Docket No. SA-533

Exhibit No. 2-III

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C.

NTSB Icing Recommendations

(148 Pages)

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Log Number 1197

Issue Date 8/7/1982 **PARKER CO** **3/27/1980**

ON MARCH 27, 1980, A BEECHCRAFT SUPER KING AIR, BE-200, N456L, OWNED AND OPERATED BY LUFKIN INDUSTRIES, INCORPORATED OF LUFKIN, TEXAS, CRASHED AND BURNED IN AN OPEN FIELD NEAR PARKER, COLORADO. THE FLIGHT HAD DEPARTED ARAPAHOE COUNTY AIRPORT, COLORADO, 13 MILES WEST OF PARKER, AT 1434:15 FOR A FLIGHT TO LUFKIN. ABOUT 9 1/2 MINUTES AFTER DEPARTURE, THE PILOTS OF N456L DECLARED AN EMERGENCY BECAUSE OF AIR FRAME ICING. THE AIRCRAFT WAS BEING VECTORED TO LAND AT STAPLETON INTERNATIONAL AIRPORT, DENVER, COLORADO, WHEN IT CRASHED. THE TWO PILOTS AND EIGHT PASSENGERS ON BOARD WERE KILLED IN THE CRASH AND SUBSEQUENT GROUND FIRE. THE AIRCRAFT WAS DESTROYED.

Recommendation # A-82-118

Overall Status
CAAA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: AMEND FAA-APPROVED FLIGHT MANUALS, WHERE APPLICABLE TO PRESCRIBE MINIMUM AIRSPEEDS AND APPROPRIATE FLIGHT PRECAUTIONS DURING FLIGHT IN ICING CONDITIONS.

FAA	Closed - Acceptable Alternate Action	9/26/1986

12/9/1982	Addressee	FAA LTR: THE FAA HAS IN PREPARATION AN AC FOR ICE PROTECTION CERTIFICATION ON 14 CFR 23 AIRPLANES. THE DRAFT AC CONTAINS, IN PART, PROCEDURES FOR DETERMINING: (1) AIRPLANE HOLDING AND APPROACH PROCEDURES AND CONFIGURATION TO MINIMIZE ICE ACCRETION; (2) INCREASE IN STALL SPEEDS WITH RESIDUAL ICE BUILDUP; (3) LANDING DISTANCE WITH RESIDUAL ICE BUILDUP; AND (4) RATE OF CLIMB (OR GRADIENT) WITH RESIDUAL ICE BUILDUP. FURTHER, THE AC WILL EMPHASIZE TO THE TYPE CERTIFICATION AND SUPPLEMENTAL-TYPE CERTIFICATION APPLICANT THAT THE PILOT MUST BE MADE UNMISTAKABLY AWARE THAT AN ICING CERTIFICATION DOES NOT ADDRESS FREEZING RAIN NOR FREEZING DRIZZLE AND DOES NOT CONSTITUTE APPROVAL TO OPERATE IN THESE CONDITIONS.
2/2/1983	NTSB	The Safety Board, after careful review, concurs with the FAA's rationale for an alternate plan aimed at informing pilots of minimum airspeeds and appropriate flight precautions during flight in icing conditions. We believe the Advisory Circular (AC) the FAA has in preparation for ice protection certification on 14 CFR 23 airplanes will satisfy the intent of A-82-118. Pending the issuance of the AC, Safety Recommendation A-82-118 will be held in an "Open--Acceptable Action" status.
5/24/1984	Addressee	FAA COMMENT: THE FEDERAL AVIATION ADMINISTRATION (FAA) HAS PREPARED A DRAFT ADVISORY CIRCULAR (AC), "ICE PROTECTION FOR SMALL AIRPLANES," WHICH WILL STRESS THAT PILOTS SHOULD BE PROVIDED WITH APPROPRIATE FLIGHT PRECAUTIONS FOR FLIGHT DURING ICING CONDITIONS. THIS DRAFT AC IS PRESENTLY BEING REVIEWED WITHIN THE FAA AND WITH THE GENERAL AVIATION MANUFACTURERS ASSOCIATION. WHEN THIS REVIEW AND RESOLUTION OF COMMENTS ARE COMPLETE, A NOTICE OF AVAILABILITY WILL BE PUBLISHED IN THE FEDERAL REGISTER TO ALLOW PUBLIC COMMENT. WE EXPECT TO PUBLISH A FINAL AC BEFORE MARCH 1985.
5/7/1985	Addressee	FAA LTR: AS NOTED IN OUR RESPONSE DATED MAY 24, 1984, THE FAA HAS PREPARED A DRAFT AC, "ICE PROTECTION FOR SMALL AIRPLANES," WHICH WILL STRESS THAT PILOTS SHOULD BE PROVIDED WITH APPROPRIATE FLIGHT PRECAUTIONS FOR FLIGHT DURING ICING CONDITIONS. THIS DRAFT AC IS PRESENTLY BEING REVIEWED WITHIN THE FAA AND WITH THE GENERAL AVIATION MANUFACTURERS ASSOCIATION AND IS TAKING LONGER THAN PLANNED. WHEN THIS REVIEW AND RESOLUTION OF COMMENTS ARE COMPLETED, A NOTICE OF AVAILABILITY WILL BE PUBLISHED IN THE FEDERAL REGISTER TO ALLOW PUBLIC COMMENT. WE ANTICIPATE THAT WE WILL PUBLISH THE FINAL AC BEFORE JULY 1985.

9/3/1985	NTSB	Your letter of May 24, 1984, indicated that the FAA had prepared a draft Advisory Circular (AC), "Ice Protection for Small Airplanes," which was expected to be published in its final form before March 1985. We note now from your letter of May 7, 1985, and from information obtained subsequently through staff sources, that the Notice of Availability of the AC has been delayed further and that it is not likely to be published in the Federal Register before September 1985.
		We are aware that the preparation of this AC has required extensive coordination and review with the General Aviation Manufacturers Association and within the FAA; Data Source: NTSB Recommendations to FAA and FAA Responses however, we believe it is important that the AC be made available to the aviation community before the winter and hope that there will be no further delay. This recommendation remains in an "Open--Acceptable Alternate Action" status.
1/17/1986	Addressee	"ENCLOSED FOR THE BOARD'S INFORMATION IS A DRAFT COPY OF ADVISORY CIRCULAR (AC) 23.1419-XX, CERTIFICATION OF SMALL AIRPLANES FOR FLIGHT IN ICING CONDITIONS. THE AC STRESSES THAT PILOTS SHOULD BE PROVIDED WITH APPROPRIATE OPERATING INSTRUCTIONS, INCLUDING FLIGHT PRECAUTIONS DURING FLIGHT IN ICING CONDITIONS. SECTION 11, PLACARDING AND AIRPLANE FLIGHT MANUALS, PROVIDES GUIDANCE MATERIAL RESPONSIVE TO RECOMMENDATION A-82-118. THE FEDERAL AVIATION ADMINISTRATION (FAA) HAS FORWARDED A NOTICE OF AVAILABILITY OF THIS DRAFT AC FOR PUBLICATION IN THE FEDERAL REGISTER WITH A 90 DAY PUBLIC COMMENT PERIOD. I ANTICIPATE THAT THIS AC WILL BE PUBLISHED BEFORE AUGUST 1, 1986, AND A COPY WILL BE FORWARDED TO THE BOARD SHORTLY THEREAFTER.-----".
3/25/1986	NTSB	The Safety Board has reviewed the draft Advisory Circular (AC), "Certification of Small Airplanes for Flight in Icing Conditions", and we are pleased to note that it adequately stresses the need for pilots to be provided with appropriate flight precautions for flight during icing conditions. Pending publication of the AC, this recommendation remains in an "Open--Acceptable Alternate Action" status.
9/26/1986	Addressee	ENCLOSED FOR THE BOARD'S INFORMATION IS A COPY OF THE FINAL AC 23.1419-1, ENTITLED CERTIFICATION OF SMALL AIRPLANES FOR FLIGHT IN ICING CONDITIONS. THE AC STRESSES THAT PILOTS SHOULD BE PROVIDED WITH APPROPRIATE FLIGHT PRECAUTIONS DURING FLIGHT IN ICING CONDITIONS. SECTION 11, PLACARDING AND AIRPLANE FLIGHT MANUAL (AFM) OF THE AC PROVIDES GUIDANCE MATERIAL IMPLEMENTING THE INTENT OF THIS RECOMMENDATION. THE AC WAS SIGNED ON 9/2/86, AND IS IN THE PROCESS OF BEING PRINTED FOR DISTRIBUTION.
11/10/1986	NTSB	The Board has reviewed the copy of Advisory Circular (AC) 23.1419-1, "Certification of Small Airplanes for Flight in Icing Conditions," and notes that the AC adequately addresses the need for pilots to be provided with appropriate airspeeds and other flight precautions for flight during icing conditions. Safety Recommendation A-82-118 has been classified as "Closed--Acceptable Alternate Action."

Recommendation # A-82-119

Overall Status
CAA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: REQUIRE THAT ACCIDENT PREVENTION SPECIALISTS REVIEW WITH PILOTS THE CRITICAL NATURE THAT EXTENDED OPERATION AT HIGH ANGLES OF ATTACK IN ICING CONDITONS CAN HAVE ON THE ACCRETION OF ICE AND AIRCRAFT PERFORMANCE WITH SPECIAL EMPHASIS ON THE NEED FOR STRICT ADHERENCE TO PRESCRIBED OPERATIONAL PROCEDURES AND ON THE PROPER PROCEDURES FOR USE OF DEICING EQUIPMENT.

FAA	Closed - Acceptable Action	2/2/1983

12/9/1982	Addressee	FAA LTR: FAA ACCIDENT PREVENTION SPECIALISTS HAVE BEEN DIRECTED TO EMPHASIZE, AT EACH SAFETY SEMINAR, THE IMPORTANCE OF FOLLOWING THE PRESCRIBED AIRCRAFT OPERATING PROCEDURES AND TO ADVISE THE ATTENDEES OF THE AVAILABILTIY OF AC'S, DIRECTIVES, AND PAMPHLETS WHICH COVER SPECIFIC SUBJECTS OF SAFE OPERATING PRACTICES.
2/2/1983	NTSB	We are pleased to note that the FAA has taken action to implement this recommendation. Safety Recommendation A-82-119 is classified in a "Closed--Acceptable Action" status.

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MODE:AVIATION KEYWORD 1:icing

Log Number 1355

Issue Date 9/24/1981 **DENVER CO** **3/27/1980**

THE NATIONAL TRANSPORTATION SAFETY BOARD HAS ISSUED A SAFETY REPORT ON THE HAZARD OF AIRCRAFT STRUCTURAL ICING, INCLUDING THE PHYSICAL ASPECTS OF THE PROBLEM AS IT RELATES TO AIRCRAFT, METHODS OF AVOIDANCE AND/OR PREVENTION, THE ADEQUACY OF ICING FORECASTS, AND THE CERTIFICATION OF AIRCRAFT FOR FLIGHT INTO KNOWN ICING CONDITIONS (SAFETY REPORT--AIRCRAFT ICING AVOIDANCE AND PROTECTION, NTSB-SR-81-1).

Recommendation # A-81-115

Overall Status
CUA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: EVALUATE INDIVIDUAL AIRCRAFT PERFORMANCE IN ICING CONDITIONS IN TERMS OF LIQUID WATER CONTENT, DROP SIZE DISTRIBUTION, AND TEMPERATURE, AND ESTABLISH OPERATIONAL LIMITS AND PUBLISH THIS INFORMATION FOR PILOT USE.

