletins (April 10, 1995) was specified in the proposal for the affected airplanes.

Comment 37. Request To Revise Referenced Service Bulletins

One commenter to the proposal for Aerospatiale airplanes suggests that service bulletin revisions should contain a statement indicating that the revision has no effect on previously modified airplanes. The commenter provides no justification for this request.

The FAA acknowledges that many service bulletins do contain the suggested phrase as an aid to operators that may already have accomplished an earlier service bulletin revision. In fact, if a particular service bulletin is specified in an AD and that service bulletin is revised, the FAA routinely determines whether the service bulletin revision adequately addresses the unsafe condition specified in the AD; if necessary, the FAA amends the AD to cite the later service bulletin revision.

Comment 38. Request To Revise Visual Cue: Ice on Side Window

One commenter suggests revised wording for the first visual cue specified in paragraph (a)(1) of the proposed rule for Aerospatiale airplanes, as follows: ''Freezing rain and freezing drizzle are characterized by ice covering all or a substantial part of the unheated portion of either forward side window and/or water splashing or streaming on the windshield or the side window when in freezing or near freezing temperatures.'' The commenter states that the present wording implies that ice will always appear on the side window; however, this is not the case.

The FAA does not concur with the commenter's request. The commenter's revised wording suggests that water splashing or streaming on the windshield or the side window would be a primary cue used to determine when severe icing conditions are present. The FAA does not concur that water splashing or streaming on the windshield or the side window would be a reliable cue in itself. However, this cue may be used as a supplemental cue to the primary cue of ice accruing on the side window. No change to the final rule for Aerospatiale airplanes is necessary.

Comment 39. Request To Remove Visual Cue: Unusually Extensive Ice Accretion

One commenter, Saab, requests that if the FAA does not withdraw the proposed AD's, paragraph (a)(1) of the proposal for Saab SF340A and SAAB 340B series airplanes should be revised. The commenter suggests that the first visual cue that appears in that paragraph, which relates to unusually extensive ice accretion, be removed from the proposal for those airplanes. Saab indicates that critical ice is believed to be ice that builds up beyond the protected surfaces on the wing. On Saab Model SF340A and SAAB 340B series airplanes, the pilot has a good view of the outer wing and the propeller spinner. Unusually extensive ice in other areas may or may not be significant in determining whether freezing rain or freezing drizzle is present; however, the primary visual cue for these airplanes is ice on the spinner/outer wing.

In light of Saab's remarks, the FAA concurs that the visual cue addressed by the commenter should be removed from the final rule for Saab Model SF340A and SAAB 340B series airplanes. (That visual cue remains in place for Saab Model SAAB 2000 series airplanes.) Paragraph (a)(1) of that final rule has been revised accordingly.

A second commenter, Raytheon, requests that the same visual cue be removed from the proposal for Beech airplanes. Raytheon indicates that it does not believe that observation of this visual cue indicates that the airplane has exceeded the Appendix C icing envelope with respect to Beech airplanes. Therefore, the cue specified in the proposal would be irrelevant in an AFM for these airplanes.

The FAA does not concur with Raytheon's request. The commenter has not submitted data to warrant removal of the visual cue. No change to the final rule for Beech airplanes has been made.

Comment 40. Request To Remove Visual Cue: Accumulation of Ice on Wing Surfaces

JAL requests that the FAA remove the generic information contained in the visual cue concerning accumulation of ice on the wing surfaces from the proposals for Jetstream airplanes. JAL indicates that, for its airplanes, the appropriate visual cue is the accretion of ice behind the protected area of the wing upper surface (not the wing lower surface).

The FAA concurs partially. The FAA does not agree that the visual cue should be removed from the final rules for Jetstream airplanes. However, the FAA finds that this particular visual cue should be airplane-specific. Therefore, the FAA has customized paragraph (a)(1) of the final rules for all affected airplanes to specify whether accumulation of ice is observed on the

upper or lower surface of the wing, depending upon whether the airplane is a high- or low-wing airplane. [Operators should note that, for Aerospatiale airplanes, the cue was customized in paragraph (a)(2) of the final rule.]

Comment 41. Request To Revise Visual Cue: Accumulation of Ice on Propeller Spinner

One commenter requests that the FAA revise the visual cue concerning accumulation of ice on the propeller spinner, as specified in paragraph (a)(1) of the proposals. For consistency, the commenter requests that the word ''back'' be replaced with ''aft.''

The FAA concurs with the commenter's request. The final rules have been revised to change the visual cue to read as follows: ''Accumulation of ice on the propeller spinner farther aft than normally observed.'' [Operators should note that, for Aerospatiale airplanes, this change appears in paragraph (a)(2) of the final rule.]

Comment 42. Request To Remove Visual Cue: Accumulation of Ice on Propeller Spinner

One commenter, JAL, requests that the FAA remove the visual cue concerning accumulation of ice on the propeller spinner from the proposals for Jetstream airplanes. JAL indicates that on Jetstream Model ATP airplanes and Model 748 series airplanes, the propeller spinner is not visible from the flight deck. On Jetstream Models 3101, 3201, and 4101 airplanes, the propeller spinner is visible from the flight deck, but flight test experience indicates that there is no unique correlation between the extent of spinner ice accretion and the existence of freezing rain/freezing drizzle conditions.

The FAA concurs partially. The FAA concurs that since the propeller spinner is not visible from the flight deck on Jetstream Model ATP airplanes and Model 748 series airplanes, the visual cue can be removed from paragraph (a)(1) of the final rules for these models. The FAA does not concur that this visual cue should be removed from the AD's for Jetstream Models 3101, 3201, and 4101 airplanes. The commenter did not submit data to substantiate its assertion that flight test experience indicates there is no unique correlation between the extent of spinner ice accretion and the existence of freezing rain/freezing drizzle conditions. Therefore, it is uncertain if the commenter's flight test airplane was equipped with instrumentation that would allow the detection and/or measurement of droplets outside the Appendix C conditions, and if the airplane had flown into icing conditions containing freezing rain or freezing drizzle.

Comment 43. Request To Remove Limitation to Immediately Exit Freezing Rain/Freezing Drizzle

Saab requests that the FAA remove a sentence from paragraph (a)(1) of the proposals that requires the pilot to immediately exit freezing rain or freezing drizzle conditions by changing altitude or course. This commenter points out that the first limitation contained in the proposal for Saab airplanes (''Flight in meteorological conditions described as freezing rain or freezing drizzle, as determined by the following visual cues, is prohibited . . .'') already prohibits flight in these conditions, and the pilot should respond accordingly. Raytheon believes a conflict exists between using observations of ice accretion, as required by paragraph (a)(1) of the proposed rules, and the ''determination'' of certain meteorological conditions.

The FAA concurs partially. The FAA does not agree that the sentence discussed by Saab should be removed from paragraph (a)(1) of the final rules. As explained previously, the first limitation in paragraph (a)(1) of the final rules has been revised to read: ''During flight, severe icing conditions that exceed those for which the airplane is certificated shall be determined by the following visual cues. If one or more of these visual cues exist, immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the icing conditions.'' (This wording is slightly different in the final rule for Aerospatiale airplanes because only one visual cue is provided.) The FAA finds that this revision to the final rules addresses the commenters' concerns with regard to the proposed limitations.

One commenter poses various questions concerning the last sentence of the first instruction listed in the procedures for exiting the freezing rain/freezing drizzle environment in paragraph (a)(2) of the proposals. (That sentence reads as follows: ''Asking for priority to leave the area is fully justified under these conditions.'')

—What does the term ''priority'' provide a pilot when asking for priority to leave icing conditions?

—What if there were three simultaneous requests for ''priority?''

—What Air Traffic Control procedures exist for treating an immediate request for ''priority?''

—Where is the term ''priority'' defined?

The commenter states that confusion over terms that have not been defined clearly by the FAA has partially resulted in accidents and incidents. However, the commenter does not cite a specific case in which this occurred.

The FAA has re-examined the last sentence of the first instruction listed in the procedures for exiting the freezing rain/freezing drizzle environment in paragraph (a)(2) of the proposals. The FAA has reconsidered use of the term ''priority.'' The FAA finds that more appropriate language that would be understood clearly by the flight crew and Air Traffic Controllers should be used in that instruction. Existing training for flight crews and Air Traffic Controllers addresses priority handling of airplanes. However, the FAA will issue additional information for Air Traffic Controllers to further clarify priority handling of airplanes in severe icing conditions. The FAA finds that the limitations specified in paragraph (a)(1) of the final rules will result in the pilot taking appropriate steps to exit the icing conditions. Therefore, the FAA finds that the sentence questioned by the commenter may be removed from the final rules without affecting safety. Accordingly, the FAA has removed that sentence from the final rules.

Additionally, in order to use terminology in the procedures for exiting the severe icing environment that is consistent with the terminology used in the revised limitation and to simplify certain language, the FAA has revised the first instruction of the procedures. The revised instruction reads as follows: ''Immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the icing conditions in order to avoid extended exposure to flight conditions more severe than those for which the airplane has been certificated.''

Comment 44. Request To Change the Note Concerning the Autopilot

One commenter, ATR, requests that the FAA revise the second note in paragraph (a)(1) of the proposal for Aerospatiale airplanes. As proposed, ATR believes the last sentence of the note is too restrictive. ATR proposes the following: ''The autopilot may mask tactile cues . . . characteristics. Therefore, when any ice is visible on the airplane, the pilot should consider flying manually for short periods in order to check the absence of any anomaly.''

Two commenters request that the FAA remove a similar note concerning the autopilot from the proposals for airplanes other than Aerospatiale

models. One of the commenters, JAL, states that the note contains advisory information and should not appear in the Limitations Section of an AFM.

The FAA concurs with ATR's comment that the last sentence of the note is too restrictive; that sentence has been removed from the final rules for all airplanes. However, the FAA does not agree with JAL's contention that the explanation of the relationship between the autopilot and the masking of tactile cues is inappropriate for insertion in the Limitations Section of an AFM. On the contrary, the FAA finds that inclusion of such information will increase the level of understanding and, consequently, will increase the level of safety.

In light of this, the FAA finds that the note may be removed from paragraph (a)(1) of the final rules for all airplanes; however, the information contained in the first sentence of that note has been combined with the autopilot limitation in paragraph (a)(1) of the final rules. The final rules have been revised accordingly.

Comment 45. Requests To Remove Autopilot Limitation

Saab requests that the FAA revise the second limitation that appears in paragraph (a)(1) of the proposal for Saab airplanes. As proposed, this limitation indicates that use of the autopilot is prohibited when any ice is observed forming aft of the protected surfaces of the wing, or when unusual lateral trim requirements or autopilot trim warnings are encountered. Saab asks that this autopilot limitation be modified to take into consideration the autopilot system design on these airplanes, which provides out-of-trim warnings; therefore, the autopilot can be used up to the point where a warning is triggered. Saab adds that the triggering point is early enough for the warning to be taken, should the reason be ice build-up beyond the protected surfaces. Additionally, there is no automatic disconnect if the autopilot servo reaches its limit torque, which would prevent any surprise to the pilot during an out-of-trim condition.

Another commenter, EMBRAER, requests that use of the autopilot not be limited for EMBRAER Model EMB–120 series airplanes. The commenter states that flight tests have demonstrated the safe ability of these airplanes to depart a freezing rain/freezing drizzle condition with the autopilot on.

Raytheon also objects to the autopilot limitation. Raytheon suggests that a better approach is to inform the pilots of the nature of ice accretion, and then let the pilots decide when to use the autopilot. The commenter believes that prohibiting use of the autopilot when any ice is observed aft of the protected surfaces of the wing is a rigid requirement that takes away a valuable aid to the flight crew when it may be needed most. Raytheon states that there is no evidence that the autopilots on Beech aircraft would mask an icing related control problem. The commenter points out that tests on those aircraft disclosed no icing related control problem to mask. The commenter adds that trying to anticipate every situation with an absolute prohibition may lead to other unsafe conditions.

The FAA does not concur that the autopilot limitation should be modified or removed from the AD's for any of the affected airplanes. The limited amount of time the pilot is using manual controls instead of the autopilot would not result in an unsafe condition. In normal operational environments and conditions, the autopilot is a valuable aid that reduces the workload of the flight crew. However, under abnormal conditions (ice aft of the protected surfaces, unusual lateral trim, or autopilot trim warnings), the autopilot will mask the build-up of large or unusual control forces in one or more axes. Therefore, for the short period of time necessary to exit severe icing conditions, the safest course of action would be manual pilot control. Even if an autopilot does not automatically disconnect, the pilot may choose to disconnect the autopilot and could then be faced unexpectedly with unusual control forces. These reasons also still hold true with airplanes that have been flight tested with the ice shapes.