FAA	Closed - Unacceptable Action	12/11/1989

12/21/1981 Addressee — FAAL LTR: FULL IMPLEMENTATION OF THIS RECOMMENDATION WOULD BE DEPENDENT UPON PRIOR IMPLEMENTATION OF SAFETY RECOMMENDATIONS A-81-113 AND 114 WHICH WERE FORWARDED TO THE FEDERAL COORDINATOR FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH. THAT IS, FOR A PILOT TO UTILIZE OPERATIONAL LIMITS IN TERMS OF LIQUID WATER CONTENT, DROP SIZE DISTRIBUTION, AND TEMPERATURE, INFORMATION ON ICING FORECASTS AND ACTUAL CONDITIONS MUST BE AVAILABLE TO HIM IN TERMS OF THESE PARAMETERS. WE CAN ENVISION THAT IMPLEMENTATON OF THIS CONCEPT WOULD ENTAIL CONSIDERABLE EXPENSE, BOTH IN MEASURING THE ATMOSPHERIC PARAMETERS AND IN PROVIDING INFORMATION FOR PILOT USE IN AIRCRAFT FLIGHT MANUALS. DURING CERTIFICATION IN ICING, THE AIRCRAFT IS EVALUATED IN TERMS OF LIQUID WATER CONTENT, DROP SIZE DISTRIBUTION, AND TEMPERATURE TO ESTABLISH THE ADEQUACY OF THE ICE PROTECTION SYSTEM AND TO DEMONSTRATE THE CAPABILITY OF THE AIRCRAFT TO OPERATE SAFELY IN THE DEFINED ATMOSPHERIC ICING CONDITIONS. LIMITED CERTIFICATION IN TERMS OF LIQUID WATER CONTENT, DROP SIZE DISTRIBUTION, AND TEMPERATURE IS NOT PERMITTED. AS THERE ARE NO LIMITATIONS IN TERMS OF THESE PARAMETERS FOR AN AIRCRAFT CERTIFICATED IN ICING, THERE WOULD BE LITTLE OR NO NEED TO PROVIDE SUCH INFORMATION TO PILOTS. (THE EXCEPTION TO THIS IS FREEZING RAIN, FREEZING DRIZZLE, AND MIXED CONDITIONS WHCH ARE DISCUSSED IN COMMENTS TO RECOMMENDTION A-81-116). WE BELIEVE THE PRESENT ICING CERTIFICATION PHILOSOPHY AND CRITERIA ARE BASICALLY SOUND AND THAT THIS IS REFLECTED IN THE ACCIDENT STATISTICS.

4/16/1982 NTSB — The relationship between this recommendation and the ability to forecast icing conditions in terms of liquid water content, drop size distribution and temperature is well understood; and as indicated in our recommendation letter, aircraft performance evaluation in icing conditions described by these parameters would only be of value if improved icing forecast techniques could be developed. However, we believe the basic concept of enabling an operator to determine the effects of icing conditions, stated in parametric terms, upon a specific aircraft is valid. Forecasts issued in terms of intensity levels ("light," "moderate," "severe") do not apply equally to all aircraft, for example, moderate icing to a large transport aircraft might be severe to a small general aviation aircraft. Therefore, we Data Source: NTSB Recommendations to FAA and FAA Responses request that FAA reconsider the reply to A-81-115 which has been classified as "Open--Unacceptable Action."

6/7/1982 Addressee — FAA LETTER: THE RULES DO NOT ALLOW CERTIFICATION FOR LESS EXTREME CONDITIONS, AS IMPLIED, IN YOUR RECOMMENDATIONS, BECAUSE VARIABLES SUCH AS LIQUID WATER CONTENT, DROPLET SIZE, AND OUTSIDE AIR TEMPERATURE ARE NOT CONTROLLABLE BY THE PILOT. THESE CONDITIONS MAY CHANGE SO RAPIDLY THAT DIVERSION TO AREAS WHERE LESS SEVERE ICING CONDITIONS EXIST MAY NOT BE POSSIBLE. PROVIDING ICING FORECASTS AND AIRPLANE OPERATING LIMITS IN PARAMETRIC TERMS (LIQUID WATER CONTENT, DROP SIZE DISTRIBUTION, AND TEMPERATURE) COULD THEREFORE PROVE HAZARDOUS FOR AN AIRCRAFT WITH ONLY A LIMITED CAPABILITY TO OPERATE SAFELY IN ICING CONDITIONS. THE FAA REQUIRES CERTIFICATION TO THE FULL ICING ENVELOPE EXPECTED IN NATURE AS DEFINED IN 14 CFR 25, APPENDIX C. TO ALLOW CERTIFICATION WITH OPERATING LIMITATIONS IN TERMS OF THE ABOVE PARAMETERS WOULD THEREFORE DEGRADE THE LEVEL OF SAFETY ESTABLISHED BY THE PRESENT RULES.

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MODE:AVIATION KEYWORD 1:icing

10/24/1983	NTSB	Regulation 14 CFR Part 91.209 allows IFR flight by any aircraft into known or forecast light icing conditions; under VFR into known or forecast light or moderate icing conditions if equipped with deicing/anti-icing equipment (no certification required); and into severe icing conditions if the requirements under Section 34 of Special Federal Aviation Regulation No. 23 (certification) are met. The problem is that the current definitions of the intensities of icing are based upon the effect of icing upon an aircraft. Yet, it is an accepted fact that similar meteorological conditions have varying effects upon different aircraft. Conditions which a pilot of a large commercial aircraft may describe as light icing, for example, might result in exceeding the deicing/anti-icing capabilities of some smaller aircraft thereby significantly affecting the performance of those aircraft. This means that a pilot has no way to judge the expected effect of a reported level of icing upon his particular aircraft and make an objective decision as to the Data Source: NTSB Recommendations to FAA and FAA Responses legality and safety of flight. You have stated that certification permits safe flight under maximum icing conditions. However, by definition, severe icing is a rate of accumulation in which the hazard is not reduced or controlled by the deicing/anti-icing equipment and immediate diversion is necessary. We maintain the position that pilots, particularly those involved with general aviation, air taxi, and commuter aircraft, need more information concerning the potential severity of icing and its effect upon the particular aircraft that they are flying. Action upon this recommendation is by necessity based upon work to be done by the Federal Coordinator for Meteorological Services and Supporting Research. The Federal Coordinator for Meteorological Services and Supporting Research is currently preparing a statement on the national requirements for icing research, forecasts and operational procedures. Pending the publication of this statement, we are classifying Safety Recommendation A-81-115 as "Open--Unacceptable Action." We request that the FAA reconsider its position after the statement by the Federal Coordinator is issued.
12/1/1986	Addressee	THE FAA ISSUED AC 29-2 ON 5/28/85, AND AC 23-1419-1 ON 9/2/86, IN RESPONSE TO THIS RECOMMENDATION. THESE AC'S DISCUSS THE EFFECT OF ICING CONDITIONS ON AIRCRAFT PERFORMANCE AND FLIGHT CHARACTERISTICS. ENCLOSED FOR THE BOARD'S INFORMATION ARE COPIES OF APPLICABLE SECTIONS OF THESE AC'S. THIS GUIDANCE SUGGESTS THAT THE CHANGES BE DETERMINED DURING THE AIRCRAFT CERTIFICATION PROCESS AND THAT THIS INFORMATION BE CONTAINED IN THE AIRCRAFT FLIGHT MANUAL.
3/12/1987	NTSB	The Safety Board has reviewed Advisory Circulars 29-2 and 23.1419-1 and finds that they provide the necessary guidance for evaluating aircraft performance in various icing conditions. However, the Safety Board notes that this guidance only "suggests" that changes in aircraft performance be determined during the certification process. The Safety Board believes that the collection of this data should be required during the certification process, especially if the aircraft is to be certificated for flight into known icing, and this information provided in the pilot's flight manual. Therefore, the Safety Board considers an adequate response to this recommendation would be for the FAA to require the performance changes due to various icing conditions to be determined during certification. Pending further correspondence, Safety Recommendation A-81-115 has been classified as "Open--Unacceptable Action."

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MODE:AVIATION KEYWORD 1:icing

6/18/1987	Addressee	AS STATED IN MY LETTER DATED 12-1-86, THE FAA ISSUED AC 29-2 MAY 28, 1985, AND AC 23-1419-1 ON SEPTEMBER 2, 1986, IN RESPONSE TO THIS RECOMMENDATION. DURING AIRCRAFT CERTIFICATION AN EVALUATION IS DONE WITH RESPECT TO FAA PART 25, APPENDIX C. IF DURING THE CERTIFICATION PROCESS OPERATIONAL LIMITATIONS ARE DETERMINED THEY WOULD BE PUBLISHED ON THE TYPE CERITFICATION DATA SHEET OR THE AIRCRAFT MANUAL. SECTION 23.1501 PROVIDES FOR REQUIR MENTS ON HOW OPERATING LIMITATIONS AND OTHER INFORMATION NECESSARY FOR SAFE OPERATION MUST BE MADE AVAILABLE TO CREWMEMBERS. THE AC'S MENTIONED IN MY 12-1-86 LETTER ARE INTENDED TO PROVE (IN NONREGULARTORY LANGUAGE) ACCEPTABLE METHODS, PROCEDURES, PRACTICES FOR COMPLIANCE WITH THE ICING REQUIREMENTS OF THE FAR'S. I CONSIDER THE FAA'S ACTION TO BE COMPLETED, AND PLAN NO FURTHER ACTION ON THIS RECOMMENDATION.

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MODE:AVIATION KEYWORD 1:icing

10/2/1987 NTSB

In the FAA's letter of June 18, 1987, it was stated that the FAA had issued Advisory Circulars (AC) 29-2 and 23.1419-1 in response to the above recommendation and that the rationale for not undertaking any further action on the recommendation was explained in the FAA's previous response dated June 7, 1982. In that response it was stated that the FAA would only accept an icing protection system that would permit safe flight under maximum icing conditions described in 14 CFR Part 25, Appendix C. Yet in both Advisory Circulars 29-2 and 23.1419-1 it is recommended that a statement be included in the flight manuals that the prescribed flight test environment does not include freezing rain and/or mixed conditions and that these conditions may exceed the capabilities of an ice protection system, or words to that effect.

The Board believes that a pilot flying into known or forecast icing conditions needs more information than is presently provided. In particular we do not believe that the present system of describing icing as "trace," "light," "moderate," or "severe" is adequate in that it describes the effect of icing conditions on an aircraft. As different aircraft differ significantly in their response to any one set of conditions, such an advisory may have little meaning.

The Safety Board has previously stated that action by the FAA on Safety Recommendation A-81-115 was dependent upon completed action by the Federal Coordinator for Meteorological Services and Supporting Research (FCM) on Safety Recommendations A-81-113 and 114 which recommended that instruments be developed to measure temperature, liquid water content, drop size distribution and altitude on a synoptic time and grid scale, and further to utilize this instrumentation to collect real-time icing data and develop means to forecast icing conditions in terms of these environmental parameters.

Action by the FCM has commenced. A National Aircraft Icing Program Council has been established. The FAA is represented on this Council. It published the National Aircraft Icing Technology Plan in April 1986. Among the goals of this plan are the development of certification and qualification standards that address all icing conditions and standardized language and units of measure for aircraft and instrument designers, operators, and weather forecasters. Subsequently, the FCM published the National Plan to Improve Icing Forecasts which outlines a series of experiments to be started this coming winter designed both to identify icing conditions in terms of quantitatively measured parameters and to use this information to describe the effects of these parameters on aircraft to improve the definition of icing conditions and the methods of forecasting them.

In a letter to the Chairman of the Safety Board dated June 16, 1987, the former Administrator of the FAA stated that the FAA would fully support the National Plan to Improve Icing Forecasts to assure its completion. If the goals of these two programs are met and utilized as planned, we believe the intent of Safety Recommendation A-81-115 will be met.

In the light of the very active programs presently being conducted by FCM to improve
Data Source: NTSB Recommendations to FAA and FAA Responses
the definitions and measurement of icing conditions and the methods of forecasting them and the FAA's reluctance to acknowledge that the certification procedures and the methods of describing icing conditions needs improvement, we are classifying Safety Recommendation A-81-115 as "Open-Unacceptable Action."

8/12/1988 NTSB

As the last correspondence from your office is now over a year old, we request an update on the FAA efforts in this area. We will continue to hold this safety recommendation as "Open--Unacceptable Action."

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MODE:AVIATION KEYWORD 1:icing

12/11/1989	Addressee	On December 1, 1986, the FAA provided the Safety Board with a copy of Advisory Circulars (AC) 29-2 and 23.1419-1 in response to this safety recommendation. These AC's discuss the effect of icing conditions on aircraft performance and flight characteristics. The FAA believes that the AC's, together with the actions in progress to address Safety Recommendations A-81-116 and -118, meet the intent of this safety recommendation. I consider the FAA's action to be completed, and I urge the Safety Board to classify this safety recommendation as "closed."
4/11/1990	NTSB	The Safety Board adheres to this position and notes that pilots are still receiving the definitions cited in its October 2 letter. If anything, the situation has become more confusing for pilots, because the quantity and scope of icing forecasts has increased since this safety recommendation was issued. Considerable important research has been conducted, and the results have been published in research and academic papers, as well as discussed with pilots at FAA safety seminars. However, because the FAA has not related this information to individual aircraft, pilots have not benefited completely from this information. Because this information has not been effectively used, Safety Recommendation A-81-115 has been classified as "Closed--Unacceptable Action."

Recommendation # A-81-116

Overall Status
CUAS

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: REVIEW THE ICING CRITERIA PUBLISHED IN 14 CFR 25 IN LIGHT OF BOTH RECENT RESEARCH INTO AIRCRAFT ICE ACCRETION UNDER VARYING CONDITIONS OF LIQUID WATER CONTENT, DROP SIZE DISTRIBUTION, AND TEMPERATURE, AND RECENT DEVELOPMENTS IN BOTH THE DESIGN AND USE OF AIRCRAFT; AND EXPAND THE CERTIFICATION ENVELOPE TO INCLUDE FREEZING RAIN AND MIXED WATER DROPLET/ICE CRYSTAL CONDITIONS, AS NECESSARY.

FAA	Closed - Unacceptable Action/Superseded	8/15/1996

12/21/1981	Addressee	FAA LTR: THE FAA, IN CONJUNCTION WITH OTHER INTERESTED AGENCIES, HAS BEEN REEXAMINING THE ENVIRONMENTAL ICING CRITERIA SPECIFIED IN 14 CFR 25, APPENDIX C, IN LIGHT OF RECENT DATA. THE DATA ANALYZED THUS FAR DO NOT SUPPORT A CHANGE TO THE APPENDIX C CRITERIA; HOWEVER, THE ANALYSIS IS CONTINUING AND NTSB WILL BE APPRISED OF THE OUTCOME. THE FAA ICING CERTIFICATION CRITERIA DOES NOT ADDRESS FREEZING RAIN, FREEZING DRIZZLE, OR MIXED WATER DROPLET/ICE CRYSTAL CONDITIONS. THE FAA HAS BEEN PURSUING A RESEARCH AND DEVELOPMENT PROGRAM TO FORMULATE CRITERIA FOR THESE CONDITIONS. THESE CONDITIONS HAVE A LOW PROBABILITY OF OCCURRENCE AND INDICATIONS ARE THAT IT WOULD BE EXCESSIVELY PENALIZING AND ECOMICALLY PROHIBITIVE TO REQUIRE COMPLIANCE WITH SUCH CRITERIA AS PART OF A NORMAL ICING CERTIFICATION. IT IS PRUDENT TO REEMPHASIZE TO PILOTS AND OPERATORS THAT AN ICING CERTIFICATION DOES NOT ADDRESS FREEZING RAIN OR FREEZING DRIZZLE AND THEREFORE DOES NOT CONSTITUTE APPROVAL TO OPERATE IN THESE CONDITIONS.
4/16/1982	NTSB	Your reply indicated icing criteria are being reexamined and an Advisory Circular is being issued to emphasize that icing certification does not address freezing rain or drizzle; however, we take exception to your position that certification requirements for these conditions should be elective. The Safety Board believes that operations in freezing rain, freezing drizzle, and mixed conditions occur often enough to warrant inclusion of such conditions in the certification criteria, especially considering their hazardous nature. Since your evaluation is continuing, we request that these comments be considered before final action is taken. The recommendation is classified as "Open--Unacceptable Action."

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MODE:AVIATION KEYWORD 1:icing

6/7/1982	Addressee	FAA LETTER: OUR PREVIOUS RESPONSE INDICATED THAT THE FAA IS REVIEWING THE ICING CRITERIA, INCLUDING FREEZING RAIN, ETC., BUT THAT THE LATTER WOULD PROBABLY BE CONSIDERED ELECTIVE RATHER THAN PART OF A NORMAL ICING CERTIFICATION. THE SAFETY BOARD BELIEVED THAT FREEZING RAIN, ETC., CRITERIA SHOULD NOT BE ELECTIVE AND REQUESTS THAT THE FAA CONSIDER THEIR COMMENTS PRIOR TO TAKING FINAL ACTION. FAA WILL CONSIDER NTSB COMMENTS REGARDING FREEZING RAIN, FREEEZING DRIZZLE, AND MIXED CONDITIONS PRIOR TO TAKING FINAL ACTION. BEYOND THAT CONSIDERATION WE PLAN NO FURTHER ACTION ON THIS RECOMMENDATION.
10/24/1983	NTSB	The Safety Board remains convinced that freezing rain should be considered as a criterion in the certification of aircraft for flight into icing conditions. Freezing rain can be and often is the cause of the heaviest and most rapid ice accumulation on aircraft. In a recent analysis of an annual compilation of icing accidents, 28 percent were found to involve freezing rain. Consequently, such an occurrence cannot be considered a rare event. Freezing rain also is the most likely icing condition to be encountered during VFR flight in that it is often encountered below the clouds in relatively good visibility at the altitudes most frequently utilized by smaller aircraft. In spite of your continued rejection of this recommendation, we believe a safety problem exists in this case and classify it as ""Open--Unacceptable Action." As in our response to Recommendation A-81-115, we request further FAA response to Safety Recommendation A-81-116 following the statement of national icing requirements by the Federal Coordinator for Meteorological Services and Supporting Research.
12/1/1986	Addressee	THE FAA HAS RECONSIDERED THE ISSUE OF CONSIDERING FREEZING RAIN AND DRIZZLE AS A CRITERION IN THE CERTIFICATION OF AIR CRAFT FOR FLIGHT IN ICING CONDITIONS. THE FAA HAS CONCLUDED THAT CURRENT RESEARCH AND DEVELOPMENT EFFORTS, AS DESCRIBED IN THE NATIONAL AIRCRAFT ICING TECHNOLOGY PLAN RECENTLY PUBLISHED BY THE FEDERAL COORDINATOR FOR METEOROLOGICAL SER VICES, WILL PROVIDE THE DATA NEEDED TO FORM A BASIS FOR DE TERMINING THE FEASIBILITY OF ANY RULEMAKING ACTION. THE FAA WILL DETERMINE THE APPROPRIATE COURSE OF ACTION ONCE THE DATA FROM THIS PROJECT ARE ASSEMBLED AND ANALYZED.
3/12/1987	NTSB	While the Safety Board is concerned about the lack of action since this recommendation was issued, it is encouraged that the FAA has reconsidered its position and is now monitoring the research being accomplished in the National Aircraft Icing Technology Plan for determination of appropriate action. Pending the Board's review of the final action taken, Safety Recommendation A-81-116 has been classified as "Open--Acceptable Action."
8/12/1988	NTSB	The last correspondence we have received regarding this safety recommendation is dated December 1, 1986. In that letter, the FAA stated that it was reconsidering the use of freezing rain and drizzle as criteria for certification of aircraft for flight into icing conditions. The Safety Board requests to be informed as to the course of action the FAA has decided upon and any other rulemaking or actions which have followed. Pending your response, this safety recommendation will be held as "Open--Acceptable Action."

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MODE:AVIATION KEYWORD 1:icing

12/11/1989	Addressee	The FAA has reconsidered the issued concerning the use of freezing rain and drizzle as criteria in the certification of aircraft for flight into icing conditions. The FAA, with the support of the Department of Defense and the National Aeronautics Space Administration, is making an effort to characterize all icing environments including freezing rain and drizzle which are not currently used in the criteria. These efforts are contained in the "National Aircraft Icing Technology Plan" published by the Federal Coordinator for Meteorological Services. A worldwide icing data base has been collected which includes 7,000 data miles of U.S. supercooled cloud data below 10,000 feet; 11,000 data miles of U.S. supercooled cloud data up to 24,000 feet; 8,000 data miles of snow and ice crystal data; and 22,400 data miles of supercooled cloud and ice crystal data from foreign icing research flights. The U.S. supercooled cloud data below 10,000 feet has been fully analyzed and are presented in FAA Technical Report No. DOT/FAA/CT-83/22, "A New Characterization of Supercooled Clouds Below 10,000 Feet AGL," dated June 1983. The remaining data are being converted to a suitable form for statistical analysis. The analysis will be conducted in 1990 and a report on the characterization of each type of icing parameter will be published in 1991. The FAA will determine the appropriate course of action in regard to expansion of the icing certification envelope once the data from this project are analyzed. I believe that the actions the FAA has taken and plans to take address the intent of this safety recommendation, and I urge the Safety Board to classify this safety recommendation as "closed."
4/11/1990	NTSB	Safety Recommendation A-81-116 states that the FAA should review the icing criteria published in 14 CFR Part 25 in light of both recent research into aircraft ice accretion under varying conditions of liquid water content, drop size distribution, and temperature, and recent developments in both the design and use of aircraft; and should expand the certification envelope to include freezing rain and mixed water droplet/ice crystal conditions, as necessary. The Safety Board recognizes that a vast amount of research and gathering of information has been accomplished and that the FAA intends to "determine the appropriate course of action" in the future. However, the content of this safety recommendation has not been addressed. The FAA has not shown the Safety Board that it has reviewed the Part 25 icing criteria or addressed the certification envelope. For these reasons, Safety Recommendation A-81-116 remains classified as ""Open--Unacceptable Action."
9/16/1994	Addressee	THE FAA HAS REVIEWED THE RESEARCH & DEVELOPMENT PROJECTS THAT HAVE BEEN CONDUCTED ON VARIOUS ICING ISSUES & ESPECIALLY WITH RESPECT TO THE ADEQUACY OF THE ICING CRITERIA PUBLISHED IN 14 CFR PART 25. MUCH OF THIS WORK WAS ACCOMPLISHED IN CONJUCTION WITH THE DEPARTMENT OF DEFENSE, THE NATIONAL AERONAUTICS & SPACE ADMINISTRATION, & THE FEDERAL COORDINATOR FOR METEOROLOGICAL SERVICES. THE FAA HAS CONCLUDED THAT THE ICING CRITERIA PUBLISHED IN 14 CFR PART 25 IS ADEQUATE WITH RESPECT TO THE ISSUES OUTLINED IN A-81-116 & A-81-118.
7/12/1995	NTSB	THE BOARD NOTES THAT THE FAA HAS REVIEWED THE ICING CRITERIA PUBLISHED IN 14 CFR PARTS 25, 91, & 135 & HAS CONCLUDED THAT THEY ARE ADEQUATE WITH RESPECT TO ISSUES OUTLINED IN A-81-116 & -118. THE BOARD DOES NOT AGREE. THE CONTENT OF 14 CFR 91.527 (C) & 14 CFR 135.227 (E) STILL IS NOT CONSISTENT WITH PROVISIONS DEFINED IN SECTION 34, APPENDIX A, OF 14 CFR PART 135. UNDER CERTAIN ICE PROTECTION PROVISIONS DEFINED IN SECTION 34, APPENDIX A OF 14 CFR PART 135, FLIGHT INTO KNOWN SEVERE ICING CONDITIONS IS PERMITTED. HOWEVER, SEVERE ICING, AS CURRENTLY DEFINED. INCLUDES HAZARDOUS ENVIRONMENTAL CONDITIONS THAT EXISTING DEICING/ANTI-ICING EQUIPMENT IS UNABLE TO REDUCE OR CONTROL, & IMMEDIATE DIVERSION IS NECESSARY. IN LIGHT OF THE ACCIDENT ON 10/31/94, NEAR ROSELAWN, INDIANA, INVOLVING A SIMMONS AIRLINES ATR-72-210 AIRPLANE IN WHICH STRUCTURAL ICING MAY HAVE BEEN INVOLVED, THE BOARD BELIEVES THE ISSUE OF ICING CRITERIA, AS RELATED TO THE DESIGN & USE OF TRANSPORT-CATEGORY AIRCRAFT, WARRANTS REEXAMINATION BY THE FAA & THE AVIATION INDUSTRY. INVESTIGATION, TESTING, & ANALYSIS FOLLOWING THE ATR-72 ACCIDENT, & TESTIMONY AT THE BOARD'S ACCOCIATED PUBLIC HEARING FOR THAT ACCIDENT, HAVE UNDERSCORED THE NEED TO AMEND THE ICING CRITERIA AS THEY PERTAIN TO 14 CFR PARTS 25, 91, & 135. ACCORDINGLY, THE BOARD CLASSIFIES A-81-116 & -118 "OPEN--UNACCEPTABLE RESPONSE," PENDING FURTHER ACTION BY THE FAA ON THIS LETTER.