Since the issuance of the proposed rules, the FAA has re-examined the autopilot limitation specified in paragraph (a)(1) of the proposals. The FAA recognizes that clarification is necessary with regard to its intent concerning that limitation. That limitation, as specified in the proposals, states that use of the autopilot is prohibited when any ice is observed forming aft of the protected surfaces of the wing, or when unusual lateral trim requirements or autopilot trim warnings are encountered. However, the FAA's intent concerning that limitation is that the autopilot be disconnected when the flight crew observes any of the visual cues identified in paragraph (a)(1) of the AD's. The need to disconnect the autopilot arises when an amount of ice accumulates that indicates the limits of the ice protection equipment have been exceeded, regardless of the means by which the flight crew becomes aware of the accumulation of ice.

Additionally, the FAA acknowledges that the autopilot limitation, as proposed, could be misinterpreted to mean that the autopilot must be disengaged when unusual lateral trim or autopilot trim warnings are encountered, regardless of whether the airplane is in icing conditions. However, the FAA only intended that the autopilot limitation apply while the airplane is in icing conditions.

In light of this, the FAA has determined that the autopilot limitation contained in paragraph (a)(1) of the final rules must be revised. The FAA has changed that limitation to read as follows: ''Since the autopilot may mask tactile cues that indicate adverse changes in handling characteristics, use of the autopilot is prohibited when any of the visual cues specified above exist, or when unusual lateral trim requirements or autopilot trim warnings are encountered while the airplane is in icing conditions.'' (This wording is slightly different in the final rule for Aerospatiale airplanes because only one visual cue is provided.) This revision more accurately reflects the FAA's intent and is, therefore, a logical outgrowth of the proposed rules.

Comment 46. Request To Insert Procedures in Limitations or Abnormal Procedures Section of AFM

One commenter suggests that operations in icing conditions that exceed the capability of the airplane should be described in the Limitations or Abnormal Procedures Section of the AFM, rather than in the Normal Procedures Section, as specified in paragraph (a)(2) of the proposals.

The FAA concurs partially. The FAA agrees that the Abnormal Procedures Section may be an appropriate location for the procedures for exiting severe icing conditions. However, the FAA does not agree that such operational procedures should appear in the Limitations Section of the AFM since such procedures are not limitations. Additionally, upon further review, the FAA finds that AFM's may have neither an Abnormal Procedures nor a Normal Procedures Section. Consequently, to provide operators with flexibility as to where the procedures specified in paragraph (a)(2) should be incorporated in the AFM, that paragraph has been revised to require that the ''Procedures'' Section of the AFM be revised. This means that the procedures may be inserted in the ''Normal Procedures,'' ''Abnormal Procedures,'' or other ''Procedures'' Section of the AFM, as appropriate.

Comment 47. Request To Remove Duplicate Visual Cues

Two commenters indicate that certain visual cues specified in paragraph (a)(2) of the proposals are duplicated in the ''Warning'' that is also contained in that paragraph. One commenter states that the duplication of text reduces the impact of the message. Another commenter questions whether the visual cues and procedures for exiting the icing environment are intended to be part of the AFM material. The FAA infers from these remarks that the commenters request that duplicate text be removed.

Transport Canada Aviation requests that the ''Warning'' be removed because indications of the possible hazard are progressive and may not necessarily require immediate action from the pilot. The commenter suggests that renaming this as a ''Caution'' may be more appropriate.

The FAA concurs partially. The FAA agrees that duplicate text should be removed from the ''Warning'' section that appeared in the proposals. The FAA finds that only one unique instruction appears in the ''Warning'' in paragraph (a)(2) of the proposals: ''If the flaps are extended, do not retract them until the airframe is clear of ice.'' Therefore, the FAA has added that instruction to the procedures for exiting the severe icing environment in paragraph (a)(2) of the AD's. The remainder of the ''Warning'' section that appeared in the proposals has been removed from the final rules.

Comment 48. Request for Revision to Instruction for Flaps Extension

Saab requests that the FAA revise an instruction contained in the procedures for exiting the freezing rain/freezing drizzle environment in paragraph (a)(2) of the proposals. That instruction indicates to ''Avoid extending flaps during extended operation in icing conditions * * *.'' Saab suggests the following: ''Do not extend flaps when holding in conditions where ice is accreting on the airframe.'' Further, the commenter asks that this instruction be inserted as a ''caution'' in the Limitations Section of the AFM, rather than into the Normal Procedures Section, as specified in the proposed rule. Saab believes that it is imperative that the flaps not be extended in such cases. Inserting the instruction into the Limitations Section, rather than the Normal Procedures Section, would add strength to the requirement.

Another commenter states that this same instruction appears to be in conflict with previously approved AFM revisions which state, ''Sustained flight in icing conditions is prohibited with flaps extended.'' However, the commenter does not provide a suggestion for rewording this instruction.

The FAA concurs that the procedures related to extension of the flaps can be reworded somewhat. For clarification purposes, the FAA has replaced the word ''avoid'' with ''do not'' in that procedure in paragraph (a)(2) of the final rules. This revision eliminates the conflict discussed by the second commenter. However, the FAA does not agree that revising the remainder of the instruction, as suggested by Saab, provides any additional clarification.

The FAA agrees that inserting the revised wording in the Limitations Section of the AFM, rather than in the Normal Procedures Section, would be acceptable; however, this would expand the scope of the originally proposed rules and would necessitate reopening the comment period to provide additional opportunity for public comment. In light of the time required to complete the rulemaking process in advance of the upcoming icing season and in consideration of the safety issues addressed by these final rules, the FAA finds that the AD's should be issued without additional delay. However, the FAA would consider a request for approval of an alternative method of compliance, in accordance with the provisions of this AD, to include this information in the Limitations Section of an operator's AFM.

Transport Canada Aviation requests that this instruction be revised to read as follows: ''Do not extend flaps during operation in icing conditions, except for approach and landing. Operation with flaps extended will result in a reduced wing angle-of-attack with the possibility of ice forming on the upper surface further aft on the wing than normal, possibly aft of the protected area.''