8/28/1995	Addressee	THE FAA HAS TAKEN ACTIONS TO ADDRESS THE ATR-72 AIRCRAFT DESIGN & OPERATION IN ICING CONDITIONS. THE FAA IS CURRENTLY EVALUATING SIMILAR AIRCRAFT DESIGNS TO ENSURE THERE ARE NO ADVERSE CHARACTERISTICS WHEN OPERATING IN ICING CONDITIONS. THE FINAL PHASE OF THIS EVALUATION IS TO REVIEW CURRENT CERTIFICATION REQUIREMENTS, APPLICABLE OPERATING REGULATIONS, & FORECAST METHODOLOGIES ASSOCIATED WITH ICE UNDER VARYING ENVIRONMENTAL CONDITIONS. THE FAA PLANS TO CONDUCT AN INTERNATIONAL MEETING IN THE SPRING OF 1996 WITH REPRESENTATIVES FROM AIRWORTHINESS AUTHORITIES, THE AVIATION INDUSTRY, THE NTSB, & OTHER INTERESTED PARTIES. THIS MEETING WILL INCLUDE A COMPREHENSIVE REVIEW OF THE ISSUE DETERMINE WHERE CHANGES OR MODIFICATIONS CAN BE MADE TO PROVIDE AN INCREASED LEVEL OF SAFETY. I WILL KEEP THE BOARD APPRISED OF THE FAA'S PROGRESS ON THESE RECOMMENDATIONS.
11/20/1995	NTSB	THE BOARD NOTES THAT THE FAA PLANS TO CONVENE AN INTERNATIONAL MEETING OF REPRESENTATIVES FROM AIRWORTHINESS AUTHORITIES, THE AVIATION INDUSTRY, THE BOARD, & OTHER INTERESTED PARTIES IN THE SPRING OF 1996. THE MEETING WILL INCLUDE A COMPREHENSIVE REVIEW OF ALL ASPECTS OF AIRWORTHINESS WHEN AIRCRAFT ARE OPERATING IN ICING CONDITIONS & DETERMINE WHERE CHANGES OR MODIFICATIONS CAN BE MADE TO PROVIDE AN INCREASED LEVEL OF SAFETY. WHILE THE BOARD SUPPORTS THE GOALS OF THE FAA IN CONVENING AN INTERNATIONAL MEETING TO EVALUATE THE NEED FOR CHANGES OR MODIFICATIONS TO THE ICING REQUIREMENTS, THE BOARD BELIEVES THAT THESE ACTIONS ARE LONG OVERDUE. ON 7/12/95, THE BOARD WROTE TO THE FAA THAT THE EVENTS ASSOCIATED WITH THE 10/31/94, ATR-72 ACCIDENT AT ROSELAWN, INDIANA, & THE SUBSEQUENT FLIGHT TESTS & ANALYSES, UNDERSCORED THE NEED TO AMEND THE ICING CRITERIA REGULATIONS. IN THAT LETTER, THE BOARD CLASSIFIED A-81-116 & -118 "OPEN--UNACCEPTABLE RESPONSE," PENDING FURTHER ACTIONS BY THE FAA. THE BOARD IS COMPLETING ITS FINAL REPORT OF THE ROSELAWM ATR-72 ACCIDENT. THE SUBJECT OF AIRCRAFT ICING CERTIFICATION WILL BE COVERED IN DEPTH IN THAT ACCIDENT REPORT, INCLUDING THE STATUS OF A-81-116 & --118. PENDING FURTHER ACTIONS BY THE FAA ON THIS SUBJECT & ADOPTIN OF THE FINAL REPORT, A-81-116 & -118 REMAIN CLASSIFIED "OPEN--UNACCEPTABLE RESPONSE."
8/15/1996	NTSB	(CLOSED FROM GREENSHEET) RECOMMENDATIONS A-81-116 & A-81-118 CLASSIFIED AS "CLOSED--UNACCEPTABLE ACTION/SUPERSEDED" BY RECOMMENDATION A-96-54.

Recommendation # A-81-118

Overall Status
CUAS

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION, AS AN INTERIM PRIORITY MEASURE: REEVALUATE AND CLARIFY 14 CFR 91.209(C) AND 135.227(C) TO INSURE THAT THE REGULATIONS ARE COMPATIBLE WITH THE DEFINITION TO INSURE THAT THE REGULATIONS ARE COMPATIBLE WITH THE DEFINITION OF SEVERE ICING ESTABLISHED BY THE FEDERAL COORDINATOR FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH AS PUBLISHED IN THE AIRMAN'S INFORMATION MANUAL.

FAA	Closed - Unacceptable Action/Superseded	8/15/1996

12/21/1981	Addressee	FAA LTR: THE FAA CONCURS IN THIS RECOMMENDATION. WE ARE AWARE THAT THE CONTENT OF THE RULES IN PARTS 91 AND 135 ARE NOT CONSISTANT WITH THE DEFINITION OF SEVERE ICING CONTAINED IN THE AIRMAN'S INFORMATION MANUAL AND USED BY THE NATIONAL WEATHER SERVICE. ACCORDINGLY, WE AGREE THAT CLARIFICATION OF THE CURRENT REGULATIONS IS NECESSARY. THIS INCOMPATIBILITY WILL BE CORRECTED IN BOTH SECTIONS 91.209(C) AND 135.227(C) IN THE NEXT MAJOR REVIEW OF THESE RULES.
4/16/1982	NTSB	Since your reply indicated that the recommended clarification of 14 CFR 91.209(c) and 14 CFR 135.227(c) would be accomplished during the next major review of these rules, we have classified this recommendation as "Open--Acceptable Action." Please provide the Safety Board with the scheduled date of this review.
6/7/1982	Addressee	FAA LETTER: IN RESPONSE TO YOUR REQUEST FOR INFORMATION ON THE STATUS OF OUR REVIEW OF 14 CFR 91 AND 14 CFR 135, WE HAVE RECONSIDERED OUR POSITION TO AMEND THESE RULES. CERTIFICATION REQUIREMENTS AS WELL AS OPERATING RULES MUST BE CONSIDERED REGARDING THE ICING PROBLEM. THEREFORE, WE HAVE DETERMINED THAT THE DEFINITION OF SEVERE ICING, AS IT NOW APPEARS IN THE AIRMAN'S INFORMATION MANUAL (AIM) SHOULD BE AMENDED TO BE MORE COMPATIBLE WITH THE REQUIREMENTS IN 14 CFR 91, 14 CFR 135, AND ALSO 14 CFR 25. THIS REVISION TO THE AIM'S IS NOW IN PROGRESS AND SHOULD BE COMPLETED BY JANUARY 1983.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

10/24/1983	NTSB	In the initial response to this recommendation on December 21, 1981, the FAA stated that it concurred in the recommendation and that Sections 91.209 and 135.227 of the Federal Air Regulations would be corrected to remove the incompatibility with the definition of severe icing given in the Airman's Information Manual (AIM). The Safety Board considered that to be acceptable action and left the recommendation open, pending the publication of the proposed changes. In your June 7, 1982, response to the recommendation, you state that you have reconsidered your position and are going to change the AIM to make it compatible with 14 CFR 91.209 and 135.227. This is in fact changing the established definition of severe icing and stating in effect that there are no conditions so severe that a properly certificated aircraft cannot safely fly in them. The definition of "severe icing," established by the Federal Coordinator for Data Source: NTSB Recommendations to FAA and FAA Responses Meteorological Services and Supporting Research and published in the AIM, states that in severe icing the rate of accumulation is such that deicing/anti-icing equipment fails to reduce or control the hazard and immediate diversion is necessary. Albeit infrequently, airplanes can encounter icing conditions, particularly in cumulonimbus clouds, that are beyond the deicing/anti-icing capability of many airplanes certified for flight into severe icing conditions under 14 CFR Part 25. Changing the AIM to be compatible with 14 CFR Parts 91.209 and 135.227 instead of vice versa ignores the fact that the airplanes cannot fly safely in those conditions. National Weather Service weather reports will continue to use the term "severe icing" which appears in the cited regulations whether or not the AIM is amended. The Safety Board cannot accept this approach and hopes that the FAA will reconsider its position on this recommendation. We are classifying the FAA's response to this recommendation as "Open--Unacceptable Action."
10/25/1983	Addressee	FAA LETTER: THE COMMITTEE OF AVIATION SERVICES (CAS), UNDER THE FEDERAL COORDINATOR FOR METEOROLOGICAL SERVICES, HAS BEGUN A PROJECT WHICH WILL EXAMINE METHODS FOR IMPROVING ICING FORECASTS AND ASSOCIATED WARNING SYSTEMS. ONE OF THE TASKS IS TO EXAMINE THE ICING DEFINITIONS AND PROVIDE THE FRAMEWORK FOR CREATING AN ACCEPTABLE SET OF DEFINITIONS THAT MEET REGULATORY REQUIREMENTS. THE CAS INTENDS TO USE THE INFORMATION GAINED DURING THE PROJECT TO DEVELOP NEW QUALITATIVE DEFINITIONS WHICH WILL BE MORE COMPATIBLE WITH FAA REGULATORY REQUIREMENTS AND CERTIFICATION PROCEDURES. THIS PROCESS WILL REQUIRE EXTENSIVE COORDINATION THROUGHOUT THE FAA, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, DEPARTMENT OF DEFENSE, AND NATIONAL WEATHER SERVICE, AS WELL AS PUBLIC AVIATION INTERESTS. THE FAA WILL EXAMINE ANY NEW DEFINITIONS WHICH MAY BE DEVELOPED AND DETERMINE WHAT, IF ANY, REGULATORY CHANGES MIGHT BE REQUIRED. WE WILL KEEP THE BOARD ADVISED OF ANY SIGNIFICANT PROGRESS RELATIVE TO THIS PROJECT.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

2/21/1984	NTSB	In its initial response of December 21, 1981, the FAA concurred in this recommendation. The FAA agreed that clarification of the regulations was necessary, and stated that appropriate changes would be made in 14 CFR Parts 91.209(c) and 135.227(c) to make them compatible with the definition of icing intensity published in the AIM. In its letter to the FAA of April 16, 1982, the Safety Board approved of the FAA's proposed actions and classified the recommendation status as "Open--Acceptable Action." However, in its letter of June 7, 1982, the FAA stated that it had reconsidered its previous response and was amending the definitions of icing in the AIM. The definitions of icing severity published in the AIM were those established in 1968 by the Federal Coordinator for Meteorological Services and Supporting Research (FCM) and are nationally accepted. The Safety Board disagreed with this action believing that it was not the FAA's prerogative to change established definitions. In its letter of October 24, 1983, the Safety Board reclassified the status of the recommendation as "Open--Unacceptable Action." We note in your letter of October 25, 1983, that the FAA now plans to withhold action on Safety Recommendation A-81-118 until the study of aviation icing Data Source: NTSB Recommendations to FAA and FAA Responses requirements by the Committee for Aviation Services, under the FCM, is completed. The Safety Board is familiar with the efforts of the Committee for Aviation Services and agrees with the FAA's present approach to this recommendation. Based on the FAA's latest response, we are reclassifying Safety Recommendation A-81-118 as "Open--Acceptable Action". We will expect no further response to it until the Committee for Aviation Services has published its findings and the FAA has had the opportunity to act on them.
11/20/1985	NTSB	
8/12/1988	NTSB	The FAA response of October 25, 1983, stated that the FAA was withholding action on this safety recommendation, pending the study of aviation icing requirements by the Committee for Aviation Services, under the FCM. The FCM issued the National Aircraft Icing Technology Plan and National Plan to Improve Icing Forecasts. These plans delineate future directions and discuss past actions on this front. The FAA and the Safety Board have been involved with them for a number of years. The Safety Board requests that the FAA renew its efforts to implement Safety Recommendation A-81-118 based on the work which has been accomplished. Pending your response, this safety recommendation is being held "Open--Acceptable Action." Thank your for your cooperation in this matter. We look forward to hearing from you in the near future.
12/11/1989	Addressee	The FAA will address the specifics of this safety recommendation once the results of the study of aviation icing requirements described in the "National Plan to Improve Aircraft Icing Forecasts" are issued. To assist in this study, the FAA is supplying a short-time icing prediction routine to the National Center for Atmospheric Research (NCAR) for its evaluation. The routine, called the Smith-Feddes model, has been refined for the FAA by the University of Dayton and will be installed on a NCAR computer for use during this winter's flight season. This model uses real-time ground instrument measurements to make short-time predictions of liquid water content, temperature, and cloud drop sizes at various altitudes. If near-accurate predictions are obtained, the FAA will develop an improved icing severity index which is scheduled to be evaluated in 1991. The FAA will consider any pertinent information that is developed from the improved icing forecasting program as it may apply to a regulatory change.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

4/11/1990	NTSB	Safety Recommendation A-81-118 concerns a reevaluation and clarification of 14 CFR 91.209(c) and 135.227(c) to ensure that the regulations are compatible with the definition of severe icing established by the Federal Coordinator for Meteorological Services and Supporting Research as published in the Airman's Information Manual. The FAA responded by stating that the specifics of this safety recommendation will be addressed once results of the study of aviation icing requirements described by the "National Plan to Improve Aircraft Icing Forecasts" are issued and once an improved icing severity index is developed and evaluated. This is expected in 1991. Although the Safety Board is disappointed that the FAA has not implemented this safety recommendation after 8 years, it will be maintained as "Open--Acceptable Action," pending further response.
9/16/1994	Addressee	THE FAA HAS REVIEWED THE RESEARCH & DEVELOPMENT PROJECTS THAT HAVE BEEN CONDUCTED ON VARIOUS ICING ISSUES & ESPECIALLY WITH RESPECT TO THE ADEQUACY OF THE ICING CRITERIA PUBLISHED IN 14 CFR PART 25. MUCH OF THIS WORK WAS ACCOMPLISHED IN CONJUCTION WITH THE DEPARTMENT OF DEFENSE, THE NATIONAL AERONAUTICS & SPACE ADMINISTRATION, & THE FEDERAL COORDINATOR FOR METEOROLOGICAL SERVICES. THE FAA HAS CONCLUDED THAT THE ICING CRITERIA PUBLISHED IN 14 CFR PART 25 IS ADEQUATE WITH RESPECT TO THE ISSUES OUTLINED IN A-81-116 & A-81-118.
7/12/1995	NTSB	THE BOARD NOTES THAT THE FAA HAS REVIEWED THE ICING CRITERIA PUBLISHED IN 14 CFR PARTS 25, 91, & 135 & HAS CONCLUDED THAT THEY ARE ADEQUATE WITH RESPECT TO ISSUES OUTLINED IN A-81-116 & -118. THE BOARD DOES NOT AGREE. THE CONTENT OF 14 CFR 91.527 (C) & 14 CFR 135.227 (E) STILL IS NOT CONSISTENT WITH PROVISIONS DEFINED IN SECTION 34, APPENDIX A, OF 14 CFR PART 135. UNDER CERTAIN ICE PROTECTION PROVISIONS DEFINED IN SECTION 34, APPENDIX A OF 14 CFR PART 135, FLIGHT INTO KNOWN SEVERE ICING CONDITIONS IS PERMITTED. HOWEVER, SEVERE ICING, AS CURRENTLY DEFINED. INCLUDES HAZARDOUS ENVIRONMENTAL CONDITIONS THAT EXISTING DEICING/ANTI-ICING EQUIPMENT IS UNABLE TO REDUCE OR CONTROL, & IMMEDIATE DIVERSION IS NECESSARY. IN LIGHT OF THE ACCIDENT ON 10/31/94, NEAR ROSELAWN, INDIANA, INVOLVING A SIMMONS AIRLINES ATR-72-210 AIRPLANE IN WHICH STRUCTURAL ICING MAY HAVE BEEN INVOLVED, THE BOARD BELIEVES THE ISSUE OF ICING CRITERIA, AS RELATED TO THE DESIGN & USE OF TRANSPORT-CATEGORY AIRCRAFT, WARRANTS REEXAMINATION BY THE FAA & THE AVIATION INDUSTRY. INVESTIGATION, TESTING, & ANALYSIS FOLLOWING THE ATR-72 ACCIDENT, & TESTIMONY AT THE BOARD'S ACCOCIATED PUBLIC HEARING FOR THAT ACCIDENT, HAVE UNDERSCORED THE NEED TO AMEND THE ICING CRITERIA AS THEY PERTAIN TO 14 CFR PARTS 25, 91, & 135. ACCORDINGLY, THE BOARD CLASSIFIES A-81-116 & -118 "OPEN--UNACCEPTABLE RESPONSE," PENDING FURTHER ACTION BY THE FAA ON THIS LETTER.
8/28/1995	Addressee	THE FAA HAS TAKEN ACTIONS TO ADDRESS THE ATR-72 AIRCRAFT DESIGN & OPERATION IN ICING CONDITIONS. THE FAA IS CURRENTLY EVALUATING SIMILAR AIRCRAFT DESIGNS TO ENSURE THERE ARE NO ADVERSE CHARACTERISTICS WHEN OPERATING IN ICING CONDITIONS. THE FINAL PHASE OF THIS EVALUATION IS TO REVIEW CURRENT CERTIFICATION REQUIREMENTS, APPLICABLE OPERATING REGULATIONS, & FORECAST METHODOLOGIES ASSOCIATED WITH ICE UNDER VARYING ENVIRONMENTAL CONDITIONS. THE FAA PLANS TO CONDUCT AN INTERNATIONAL MEETING IN THE SPRING OF 1996 WITH REPRESENTATIVES FROM AIRWORTHINESS AUTHORITIES, THE AVIATION INDUSTRY, THE NTSB, & OTHER INTERESTED PARTIES. THIS MEETING WILL INCLUDE A COMPREHENSIVE REVIEW OF THE ISSUE DETERMINE WHERE CHANGES OR MODIFICATIONS CAN BE MADE TO PROVIDE AN INCREASED LEVEL OF SAFETY. I WILL KEEP THE BOARD APPRISED OF THE FAA'S PROGRESS ON THESE RECOMMENDATIONS.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

11/20/1995	NTSB	THE BOARD NOTES THAT THE FAA PLANS TO CONVENE AN INTERNATIONAL MEETING OF REPRESENTATIVES FROM AIRWORTHINESS AUTHORITIES, THE AVIATION INDUSTRY, THE BOARD, & OTHER INTERESTED PARTIES IN THE SPRING OF 1996. THE MEETING WILL INCLUDE A COMPREHENSIVE REVIEW OF ALL ASPECTS OF AIRWORTHINESS WHEN AIRCRAFT ARE OPERATING IN ICING CONDITIONS & DETERMINE WHERE CHANGES OR MODIFICATIONS CAN BE MADE TO PROVIDE AN INCREASED LEVEL OF SAFETY. WHILE THE BOARD SUPPORTS THE GOALS OF THE FAA IN CONVENING AN INTERNATIONAL MEETING TO EVALUATE THE NEED FOR CHANGES OR MODIFICATIONS TO THE ICING REQUIREMENTS, THE BOARD BELIEVES THAT THESE ACTIONS ARE LONG OVERDUE. ON 7/12/95, THE BOARD WROTE TO THE FAA THAT THE EVENTS ASSOCIATED WITH THE 10/31/94, ATR-72 ACCIDENT AT ROSELAWN, INDIANA, & THE SUBSEQUENT FLIGHT TESTS & ANALYSES, UNDERSCORED THE NEED TO AMEND THE ICING CRITERIA REGULATIONS. IN THAT LETTER, THE BOARD CLASSIFIED A-81-116 & -118 "OPEN--UNACCEPTABLE RESPONSE," PENDING FURTHER ACTIONS BY THE FAA. THE BOARD IS COMPLETING ITS FINAL REPORT OF THE ROSELAWM ATR-72 ACCIDENT. THE SUBJECT OF AIRCRAFT ICING CERTIFICATION WILL BE COVERED IN DEPTH IN THAT ACCIDENT REPORT, INCLUDING THE STATUS OF A-81-116 & --118. PENDING FURTHER ACTIONS BY THE FAA ON THIS SUBJECT & ADOPTIN OF THE FINAL REPORT, A-81-116 & -118 REMAIN CLASSIFIED "OPEN--UNACCEPTABLE RESPONSE."
8/15/1996	NTSB	(CLOSED FROM GREENSHEET) RECOMMENDATIONS A-81-116 & A-81-118 CLASSIFIED AS "CLOSED--UNACCEPTABLE ACTION/SUPERSEDED" BY RECOMMENDATION A-96-54.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Log Number 1355A

Issue Date 9/24/1981 **DENVER CO** **3/27/1980**

THE NATIONAL TRANSPORTATION SAFETY BOARD HAS ISSUED A SAFETY REPORT ON THE HAZARD OF AIRCRAFT STRUCTURAL ICING, INCLUDING THE PHYSICAL ASPECTS OF THE PROBLEM AS IT RELATES TO AIRCRAFT, METHODS OF AVOIDANCE AND/OR PREVENTION, THE ADEQUACY OF ICING FORECASTS, AND THE CERTIFICATION OF AIRCRAFT FOR FLIGHT INTO KNOWN ICING CONDITIONS (SAFETY REPORT--AIRCRAFT ICING AVOIDANCE AND PROTECTION, NTSB-SR-81-1).

Recommendation # A-81-114

Overall Status
CAAA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FEDERAL COORDINATOR FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH (NOAA) COORDINATE AND DIRECT EFFORTS TO: USE THE DEVELOPED INSTRUMENTATION TO COLLECT ICING DATA ON A REAL-TIME BASIS ON A SYNOPTIC GRID AND, IN TURN, DEVELOP TECHNIQUES TO FORECAST ICING CONDITIONS IN TERMS OF LIQUID WATER CONTENT, DROP SIZE DISTRIBUTION, AND TEMPERATURE.