The FAA concurs partially. The FAA does not concur with the commenter's suggested rewording to limit use of the flaps in all operation in icing conditions except approach and landing. The wording proposed in the AD's would affect use of the flaps only during extended operation in icing conditions. The FAA finds that an amount of ice sufficient to cause control problems is more likely to accumulate during prolonged operations in icing conditions. Further, the FAA does not concur that the words ''operation of the flaps can result in a reduced angle-of-attack * * *'' should be changed to ''operation of the flaps will result in a reduced angle-of-attack * * *'' in this instruction. Operation with flaps extended does not always result in a reduced angle-of-attack. For instance, during extension of the flaps while the airplane is slowing, the angle-of-attack will increase.

The FAA concurs with the suggestion to include the words ''the possibility of ice forming on the upper surface further aft * * *'' The FAA acknowledges that under certain conditions the droplets will not impinge further aft with a reduced angle-of-attack. The final rules have been revised to add the words suggested by the commenter to the sixth instruction specified in the procedures for exiting the severe icing environment contained in paragraph (a)(2) of the AD's. That revised instruction reads as follows: ''Do not extend flaps * * * with the possibility of ice forming on the upper surface * * *''

Comment 49. Requests To Revise ''Caution'' Paragraph

One commenter asks that the heading, ''Caution,'' which appears in paragraph (a)(2) of the proposals, be renamed ''Warning'' because this section is intended to prevent loss of life or injury. Transport Canada Aviation requests that the ''Caution'' section be changed to a note. The commenter provides no justification.

The FAA concurs partially. The FAA does not concur that the ''Caution'' should be changed to a note because this section is intended to prevent loss of life or injury. In light of this, the FAA concurs with the commenter's request to rename the ''Caution'' section ''Warning.'' The FAA finds that ''Warning'' is a stronger term and would be a more appropriate heading for the paragraph in question. Additionally, the FAA finds that the ''Warning'' provides advisory information that should precede the first limitation in paragraph (a)(1) of the AD's. Accordingly, the FAA has revised the heading ''Caution'' to ''Warning'' in the final rules. In addition, the ''Warning'' has been placed at the beginning of paragraph (a)(1) of the final rules. The FAA has determined that including this information in the Limitations Section of the AFM will not impose an additional burden on any operator, since it is informational only and does not necessitate providing an additional opportunity for public comment.

Additionally, the commenter notes that an undefined term, ''extreme,'' is used in a sentence in the ''Caution'' paragraph of the proposals, as follows: ''Flight in freezing rain, freezing drizzle, or mixed icing conditions (supercooled liquid water and ice crystals) may result in extreme ice build-up on protected surfaces * * *'' The FAA infers from

this remark that the commenter asks that the word ''extreme'' be removed from the ''Caution'' paragraph.

The FAA concurs. The FAA finds that removing the word ''extreme'' would not change the intent of the sentence and may eliminate confusion. The word ''extreme'' has been removed from this section of the final rule. In addition, for clarification purposes, the FAA has revised the first sentence of the proposed ''Caution'' from ''Severe icing comprises environmental conditions * * *'' to ''Severe icing may result from environmental conditions * * *''

Comment 50. Request To Remove Visual Cues: Identification of Freezing Rain/Freezing Drizzle

One commenter indicates that the cues provided in paragraph (a)(2) of the proposals for identifying freezing rain/freezing drizzle conditions are duplicated in material that appears in paragraph (a)(1) of the proposals. The FAA infers from this remark that the commenter requests that duplicative wording be removed from paragraph (a)(2) of the proposed rules.

The FAA concurs. The FAA finds that the section entitled ''The following shall be used to identify freezing rain/freezing drizzle icing conditions'' is duplicated in material that appears in paragraph (a)(1), and does not enhance the effectiveness of the AD's. Therefore, that section has been removed from paragraph (a)(2) of the final rules for all airplanes other than Aerospatiale Model ATR–42 and ATR–72 series airplanes.

Paragraph (a)(1) of the proposals for Aerospatiale airplanes specified secondary indications for identifying possible freezing rain/freezing drizzle conditions. The FAA recognizes that the flight crew could have interpreted that paragraph to mean that if the secondary indicators were observed, the airplane must be flown clear of the severe icing conditions. However, the FAA's intent is that the flight crew must immediately request priority handling to exit the icing conditions only when the visual cue (ice on the side window) specified in paragraph (a)(1) of the AD is observed.

Accordingly, the FAA has deleted the secondary indications of possible severe icing conditions from paragraph (a)(1) of the final rule for Aerospatiale airplanes. In addition, the FAA has removed the visual cue (ice on the side window) from paragraph (a)(2) of the final rule. The FAA has retitled the section containing the secondary indications of possible severe icing as follows: ''The following may be used as secondary indications of severe icing conditions.'' Further, the last two secondary indicators contained in that section are specified in the final rule in a section titled: ''The following weather conditions may be conducive to severe in-flight icing.'' (This change is explained further in Comment 51 below.)

Comment 51. Request To Remove Visual Cues: Identification of Possible Freezing Rain/Freezing Drizzle

One commenter states that the word ''may'' in the following title, which appears in paragraph (a)(2) of the proposals, is confusing: ''The following may be used to identify possible freezing rain/freezing drizzle conditions.'' The commenter indicates that AFM procedures should provide a clear sequence of steps that must be followed and that such procedures should be explicit; general advice, regardless of how prudent, should be published elsewhere. The FAA infers from this remark that the commenter asks that the cues that appear under this section be deleted.

The FAA does not concur that this section should be removed. The cues provided for identification of possible severe icing conditions will alert the pilot to the possibility that unusual ice accretion may develop. The FAA finds that the level of detail provided in the final rules will increase the level of pilot awareness and, consequently, will increase the level of safety over that which exists currently. Therefore, the FAA has determined that it is appropriate to incorporate this section in the AFM.

However, the FAA finds that clarification is necessary with regard to the title of this section. The FAA finds that operators may misinterpret that title, as proposed, to mean that this section contains visual cues that should be used to identify possible severe icing conditions prior to takeoff, dispatch, or release while the airplane is on the ground. Additionally, the FAA finds that confusion could result in differentiating between the weather conditions specified in this section and the visual cues provided in paragraph (a)(1) of the AD's. For clarification purposes, the FAA has revised the title of this section to read as follows: ''The following weather conditions may be conducive to severe in-flight icing.''

Comment 52. Request To Revise Air Temperature References

Transport Canada Aviation states that ambient temperature is indicated as static air temperature (SAT), rather than outside air temperature (OAT), for de Havilland Model DHC–8 series airplanes. The FAA infers from this remark the commenter requests that the ambient temperature that appears in the weather conditions specified in paragraph (a)(2) of the proposals be expressed as SAT for those airplanes.

The FAA does not concur. The FAA does not intend to specify which specific indicator in the cockpit a pilot should use to determine the ambient air temperature. The FAA intends that the pilot use whatever means necessary to determine ambient air temperature.

However, since airplanes may have indicators other than OAT, the FAA has replaced the words ''outside air temperature'' with ''ambient air temperature'' in the weather conditions, and in the procedures for exiting the severe icing environment, specified in paragraph (a)(2) of these final rules to eliminate confusion concerning the need for a specific type of indicator.

In addition, the FAA has re-examined the ambient temperature of +5 degrees Celsius that is specified in paragraph (a)(2) of the proposals. The FAA has determined that this temperature is too high to be used as a reliable indication of whether severe icing conditions may exist during flight. The FAA finds that 0 degrees Celsius is a more appropriate indication. The FAA has revised paragraph (a)(2) of the final rules for all airplanes accordingly.

Comment 53. Request To Replace Reference to Droplets that Splash or Splatter

JAL requests that the weather condition that pertains to ''droplets that splash or splatter'' be removed from paragraph (a)(2) of the proposals. JAL believes that this weather condition places too much emphasis on subjective judgment. JAL states that normal rain conditions will contain droplets that splash or splatter upon impact with the windshield. JAL indicates that information included in its existing AFM revisions, specified as follows, adequately addresses the issue: ''Prolonged operation in altitude bands where temperatures are near freezing and heavy moisture is visible on the windscreen should be avoided.''

The FAA does not concur that this weather condition should be removed from the AD's. This weather condition must be used in conjunction with the temperature specified as a means of identifying severe in-flight icing conditions. The weather condition also will alert the pilot to the possibility that unusual ice accretion may develop. The FAA finds that the AFM information submitted by JAL does not provide an equivalent alert to the pilot.

Comment 54. Request To Revise Procedures for Exiting Freezing Rain/Freezing Drizzle

JAL requests that the procedures for exiting freezing rain/freezing drizzle specified in paragraph (a)(2) of the proposals be restricted to essential instructions that the flight crew must follow. JAL contends that the procedures contained in the proposals are not written in the appropriate format for AFM procedures, but are more representative of advisory material. JAL also states that the current FAA-approved AFM procedures for exiting freezing rain/freezing drizzle already provide this essential information and conform to the existing style of the AFM's. Transport Canada Aviation requests that the first instruction in these procedures be revised to state only: ''Exit the freezing rain or freezing drizzle conditions immediately.'' The commenter also requests clarification of the terms ''extended exposure,'' as used in that instruction.

The FAA concurs partially. The FAA has reviewed the procedures for exiting the severe icing environment and finds that two of the instructions contained in those procedures do not require the level of detail provided in the proposed rules. The FAA finds that the information concerning masking of control system forces is already provided in the Limitations Section of the AFM. Therefore, the FAA has revised the third instruction of those procedures to read as follows: ''Do not engage the autopilot.'' Additionally, the FAA has determined that the flight crew need not be provided with instructions for reducing the angle-of-attack because instructions such as this are considered to be basic airmanship. Accordingly, the FAA has revised the fifth instruction in the procedures for exiting the severe icing environment to specify only information that is essential for the flight crew. The revised instruction reads as follows: ''If an unusual roll response . . . reduce the angle-of-attack.'' The FAA finds that, for the remainder of the procedures for exiting, the additional level of details provided in the final rules will increase the level of understanding and, consequently, will increase the level of safety over that which exists currently. The FAA finds that these procedures are appropriate for insertion in the AFM's.

Regarding the terms ''extended exposure,'' the intent of that instruction is to advise the flight crew that exiting the severe icing conditions will minimize the exposure to flight conditions outside those for which the airplane has been certificated. The FAA finds that remaining in such conditions for a prolonged period may result in accumulating an amount of ice sufficient to cause control problems. The phrase ''to avoid extended exposure'' is only intended to explain to the flight crew why severe icing conditions should be exited immediately.

Raytheon questions the necessity to tell a commercial pilot not to make any abrupt or excessive maneuvers if the aircraft is in the position of having control difficulties. This instruction appears under the heading ''Procedures for exiting the freezing rain/freezing drizzle environment,'' which appears in paragraph (a)(2) of the proposals. The commenter contends that this is a training issue and is not appropriate for AFM procedures. The FAA infers from the commenter's remark that the commenter requests that these instructions be eliminated from the proposed rules.

The FAA does not concur. The FAA has determined that such instructions provide beneficial guidance to the flight crew, which will enhance the safety of the aircraft.

Saab requests that the FAA revise one of the instructions specified in the procedures for exiting freezing rain/freezing drizzle specified in the proposals. The instruction states that if an unusual roll response or uncommanded control movement is observed, the angle-of-attack should be reduced by increasing the airspeed or rolling the wings level (if in a turn), and applying additional power, if needed. Saab suggests that this instruction be revised to include the word ''aileron'' in the reference to uncommanded control movement. Saab states further that in the case of wing ice beyond the protected surfaces, the application of power may be appropriate to increase airspeed/improve airflow. However, if ice has accrued on the wings beyond the protected surfaces, there is a possibility that there also is ice on the horizontal stabilizers. In this case, a sudden burst of power may be detrimental. An uncommanded pitch control movement is indicative of tail ice, which normally calls for a different action, both concerning power as well as the handling of flaps, if extended. Another commenter, Transport Canada Aviation, requests that the same instruction be revised to include the word ''lateral'' in reference to ''uncommanded control movement,'' and to change the phrase ''or rolling wings level'' to ''and rolling wings level.''

The FAA concurs partially. The FAA agrees that the correct procedures for reducing the angle-of-attack is to increase the airspeed and roll the wings level, if in a turn. However, as explained previously, this portion of the procedure has been removed from the final rules. The FAA does not agree that either ''lateral'' or ''aileron'' should be used to specify the type of uncommanded control movement. The FAA finds that use of the term ''lateral'' may not be understood by the flight crew. The FAA finds that including the word ''aileron'' may clarify which control surface is of concern; however, the FAA has determined that use of a more general term, ''roll'' will correctly specify the type of uncommanded control movement that is of concern. The FAA has revised the fifth instruction in the procedures for exiting the severe icing environment in paragraph (a)(2) of the final rules accordingly. The revised instruction reads as follows: ''If an unusual roll response or uncommanded roll control movement is observed, reduce the angle-of-attack.''