NOAA	Closed - Acceptable Alternate Action	4/11/1994

3/22/1982	Addressee	
5/3/1982	NTSB	
12/10/1985	NTSB	
4/11/1994	Addressee	THE OFCM PUBLISHED THE "NATIONAL AIRCRAFT ICING TECHNOLOGY PLAN "DURING APRIL 1986. THE DUAL OBJECTIVES OF THE PLAN WAS TO: 1) IMPROVE AIRCRAFT ICING DETECTION TECHNOLOGIES FOR THE CURRENT GENERATION OF AIRCRAFT, AND 2) PROMOTE ADVANCES IN AIRCRAFT ICING DETECTION TECHNOLOGY THAT WILL BE NEEDED BY 1995 TO MEET NATIONAL AERONAUTICAL GOALS FOR NEW GENERATIONS OF AIRCRAFT. IN JULY 1986, THE "NATIONAL PLAN TO IMPROVE AIRCRAFT ICING FORECASTS" WAS PUBLISHED.
5/12/1994	NTSB	STAFF NOTES THAT THE OFCM PUBLISHED A REPORT IN FEBRUARY 1982 ENTITLED, "A REPORT ON IMPROVING FORECASTS OF ICING CONDITIONS FOR AVIATION." ADDITIONALLY, THE AIRCRAFT ICING PROGRAM COUNSEL WAS ESTABLISHED IN 1984. THE OFCM PUBLISHED THE "NATIONAL AIRCRAFT ICING TECHNOLOGY PLAN" IN APRIL 1986. THE OBJECTIVES OF THE PLAN WERE TO IMPROVE AIRCRAFT ICING DETECTION TECHNOLOGIES ON THE CURRENT GENERATION OF AIRCRAFT AND TO PROMOTE ADVANCES IN AIRCRAFT ICING DETECTION TECHNOLOGY THAT WILL BE NEEDED BY 1995 TO MEET THE NATIONAL AERONAUTICAL GOALS FOR THE NEW GENERATION OF AIRCRAFT. STAFF NOTES THAT THE FAA ESTABLISHED A 6-YEAR RESEARCH AND DEVELOPMENT EFFORT TO IMPROVE AIRCRAFT ICING FORECASTS AS RECOMMENDED BY THIS PLAN. BASED ON THIS INFORMATION, STAFF RECOMMENDS THAT THE BOARD CLASSIFY RECOMMENDATIONS A-81-113 AND -114 "CLOSED--ACCEPTABLE ALTERNATE ACTION."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Log Number 2225

Issue Date 9/24/1990 **WEST LAFAYETTE IN** **3/15/1989**

ON MARCH 15, 1989, MID PACIFIC AIRLINES FLIGHT 101, CRASHED WHILE ON APPROACH TO PURDUE UNIVERSITY AIRPORT, WEST LAFAYETTE, INDIANA. THE AIRPLANE WAS BEING POSITIONED FOR A REVENUE FLIGHT AND CONTAINED NO CARGO OR PASSENGERS. EYEWITNESSES NOTED THAT THE AIRPLANE'S NOSE SUDDENLY PITCHED DOWNWARD WHILE ON SHORT FINAL APPROACH. THE AIRPLANE STRUCK AN EMBANKMENT 20 FEET HIGH, ABOUT 1/4 MILE FROM THE RUNWAY THRESHOLD. THE LANDING GEARS WERE EXTENDED AND FLAPS WERE EXTENDED AND THE FLAPS WERE EXTENDED TO 35 DEGREE WHEN THE IMPACT OCCURRED. AS A RESULT OF THE ACCIDENT, THE TWO CREWMEMBERS WERE KILLED AND THE AIRPLANE WAS DESTROYED. A SUBSTAINTIAL QUANTITY OF ICE WAS FOUND ON THE LEADING EDGES OF THE HORIZONTAL STABILIZER SHORTLY AFTER THE CRASH. NO EVIDENCE OF ICE WAS FOUND ON THE VERTICAL STABILIZER OR WINGS. THE EXAMINATION AND TESTING OF THE PNEUMATIC DEICING SYSTEM COMPONENTS REVEALED NO ANOMALIES. ON APRIL 3, 1990, ANOTHER NIHON YS-11 OPERATED BY MID PACIFIC AIRLINES, EXPER IENCED A LOSS OF PITCH CONTROL WHILE ON FINAL APPROACH TO PURDUE UNIVERSITY AIRPORT.

Recommendation # A-90-121

Overall Status **Priority**

CAA **CLASS II**

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: CONDUCT A DIRECTED SAFETY REVIEW OF THE NIHON YS-11 ICING CERTIFICATION TO INCLUDE THE EFFECTS OF FLAP EXTENSION AND FORWARD CG LOADING ON PITCH CONTROL WITH TAILPLANE ICE ACCUMULATION.

FAA	Closed - Acceptable Action	7/25/1991

12/10/1990	Addressee	THE FAA IS REQUESTING TYPE DESIGN DATA FROM THE JAPANESE CIVIL AVIATION BUREAU TO ASSIST IN THE REVIEW OF THE ICING CERTIFICATION OF THE NIHON YS-11.
3/6/1991	NTSB	Safety Recommendation A-90-121 states that the FAA should conduct a directed safety review of the Nihon YS-11 icing certification to include the effects of flap extension and forward CG loading on pitch control during tailplane ice accumulation. The Safety Board notes that the FAA has requested type design data from the Japanese Civil Aviation Bureau to assist in the review. Pending further information, Safety Recommendation A-90-121 is classified as "Open--Acceptable Response."
7/25/1991	Addressee	THE FAA CONDUCTED A SAFETY REVIEW OF THE MITSUBISHI HEAVY INDUSTRIES (MHI) (FORMERLY NIHON AEROPLANE MANUFACTURING COMPANY) YS-11 AIRPLANE ICING CERTIFICATION. THE FAA HAS DETERMINED THAT SINCE THE HORIZONTAL STABILIZER COULD ACCRETE ICE MORE READILY THAN THE WING DUE TO A SMALLER LEADING EDGE RADIUS, THE ABSENCE OF WING ICE WOULD NOT BE INDICATIVE OF THE ABSENCE OF ICE ACCRETION ON THE TAIL. THE RESPONSE RECEIVED FROM JCAB AND MHI HAS NOT PROVIDED ANY INFORMATION WHICH WOULD SUGGEST ANY ALTERNATE SOLUTIONS TO A POSSIBLE TAILPLANE ICING PROBLEM ON THE YS-11 AIRPLANE EXCEPT TO AVOID THE AIRCRAFT CONFIGURATION COMMON TO THE ACCIDENT SCENARIOS--WING FLAPS GREATER THAN 20 DEGREES WITH LANDING GEAR DOWN IN ICING CONDITIONS.
11/15/1991	NTSB	The Safety Board notes that the FAA has completed a safety review of the Nihon YS-11 icing certification and has concluded that there is no alternate solution to a possible tailplane icing problem on the airplane except to avoid the aircraft configuration common to the accident scenarios; that is, wing flaps greater than 20 degrees with landing gear down in icing conditions. Based on the above information, the Safety Board classifies Safety Recommendation A-90-121 as "Closed--Acceptable Action."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Recommendation # A-90-122

Overall Status
CAA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: AS AN INTERIM MEASURE TO THE COMPLETION OF THE DIRECTED SAFETY REVIEW, ISSUE AN EMERGENCY AIRWORTHINESS DIRECTIVE APPLICABLE TO YS-11 AIRPLANES THAT LIMITS THE USE OF FLAPS TO 20 DEGREES OR LESS FOR LANDING IN THE PRESENCE OF KNOWN ICING CONDITIONS. REQUIRE THAT A PLACARD BE INSTALLED AND THAT THE PILOT'S OPERATIONAL HANDBOOK BE MODIFIED ACCORDINGLY.

FAA	Closed - Acceptable Action	11/15/1991

12/10/1990	Addressee	THE FAA IS CONSIDERING THE ISSUANCE OF AN AIRWORTHINESS DIRECTIVE TO LIMIT THE FLAPS 20 DEGREE IN THE PRESENCE OF KNOWN ICING. IF ADOPTED, THIS RULEMAKING WILL NEGATE THE NEED FOR AN OPERATIONS BULLETIN AS REQUESTED IN SAFETY RECOMMENDATION A-90-123.
3/6/1991	NTSB	Safety Recommendation A-90-122 states that the FAA should issue an emergency airworthiness directive applicable to YS-11 airplanes that limits the use of flaps to 20° or less for landing in the presence of known icing conditions. Safety Recommendation A-90-123 recommends that the FAA issue an air carrier operation bulletin to principal operations inspectors to advise YS-11 operators of the potential for loss of pitch control when using flaps greater than 20° for landing with ice on the tailplane. The Safety Board is pleased to note that the FAA is considering the issuance of an airworthiness directive to limit the flaps to 20° in the presence of known icing. Pending further information, Safety Recommendations A-90-122 and -123 are classified as "Open--Acceptable Response."
7/25/1991	Addressee	THE FAA ISSUED AN AD (DOCKET NO. 91-NM-06-AD, AMENDMENT 39-6922) APPLICABLE TO ALL MHI MODEL YS-11/11A SERIES AIRPLANES. THIS AD REQUIRES CHANGES IN THE AFM TO LIMIT FLAP POSITIONS TO NO MORE THAN 20 DEGREES IN KNOWN OR POTENTIAL ICING CONDITIONS ON FINAL APPROACH TO LANDING.
11/15/1991	NTSB	The Safety Board notes that the FAA issued an AD on March 19, 1991, that meets the intent of Safety Recommendations A-90-122 and A-90-123. Therefore, the Safety Board classifies these recommendations as "Closed--Acceptable Action."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Log Number 2331

Issue Date 11/19/1991 **PASCO WA** **12/26/1989**

ON DECEMBER 26, 1989, UNITED EXPRESS, FLIGHT 2415 (SUNDANCE 415), A BRITISH AEROSPACE BA-3101 JETSTREAM, N41OUE, CRASHED APPROXIMATELY 400 FEET SHORT OF RUNWAY 21R AT TRI-CITIES AIRPORT, PASCO, WASHINGTON. THE AIRPLANE CRASHED WHILE EXECUTING AN INSTRUMENT LANDING SYSTEM (ILS) APPROACH TO THE RUNWAY AT APPROXIMATELY 2230 PACIFIC STANDARD TIME. VISUAL METEOROLOGICAL CONDITIONS PREVAILED BENEATH THE CLOUD BASES, WHICH WERE APPROXIMATELY 1,000 FEET ABOVE GROUND LEVEL AT THE TIME OF THE ACCIDENT. THE AIRPLANE WAS DESTROYED, AND THE TWO PILOTS AND ALL FOUR PASSENGERS RECEIVED FATAL INJURIES.

Recommendation # A-91-087

Overall Status **CAA**

Priority **CLASS II**

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: AMEND THE ICING CERTIFICATION RULES TO REQUIRE FLIGHT TESTS WHEREIN ICE IS ACCUMULATED IN THOSE CRUISE AND APPROACH FLAP CONFIGURATION IN WHICH EXTENSIVE EXPOSURE TO ICING CONDITIONS CAN BE EXPECTED, AND REQUIRE SUBSEQUENT CHANGES IN CONFIGURATION, TO INCLUDE LANDING FLAPS.

FAA	Closed - Acceptable Action	5/2/2008

1/31/1992	Addressee	THE FAA BELIEVES THAT THE CURRENT CERTIFICATION REQUIREMENTS OF 14 CFR 25.1419 CONTAIN THE STANDARDS REQUESTED BY THIS SAFETY RECOMMENDATION. SECTION 25.1419 (B) STATES, IN PART, THAT THE AIRPLANE OR ITS COMPONENTS MUST BE FLIGHT TESTED IN THE VARIOUS OPERATIONAL CONFIGURATIONS IN MEASURED NATURAL ATMOSPHERIC ICING CONDITIONS IN ACCORDANCE WITH APPENDIX C. THE REGULATIONS ALSO DESCRIBE OTHER TESTS THAT MUST BE PERFORMED "AS FOUND NECESSARY ." ADDITIONALLY THE FAA BELIEVES THAT SINCE THE ICING CERTFICATION RULES UNDER 14 CFR 23.1419 (B) REFER TO APPENDIX C OF 14 CFR PART 25, THESE REGULATIONS ADEQUATELY ADDRESS THE ICING CERTIFICATION REQUIREMENTS. AS AN ALTERNATE ACTION, THE FAA WILL PUBLISH ADVISORY MATERIAL TO ADDRESS ICING CERTIFICATION PROCEDURES FOR 14 CFR PARTS 23 25 CATEGORY AIRPLANES.
4/10/1992	NTSB	In response to Safety Recommendation A-91-87, which asked the FAA to amend icing certification rules, we note that the FAA will publish advisory material to address icing certification procedures for 14 CFR Parts 23 and 25 category airplanes. Although the Safety Board does not agree that the current language in 14 CFR 25.1419 specifically addresses the change of configuration following the accumulation of ice, the inclusion of this certification procedure in an appropriate document, such as the Engineering Flight Test Guide, may satisfy the Safety Board's concern. Thus, pending our further review, this safety recommendation is classified as "Open-Acceptable Alternate Response."
2/13/1996	Addressee	ON 4/29/94, THE FAA ISSUED A POLICY MEMORANDUM TO ALL CERTIFICATION OFFICES DESCRIBING THE TAILPANE STALL PHENOMENA & DEFINING A FLIGHT TEST MANEUVER (ZERO-G PUSHOVER MANEUVER) TO IDENTIFY SUSCEPTIBILITY TO ICE CONTAMINATED TAILPLANE STALL. THIS INTERIM GUIDANCE IS BEING CONSIDERED FOR INCLUSION IN A PROPOSED REVISION TO ADVISORY CIRCULAR 25-7, FLIGHT TEST GUIDE FOR CERTIFICATION OF TRANSPORT CATEGORY AIRPLANES.
7/19/1996	NTSB	THE BOARD NOTES THAT ON 4/29/94, THE FAA ISSUED A POLICY MEMORANDUM TO ALL CERTIFICATION OFFICES DESCRIBING THE TAILPLANE STALL PHENOMENA & DEFINING A FLIGHT TEST MANEUVER (ZERO-G PUSHOVER MANEUVER) TO IDENTIFY SUSCEPTIBILITY TO ICE-CONTAMINATED TAILPLANE STALL. THE BOARD ALSO NOTES THAT THIS INTERIM GUIDANCE MAY BE INCLUDED IN A PROPOSED REVISION TO ADVISORY CIRCURLAR 25-7, "FLIGHT TEST GUIDE FOR CERTIFICATION OF TRANSPORT CATEGORY AIRPLANES." ALSO, A "TERMS OF REFERENCE" DOCUMENT HAS BEEN DRAFTED & HAS BEEN SUBMITTED TO THE AVIATION RULEMAKING ADVISORY COMMITTEE FOR REVIEW & HARMONIZATION OF ICE PROTECTION STANDARDS FOR TRANSPORT-CATEGORY AIRPLANES. PENDING THE BOARD'S REVIEW OF THE REVISION TO AC 25-7, & THE FAA'S REVIEW OF APPENDIX C OF 14 CFR PART 25 & ANY RULEMAKING TO REVISE PARTS 23 & 25, A-91-87 IS CLASSIFIED "OPEN--ACCEPTABLE ALTERNATE RESPONSE."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

12/11/1998	Addressee	Letter Mail Controlled 02/19/1999 10:03:45 AM MC# 981470 ON 4/29/94, THE FAA ISSUED A POLICY MEMORANDUM TO ALL CERTIFICATION OFFICES DESCRIBING THE TAILPLANE STALL PHENOMENA AND DEFINING A FLIGHT TEST MANEUVER (ZERO-G PUSHOVER MANEUVER) TO IDENTIFY SUSCEPTIBILITY TO ICE CONTAMINATED TAILPLANE STALL. ON 3/31/98, FAA ISSUED ADVISORY CIRCULAR (AC) 25-7, FLIGHT TEST GUIDE FOR CERTIFICATION OF TRANSPORT CATEGORY AIRPLANES. THE AC INCLUDES GUIDANCE MATERIAL ON ZERO-G PUSHOVER MANEUVER FOR COMPLIANCE WITH 14 CFR 25.143, CONTROLLABILITY AND MANEUVERABILITY. I HAVE ENCLOSED A COPY OF THE AC FOR THE BOARD'S INFORMATION. AN AVIATION RULEMAKING ADVISORY COMMITTEE (ARAC) PROJECT TO HARMONIZE REGULATORY AND ADVISORY MATERIAL FOR EVALUATING AIRPLANE PERFORMANCE AND HANDLING CHARACTERISTICS IN THE ICING CONDITIONS OF APPENDIX C TO 14 CFR PART 25 WILL ALSO ADDRESS THE TAILPLANE STALL ISSUE. THE RESULTS OF THE ARAC EFFORT WILL BE PUBLISHED AS NEW REGULATIONS AND ADVISORY MATERIAL.
3/1/1999	NTSB	THE BOARD NOTES THE CHANGES IN AC 25-7A AS THEY PERTAIN TO FLIGHT TESTING IN ICING CONDITIONS. THESE CHANGES OFFER GUIDANCE IN TESTING FLIGHT OPERATIONS IN ICING CONDITIONS, AND THE EXPECTED NEW RULES THAT MAY RESULT FROM THE ACTIONS OF THE ARAC PROCESS SHOULD PROVIDE UPDATED GUIDANCE IN THIS CRITICAL FIELD. A-91-87 IS CLASSIFIED "OPEN--ACCEPTABLE RESPONSE," PENDING THE ACTIONS OF THE ARAC EFFORT.
3/16/2000	NTSB	ON 3/16/00 THE SAFETY BOARD REQUESTED AN UPDATE ON THE STATUS OF THIS RECOMMENDATION.
8/29/2000	Addressee	Letter Mail Controlled 09/01/2000 1:25:45 PM MC# 2001200 ON 4/29/94, THE FAA ISSUED A POLICY MEMORANDUM TO ALL CERTIFICATION OFFICES DESCRIBING THE TAILPLANE STALL PHENOMENON AND DEFINING A FLIGHT TEST MANEUVER (ZERO-G PUSHOVER MANEUVER) TO IDENTIFY SUSCEPTIBILITY TO ICE-CONTAMINATED TAILPLANE STALL. ON 3/31/98, THE FAA ISSUED ADVISORY CIRCULAR (AC) 25-7, FLIGHT TEST GUIDE FOR CERTIFICATION OF TRANSPORT CATEGORY AIRPLANES. THE AC INCLUDES GUIDANCE MATERIAL DEFINING ZERO-G PUSHOVER MANEUVER FOR SHOWING COMPLIANCE WITH 14 CFR 25.143, CONTROLLABILITY AND MANEUVERABILITY. COPIES OF THE POLICY MEMORANDUM AND THE AC WERE PROVIDED TO THE BOARD. THE FLIGHT TEST HARMONIZATION WORKING GROUP HAS NOW COMPLETED THE TECHNICAL CONTENT OF PROPOSED 14 CFR PART 25 REGULATIONS AND ADVISORY MATERIAL FOR EVALUATING AIRPLANE PERFORMANCE AND HANDLING CHARACTERISTICS IN THE ICING CONDITIONS OF APPENDIX C AND IS CURRENTLY DEVELOPING ITS PROPOSALS. THESE PROPOSALS INCLUDE A REQUIREMENT TO INVESTIGATE AIRPLANE SUSCEPTIBILITY TO ICE-CONTAMINATED TAILPLANE STALL. THE FAA WILL PUBLISH A NOTICE OF PROPOSED RULEMAKING (NPRM) AFTER THE ARAC COMPLETES ITS WORK. IT IS ANTICIPATED THAT THE NPRM WILL BE PUBLISHED IN EARLY 2002. I WANT TO EMPHASIZE THAT UNTIL THE RULEMAKING EFFORT IS COMPLETED, THE FAA WILL REVIEW EACH SIGNIFICANT PROJECT RELATED TO ICING TO ENSURE THROUGH THE PROVISIONS OF 14 CFR 21.21(B)(2) THAT NO UNSAFE CONDITION EXISTS. I WILL KEEP THE BOARD INFORMED OF THE FAA'S PROGRESS ON THIS RECOMMENDATION.
1/4/2001	NTSB	THE SAFETY BOARD IS CONCERNED ABOUT THE LENGTH OF TIME IT HAS TAKEN TO COMPLETE WORK ON THIS RECOMMENDATION. THE BOARD NOTES THAT IT HAS BEEN ABOUT 9 YEARS SINCE THIS RECOMMENDATION WAS ISSUED. HOWEVER, THE BOARD ALSO NOTES THAT SEVERAL PROMINENT AVIATION ACCIDENTS OCCURRED DURING THE 1990'S IN WHICH ICING WAS AN IMPORTANT CONSIDERATION AND FROM WHICH IMPORTANT INFORMATION WAS LEARNED. THEREFORE, ALTHOUGH THE BOARD UNDERSTANDS THE REASONS FOR THE DELAY IN COMPLETING THIS WORK, THE BOARD ALSO BELIEVES THAT THE FAA SHOULD COMPLETE THIS WORK SOON. PENDING AMENDMENT OF THE ICING CERTIFICATION RULES, A-91-87 REMAINS CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

5/5/2003	Addressee	Letter Mail Controlled 5/13/2003 10:57:31 AM MC# 2030238 The Aviation Rulemaking Advisory Committee has drafted recommended changes to 14 CFR Part 25 requirements and related advisory material to introduce new requirements for evaluating airplane performance and handling characteristics of transport-category airplanes for flight in the icing conditions of 14 CFR Part 25, Appendix C. The Federal Aviation Administration (FAA) will publish a notice of proposed rulemaking (NPRM) based on these recommendations. It is anticipated that the NPRM will be issued by June 2004. The recommendations include a proposed regulatory amendment that contains a flight test maneuver to evaluate airplanes for susceptibility to ice-contaminated tailplane stall. The advisory material provides detailed flight test guidance, including consideration of critical ice accretions that may be accumulated during extensive exposure to icing conditions, and evaluated in the most critical landing configurations. I will keep the Board informed on the FAA's progress on this safety recommendation.
7/31/2003	NTSB	The Safety Board is pleased that the FAA is responding positively to this recommendation, but feels compelled to note that it has been 11 1/2 years since it was issued. The Board is aware that several prominent aviation accidents occurred during the 1990s in which icing was a factor and from which important lessons were learned. The Board believes that analyses of these accidents should result in a more complete response to this recommendation. Pending publication of the NPRM by June 2004 and adoption of a final rule, Safety Recommendation A-91-87 remains classified "Open--Acceptable Response."
10/26/2005	Addressee	Letter Mail Controlled 10/27/2005 2:12:40 PM MC# 2050501 Marion C. Blakey, Administrator, FAA, 10/26/05 The Federal Aviation Administration is continuing its efforts to revise the 14 CFR Part 25 requirements and related advisory material to introduce new requirements for evaluating airplane performance and handling characteristics of transport-category airplanes for flight in the icing conditions of 14 CFR Part 25, Appendix C. There has been a delay in the publication of these documents and it is now anticipated that they will be published for comment by October 2005. Although the proposed notice of proposed rulemaking (NPRM) and advisory circular (AC) have been delayed, the FAA has been responsive to the safety issue addressed in this safety recommendation. The FAA has been conducting flight test evaluations for susceptibility to ice-contaminated tailplane stall for all airplanes approved for flight in icing conditions since the mid-1990s. The FAA has also investigated airplanes with unpowered control systems operating under 14 CFR Parts 121 and 135 operating rules that had been certificated without such an evaluation. For those airplanes found to be susceptible to ice-contaminated tailplane stall, the FAA mandated changes through airworthiness directives (AD) to improve tailplane stall margins. Also, AC 23.1419-2C, Certification of Part 23 Airplanes for Flight in Icing, was issued in August 2004 and guidance on ice accretions in the landing configuration has been added. The proposed NPRM will provide a comprehensive set of new certification requirements to evaluate airplane performance and handling characteristics in icing conditions in order to improve the level of safety for operation in icing conditions. One of the proposed certification requirements will be to conduct a flight test maneuver that is designed to evaluate airplanes for susceptibility to ice-contaminated tailplane stall. This evaluation takes into account lessons learned from analyses of icing accidents that have occurred sincc the accident that generated this safety recommendation. Therefore, it will address more potential causes of ice-contaminated tailplane stall than the single concern identified in this safety recommendation. In addition to the concern identified in the safety recommendation, this evaluation considers changes in flight conditions (for example, a high approach speed resulting in an increased flap downwash angle, gusts, maneuvering, or changes to engine power setting, as well as lateral airflow effects like a sideslip or a lateral wind gust). An accompanying AC will provide detailed guidance on acceptable means of compliance with the new requirements. The proposed AC will include several flight test maneuver conditions with ice being progressively accreted while the airplane configuration changes from flaps and gear retracted with the airplane trimmed at the recommended holding speed to flaps and gear fully extended with the airplane trimmed at the landing reference speed. I will provide the Board with copies of the NPRM and AC as soon as they are published for comment.