In addition, the procedures for exiting the freezing rain/freezing drizzle environment contained in the proposals did not specify to use ''a sudden burst of power'' when reducing the angle-of-attack. Rather, the proposed procedure indicates to apply additional power, if needed, to provide the desired flight path. However, as discussed previously, the FAA has removed this reference from the final rules. In addition, as explained previously, the FAA has revised the final rules to add the word ''roll'' to describe the type of uncommanded control movement. This revised wording addresses Saab's concern regarding increasing power for a pitch anomaly.

Saab also notes that this instruction recommends a reduction in the angle-of-attack and application of power, if needed. However, the next instruction of the procedures indicates that reducing the angle-of-attack may cause ice to build up beyond the protected areas of the wing. Saab concludes that there is a conflict in that the proposed AD would require that the angle-of-attack not be reduced or ice will collect beyond the protected surfaces; however, the angle-of-attack must be reduced if there is an unusual roll response or uncommanded control movement.

The FAA does not concur with the commenter's contention that there is a conflict in the AD's. Reducing the angle-of-attack by increasing airspeed or rolling the wings level (if in a turn), and applying additional power, if needed, is a procedure used to exit severe icing conditions following an unusual roll response or uncommanded roll control movement; whereas the instruction that involves not extending the flaps during

extended operation in icing conditions is intended to prevent ice build-up beyond the unprotected surfaces.

Raytheon asks for removal of the instruction to reduce the angle-of-attack and apply additional power, if needed, in response to an unusual roll response or uncommanded control movement. The commenter states that these are normal instructions with respect to wing stall and are inappropriate for inclusion in an AFM.

The FAA concurs partially. There may not be a stall warning associated with uncommanded control movements in the case of encounters with severe icing conditions. Since this is not a ''normal'' stall, the flight crew may not recognize that normal stall recovery procedures should be used. However, as stated previously, the instruction referenced by the commenter has been deleted, in part, from the final rules.

Raytheon also states that it is not appropriate to require contact with Air Traffic Control as part of an AFM procedure since this is already addressed in the Aeronautical Information Manual and in section 91.183 of the Federal Aviation Regulations (14 CFR 91.183). The FAA infers from this statement that the commenter requests that the instruction to contact Air Traffic Control should be removed from the procedures for exiting severe icing conditions.

The FAA does not concur. The FAA is aware that this instruction is contained in the references provided by the commenter. However, the FAA finds that the importance of timely dissemination of this instruction warrants its inclusion in the final rules. Inclusion of instructions of this type is not without precedent; for example, similar information also is specified in certain AFM's where the forward look windshear system is addressed.

Comment 55. Request To Revise Procedures for Exiting the Severe Icing Environment: Include Airplane- Specific Instructions

One commenter suggests that any action that might be necessary to optimize aircraft performance and control in conditions of exceptional icing, and exit from those conditions, should be determined separately with each manufacturer; such procedures should be contained in the AFM for each airplane model. The FAA infers from this remark that the commenter requests that the FAA revise the procedures for exiting the severe icing environment in each final rule to include airplane-specific instructions.

The FAA agrees that procedures obtained from each individual manufacturer should be considered and included in the final rules, if appropriate. All manufacturers have been provided with an opportunity to submit such procedures in response to the proposed rules. Some manufacturers requested changes to the final rules. The FAA has revised the final rules for those requests that were substantiated adequately. Following issuance of the final rules, the FAA would consider a request to include additional changes to the AFM revisions, in accordance with the provisions of these AD's, provided that adequate justification is presented to support such a request.

Comment 56. Revision of Procedures for Exiting the Severe Icing Environment

The FAA has re-examined the section titled ''Procedures for exiting the severe icing environment'' in paragraph (a)(2) of the proposals. As proposed, that section states that if the visual cues used for identifying ''possible'' freezing rain or freezing drizzle conditions are observed, the flight crew should follow the procedures specified for exiting those conditions. The FAA did not intend that the flight crew use the procedures for exiting the severe icing environment when the weather conditions specified in paragraph (a)(2) of these AD's are observed. The FAA's intent is that the flight crew use those procedures only when the visual cues identified in the Limitations Section of the AFM are observed.

In order to eliminate any confusion, the FAA has revised the last sentence of the first paragraph in the procedures for exiting the severe icing environment. The FAA has removed the word ''possible'' from that sentence, and has added clarification that the visual cues are specified in the Limitations Section of the AFM. The revised sentence reads as follows: ''If the visual cues specified in the Limitations Section of the AFM for identifying severe icing conditions are observed, accomplish the following.'' (Operators should note that, for Aerospatiale airplanes, the final rule specifies only one visual cue, which involves ice on the side window.)

Comment 57. Request to Revise Cost Estimate

Transport Canada requests that the FAA provide an operational cost estimate in the proposed AD's.

The FAA acknowledges the concern of the commenter. The FAA recognizes that, in accomplishing the requirements of any AD, operators may incur other costs in addition to the ''direct'' costs that are reflected in the cost analysis presented in the AD preamble. However, the cost analysis in AD rulemaking actions typically only includes such direct costs. In the case of these AD's, for example, the requirements are to revise the AFM to include certain information. How operators actually ''implement'' that information thereafter (once it is placed in the AFM) may vary greatly among them.

Further, because AD's require specific actions to address specific unsafe conditions, they appear to impose costs that would not otherwise be borne by operators. However, because of the general obligation of operators to maintain and operate aircraft in an airworthy condition, this appearance is deceptive. Attributing those costs solely to the issuance of this AD is unrealistic because, in the interest of maintaining and operating safe aircraft, prudent operators would accomplish the required actions even if they were not required to do so by the AD. In any case, the FAA has determined that direct and incidental costs are still outweighed by the safety benefits of the AD.

The FAA points out that it is not required to do a full cost-benefit analysis for each AD. AD's were explicitly exempted from the Office of Management and Budget (OMB) coordination process described in Section 6 of that Executive Order. As a matter of law, in order to be airworthy, an aircraft must conform to its type design and be in a condition for safe operation. The type design is approved only after the FAA makes a determination that it complies with all applicable airworthiness requirements. In adopting and maintaining those requirements, the FAA has already made the determination that they establish a level of safety that is cost-beneficial. When the FAA later makes a finding of an unsafe condition in an aircraft and issues an AD, it means that the original cost beneficial level of safety is no longer being achieved and that the required actions are necessary to restore that level of safety. Because this level of safety has already been determined to be cost beneficial, and because the AD does not add an additional regulatory requirement that increases the level of safety beyond what has been established by the type design, a full cost-benefit analysis for each AD would be redundant and unnecessary.

Comment 58. Requests to Delay Issuance of the Final Rules

Three commenters request that the FAA extend the comment period for the proposed rules by 90 days. Each of the commenters request the extension in order to complete a comprehensive

analysis of this issue. The commenters state their involvement in focusing on ''. . . ther recent rulemaking activity, including the Commuter Rule, flight crewmember training requirements, and proposed rules covering flight crew flight, duty and test requirements . . .'' as a reason that did not allow complete analysis of the proposed AD's.

One commenter requests that implementation of the AD's be deferred until further discussion with industry has been undertaken.

The FAA has reviewed these requests and, in consideration of the importance and need for dissemination of this important information to the aviation community, does not concur that the comment period should be extended or issuance of the final rules be deferred until a later date. Issuing the final rules will ensure that the information is available, understood, and implemented by the aviation community before the next icing season. For these reasons, the FAA has determined that it is imperative that the information and actions contained in these final rules be incorporated into the operators' AFM's immediately.

Conclusion

After careful review of the available data, including the comments noted above, the FAA has determined that air safety and the public interest require the adoption of the rule with the changes previously described. The FAA has determined that these changes will neither increase the economic burden on any operator nor increase the scope of the AD.

Cost Impact

The FAA estimates that 169 airplanes in the U.S. registry will be affected by this AD, that it will take approximately 1 workhour per airplane to accomplish the required action, and that the average labor rate is approximately $60 an hour. Since an owner/operator who holds at least a private pilot's certificate as authorized by sections 43.7 and 43.11 of the Federal Aviation Regulations (14 CFR 43.7 and 43.11) can accomplish the required action, the only cost impact upon the public is the time it would take the affected airplane owner/operators to incorporate the AFM revisions.

In addition, the FAA recognizes that this AD may impose operational costs. However, those costs are incalculable because the frequency of occurrence of the specified conditions and the associated additional flight time cannot be determined. Nevertheless, because of the severity of the unsafe condition addressed, the FAA has determined that continued operational safety necessitates the imposition of these costs.

Regulatory Impact

The regulations adopted herein will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 12612, it is determined that this final rule does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

For the reasons discussed above, I certify that this action (1) is not a ''significant regulatory action'' under Executive Order 12866; (2) is not a ''significant rule'' under DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979); and (3) will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act. A copy of the final evaluation prepared for this action is contained in the Rules Docket. A copy of it may be obtained by contacting the Rules Docket at the location provided under the caption **ADDRESSES**.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

Adoption of the Amendment

Accordingly, pursuant to the authority delegated to me by the Administrator, the Federal Aviation Administration amends part 39 of the Federal Aviation Regulations (14 CFR part 39) as follows:

PART 39—AIRWORTHINESS DIRECTIVES

1. The authority citation for part 39 continues to read as follows:

Authority: 49 USC 106(g), 40113, 44701.

§ 39.13 [Amended]

2. Section 39.13 is amended by adding a new airworthiness directive (AD) to read as follows:

96–09–11 De Havilland: Amendment 39–9587; Docket No. 96–CE–01–AD.

Applicability: Models DHC–6–1, DHC–6–100, DHC–6–200, and DHC–6–300 airplanes (all serial numbers), certificated in any category.

Note 1: This AD applies to each airplane identified in the preceding applicability provision, regardless of whether it has been modified, altered, or repaired in the area subject to the requirements of this AD. For airplanes that have been modified, altered, or repaired so that the performance of the requirements of this AD is affected, the owner/operator must request approval for an alternative method of compliance in accordance with paragraph (d) of this AD. The request should include an assessment of the effect of the modification, alteration, or repair on the unsafe condition addressed by this AD; and, if the unsafe condition has not been eliminated, the request should include specific proposed actions to address it.

Compliance: Required as indicated, unless accomplished previously.

To minimize the potential hazards associated with operating the airplane in severe icing conditions by providing more clearly defined procedures and limitations associated with such conditions, accomplish the following:

(a) Within 30 days after the effective date of this AD, accomplish the requirements of paragraphs (a)(1) and (a)(2) of this AD.

Note 2: Operators must initiate action to notify and ensure that flight crewmembers are apprised of this change.

(1) Revise the FAA-approved Airplane Flight Manual (AFM) by incorporating the following into the Limitations Section of the AFM. This may be accomplished by inserting a copy of this AD in the AFM.

''WARNING

Severe icing may result from environmental conditions outside of those for which the airplane is certificated. Flight in freezing rain, freezing drizzle, or mixed icing conditions (supercooled liquid water and ice crystals) may result in ice build-up on protected surfaces exceeding the capability of the ice protection system, or may result in ice forming aft of the protected surfaces. This ice may not be shed using the ice protection systems, and may seriously degrade the performance and controllability of the airplane.

• During flight, severe icing conditions that exceed those for which the airplane is certificated shall be determined by the following visual cues. If one or more of these visual cues exists, immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the icing conditions.

—Unusually extensive ice accreted on the airframe in areas not normally observed to collect ice.

—Accumulation of ice on the upper surface of the wing aft of the protected area.

—Accumulation of ice on the propeller spinner farther aft than normally observed.

• Since the autopilot may mask tactile cues that indicate adverse changes in handling characteristics, use of the autopilot is prohibited when any of the visual cues specified above exist, or when unusual lateral trim requirements or autopilot trim warnings are encountered while the airplane is in icing conditions.

• All icing detection lights must be operative prior to flight into icing conditions at night. [NOTE: This supersedes any relief provided by the Master Minimum Equipment List (MMEL).]''

(2) Revise the FAA-approved AFM by incorporating the following into the

Procedures Section of the AFM. This may be accomplished by inserting a copy of this AD in the AFM.

''THE FOLLOWING WEATHER CONDITIONS MAY BE CONDUCIVE TO SEVERE IN-FLIGHT ICING:

• Visible rain at temperatures below 0 degrees Celsius ambient air temperature.
• Droplets that splash or splatter on impact at temperatures below 0 degrees Celsius ambient air temperature.

PROCEDURES FOR EXITING THE SEVERE ICING ENVIRONMENT:

These procedures are applicable to all flight phases from takeoff to landing. Monitor the ambient air temperature. While severe icing may form at temperatures as cold as −18 degrees Celsius, increased vigilance is warranted at temperatures around freezing with visible moisture present. If the visual cues specified in the Limitations Section of the AFM for identifying severe icing conditions are observed, accomplish the following:

• Immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the severe icing conditions in order to avoid extended exposure to flight conditions more severe than those for which the airplane has been certificated.
• Avoid abrupt and excessive maneuvering that may exacerbate control difficulties.
• Do not engage the autopilot.
• If the autopilot is engaged, hold the control wheel firmly and disengage the autopilot.
• If an unusual roll response or uncommanded roll control movement is observed, reduce the angle-of-attack.
• Do not extend flaps during extended operation in icing conditions. Operation with flaps extended can result in a reduced wing angle-of-attack, with the possibility of ice forming on the upper surface further aft on the wing than normal, possibly aft of the protected area.
• If the flaps are extended, do not retract them until the airframe is clear of ice.
• Report these weather conditions to Air Traffic Control.''

(b) Incorporating the AFM revisions, as required by this AD, may be performed by the owner/operator holding at least a private pilot certificate as authorized by section 43.7 of the Federal Aviation Regulations (14 CFR 43.7), and must be entered into the aircraft records showing compliance with this AD in accordance with section 43.11 of the Federal Aviation Regulations (14 CFR 43.11).

(c) Special flight permits may be issued in accordance with sections 21.197 and 21.199 of the Federal Aviation Regulations (14 CFR 21.197 and 21.199) to operate the airplane to a location where the requirements of this AD can be accomplished.

(d) An alternative method of compliance or adjustment of the compliance time that provides an acceptable level of safety may be used if approved by the Manager, Small Airplane Directorate, FAA, 1201 Walnut, suite 900, Kansas City, Missouri 64106. The request shall be forwarded through an appropriate FAA Maintenance Inspector, who may add comments and then send it to the Manager, Small Airplane Directorate.

Note 3: Information concerning the existence of approved alternative methods of compliance with this AD, if any, may be obtained from the Small Airplane Directorate.

(e) All persons affected by this directive may examine information related to this AD at the FAA, Central Region, Office of the Assistant Chief Counsel, Room 1558, 601 E. 12th Street, Kansas City, Missouri 64106.

(f) This amendment (39–9587) becomes effective on June 11, 1996.

Issued in Kansas City, Missouri, on April 24, 1996.

Henry A. Armstrong,

Acting Manager, Small Airplane Directorate, Aircraft Certification Service.

[FR Doc. 96–10728 Filed 5–1–96; 3:23 pm]

BILLING CODE 4910–13–P

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14 CFR Part 39

[Docket No. 96–CE–02–AD; Amendment 39–9588; AD 96–09–12]

RIN 2120–AA64

Airworthiness Directives; Empresa Brasileiro de Aeronautico, S.A. Models EMB–110P1 and EMB–110P2 Airplanes

AGENCY: Federal Aviation Administration, DOT.

ACTION: Final rule.

SUMMARY: This amendment adopts a new airworthiness directive (AD) that applies to Empresa Brasileiro de Aeronautico, S.A. (EMBRAER) Models EMB–110P1 and EMB–110P2 airplanes. This action requires revising the Airplane Flight Manual (AFM) to provide the flight crew with recognition cues for, and procedures for exiting from, severe icing conditions, and to limit or prohibit the use of various flight control devices. This amendment is prompted by results of a review of the requirements for certification of the airplane in icing conditions, new information on the icing environment, and icing data provided currently to the flight crews. The actions specified by this AD are intended to minimize the potential hazards associated with operating the airplane in freezing rain or freezing drizzle conditions by providing more clearly defined procedures and limitations associated with such conditions.

EFFECTIVE DATE: June 11, 1996.

ADDRESSES: Information that relates to this AD may be examined at the Federal Aviation Administration (FAA), Central Region, Office of the Assistant Chief Counsel, Attention: Rules Docket 96–CE–02–AD, Room 1558, 601 E. 12th Street, Kansas City, Missouri 64106.

FOR FURTHER INFORMATION CONTACT: Mr. John Dow, Aerospace Engineer, FAA, Small Airplane Directorate, 1201 Walnut, suite 900, Kansas City, Missouri 64106; telephone (816) 426–6934; facsimile (816) 426–2169.

SUPPLEMENTARY INFORMATION: A proposal to amend part 39 of the Federal Aviation Regulations (14 CFR part 39) to include an AD that would apply to EMBRAER Models EMB–110P1 and EMB–110P2 airplanes was published in the Federal Register on January 25, 1996 (61 FR 2183). The action proposed to require revising the Airplane Flight Manual (AFM) to specify procedures that would prohibit flight in freezing rain or freezing drizzle conditions (as determined by certain visual cues), limit or prohibit the use of various flight control devices, and provide the flight crew with recognition cues for, and procedures for exiting from, severe icing conditions.

Disposition of Comments

For the disposition of comments on this rulemaking action, see Docket No. 96–CE–01; Amendment 39–9587; AD 96–09–11, Airworthiness Directives; de Havilland, Inc. DHC–6 Series Airplanes, published elsewhere in this issue of the Federal Register.

Conclusion

After careful review of the available data, including the comments noted above, the FAA has determined that air safety and the public interest require the adoption of the rule with the changes previously described. The FAA has determined that these changes will neither increase the economic burden on any operator nor increase the scope of the AD.

Cost Impact

The FAA estimates that 169 airplanes in the U.S. registry will be affected by this AD, that it will take approximately 1 workhour per airplane to accomplish the required action, and that the average labor rate is approximately $60 an hour. Since an owner/operator who holds at least a private pilot's certificate as authorized by sections 43.7 and 43.11 of the Federal Aviation Regulations (14 CFR 43.7 and 43.11) can accomplish the required action, the only cost impact upon the public is the time it would take the affected airplane owner/operators to incorporate the AFM revisions.

In addition, the FAA recognizes that this AD may impose operational costs. However, those costs are incalculable