5/10/2006	NTSB	The Safety Board notes that on November 4, 2005, the FAA issued a notice of proposed rulemaking (NPRM) titled "Airplane Performance and Handling Qualities in Icing Conditions; Proposed Advisory Circular [AC] 25.21-1X, Performance and Handling Characteristics in the Icing Conditions Specified in Part 25, Appendix C." The Board reviewed this large and technically complex NPRM, and separately submitted technical comments to the docket. The NPRM is responsive to this recommendation. This recommendation is now 14 years old, and it is currently the oldest open aviation safety recommendation. The Board believes that issuance of this NPRM was delayed by important lessons learned from several significant icing accidents during the 1990s, each of which revealed new information concerning the icing problem. Before the NPRM was issued, the FAA conducted flight tests of ice contaminated tailplane stall and investigated airplanes with unpowered control systems that had been certificated without such an evaluation. For airplanes susceptible to ice contaminated tailplane stall, the FAA issued airworthiness directives (ADs) to improve tailplane stall margins. Finally, in August 2004, the FAA issued AC 23.1419 2C, "Certification of Part 23 Airplanes for Flight in Icing." The Board is pleased to see that the NPRM has been issued, and we urge the FAA to move quickly to issue the final rule. Pending issuance of a final rule revising sections of Part 25 regulations and advisory material for evaluating airplane performance and handling characteristics in icing conditions, Safety Recommendation A-91-87 remains classified "Open-Acceptable Response." Safety Recommendations A-96-54, -56, and -58 were issued to the FAA as a result of the Safety Board's investigation of an October 31, 1994, accident in which American Eagle flight 4184, an Avions de Transport Regional Model 72-212 (ATR 72-212), crashed during a rapid descent after an uncommanded roll excursion in icing conditions over Roselawn, Indiana.
1/22/2008	Addressee	Letter Mail Controlled 1/29/2008 11:10:10 AM MC# 2080040: Robert A. Sturgell, Acting Administrator, FAA, 1/22/08 On May 10, 2006, the Board classified this recommendation Open-Acceptable Response pending issuance of the final rule and advisory material for evaluating airplane performance and handling characteristics in icing conditions. The enclosed final rule for Airplane Performance and Handling Qualities in Icing Conditions was issued July 25, 2007 and became effective on October 9, 2007. This final rule applies to transport category airplanes and becomes amendment 121 to 14 Code of Federal Regulations part 25. We also released the enclosed Advisory Circular (AC) 25-25, which provides detailed guidance on acceptable means of compliance with the new part 25 requirements. The final rule and AC also partially address Safety Recommendations A-96-56, A-96-58, and A-98-96. I will update the Board of the FAA's progress on these safety recommendations separately. I believe that the FAA has satisfactorily responded to Safety Recommendation A-91-87, and I look forward to your response.
5/2/2008	NTSB	On July 25, 2007, the FAA issued a final rule, titled Airplane Performance and Handling Qualities in Icing Conditions, which became effective October 9, 2007. On September 10, 2007, the FAA issued Advisory Circular (AC) 25-25, Performance and Handling Characteristics in the Icing Conditions Specified in Part 25, Appendix C. The AC provides detailed guidance on acceptable means of compliance with the new requirements. The Safety Board reviewed the final rule and related information in the AC and has determined that it fully meets the intent of this recommendation. Consequently, Safety Recommendation A-91-87 is classified Closed Acceptable Action.

Recommendation # A-91-088

Overall Status
CAA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: REVIEW THE AIRRAME ICING CERTIFICATION DATA FOR EXISTING PART 23 AND PART 25 AIRPLANES TO VERIFY THAT THE FLIGHT PROFILES EXAMINED INCLUDED ICE ACCUMULATED AT THOSE CRUISE AND APPROACH FLAP CONFIGURATIONS IN WHICH EXTENSIVE EXPOSURE TO ICING CONDITIONS CAN BE EXPECTED, WITH SUBSEQUENT CHANGES IN CONFIGURATION, TO INCLUDE LANDING FLAPS. REQUIRE ADDITIONAL FLIGHT TESTS AS NECESSARY.

FAA	Closed - Acceptable Action	1/7/1999

1/31/1992	Addressee	THE FAA AGREES WITH THIS SAFETY RECOMMENDATION AND HAS INITIATED A PROGRAM TO DEVELOP CRITERIA TO BE USED IN DEFINING FLIGHT PROFILES, ICING LEVELS, AND CONFIGURATIONS TO BE EXPLORED IN ICING CERTIFICATION. THE PROGRAM INCLUDES THE ACTIONS PROPOSED BY THE SAFETY BOARD, AS WELL AS OTHER RECOMMENDATIONS PROPOSED AT THE INTERNATIONAL TAILPLANE ICING WORKSHOP WHICH WAS HELD 11/5-6/91. THE FAA'S TRANSPORT AIRPLANE AND SMALL AIRPLANE DIRECTORATES WILL WORK TOGETHER WITH INDUSTRY TO DEFINE THE REVIEW PARAMETERS AND ADDRESS THE NEED FOR ADDITIONAL FLIGHT TESTING. IT IS ANTICIPATED THAT THE DEFINITION OF THE EVALUATION CRITERIA WILL BE COMPLETED BY JULY 1992. THE FAA WILL REVIEW THE EXISTING CERTIFICATION DATA AT THAT TIME.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

4/10/1992	NTSB	Safety Recommendations A-91-88 through -90 and A-91-122 also pertain to aircraft ice protection. We note that the FAA agrees with these safety recommendations and is taking action towards their satisfactory resolution. Pending the FAA's further response, these safety recommendations are classified as "Open--Acceptable Response."
2/13/1996	Addressee	FAA CERTIFICATION OFFICES REVIEWED THE RESULTS OF A STUDY THAT SCREENED & RANKED TURBOPROPELLER AIRPLANES BASED ON THE TAILPLANE STALL MARGIN & WHERE APPROPRIATE, TOOK CORRECTIVE ACTION. SOME AIRCRAFT HAVE HAD EXTENSIVE WORK DONE TO THEM & NOW MEET THE FAA'S STANDARD FOR CONTROLLABILITY. OTHERS DO NOT MEET FAA STANDARDS & ARE IN THE PROCESS OF HAVING AIRWORTHINESS DIRECTIVES OR NOTICE OF PROPOSED RULEMAKING ISSUED ON THEM.
7/18/1996	NTSB	THE BOARD NOTES THAT THE FAA DEVELOPED A PROGRAM TO SCREEN & RANK THE TURBOPROLLER FLEET BASED ON THE TAILPLANE STALL MARGIN UNDER CERTAIN AERODYNAMIC & ICE ACCRETION CONDITIONS. FAA CERTIFICATION OFFICES THEN REVIEWED THE RESULTS OF THE STUDY &, WHERE APPROPRIATE, TOOK CORRECTIVE ACTION. SOME AIRCRAFT, SUCH AS THE EMBRAER EMB-120, HAVE HAD EXTENSIVE WORK DONE TO THEM & NOW MEET THE FAA'S STANDARDS FOR CONTROLLABILITY. OTHERS SUCH AS THE CONVAIR 240 SERIES & THE LOCKHEED L-188, DO NOT MEET FAA STANDARD & AIRWORTHINESS DIRECTIVES OR NOTICES OF PROPOSED RULEMAKING ABOUT THEM MAY BE ISSUED. PENDING THE FAA'S ISSUANCE OF RELEVANT NPRMS & ADS & THEIR REVIEW BY THE BOARD A-91-88 IS CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."
9/1/1998	Addressee	THE FAA DEVELOPED A COMPREHENSIVE PROGRAM TO SCREEN AND RANK THE TURBOPROPELLER FLEET BASED ON THE TAILPLANE STALL MARGIN UNDER CERTAIN AERODYNAMIC AND ICE ACCRETION CONDITIONS. FAA CERTIFICATION OFFICES REVIEWED THE RESULTS OF THE STUDY AND , WHERE APPROPRIATE, TOOK CORRECTIVE ACTION. THE FOLLOWING IS A SUMMARY OF AIRPLANE-SPECIFIC AIRWORTHINESS DIRECTIVES (AD) RELATED TO ICE CONTAMINATION TAILPLANE STALLS: AD 96-03-04, EFFECTIVE 2/28/96, APPLIES TO CONVAIR CV@240 (INCLUDING THE T-29), CV-340, CV-440, AND C-131, INCLUDING THOSE MODIFIED FOR TURBOPROPELLER POWER. THIS AD REQUIRES THAT THE FLIGHTCREW LIMIT THE FLAP SETTINGS DURING CERTAIN ICING CONDITIONS AND AIR TEMPERATURES. AD 94-25-10, EFFECTIVE 12/28/94, APPLIES TO BEECH 400, 400A, 400T, MU-300-10, AND MITSUBISHI MU-300. THIS AD REQUIRES REVISION TO THE AIRPLANE FLIGHT MANUAL THAT PROVIDES PILOTS WITH SPECIAL OPERATING PROCEDURES DURING ICING CONDITIONS. AD 86-06-03 R1, EFFECTIVE 6/17/88, APPLIES TO THE 340A. REVISION 1 AMMENDS AD 86-06-03, WHICH REQUIRES THE INSTALLATION OF A POSITIVE STOP TO LIMIT THE MAXIMUM FLAP SETTING TO 20 DEGREES TO PREVENT UNCOMMANDED PITCH EXCURSION. THIS REVISION PROVIDES FOR OPTIONAL MODIFICATIONS WHICH, IF INCORPORATED, ALLOW REMOVAL OF THE LIMITATIONS REQUIRED BY AD 86-06-03. AD 96-03-04, EFFECTIVE 2/28/96, APPLIES TO CONVAIR CV240 (INCLUDING THE T-29), CV-340, CV-440, AND C-131, INCLUDING THOSE MODIFIED FOR TURBOPROPELLER POWER. THIS AD REQUIRES THAT THE FLIGHTCREW LIMIT THE FLAP SETTINGS DURING CERTAIN ICING CONDITIONS AND AIR TEMPERATURES. AD 86-20-02, EFFECTIVE 10/15/86, APPLIES TO THE ATR, THIS AD REQUIRES THE INSTALLATION OF A POSITIVE STOP TO LIMIT THE MAXIMUM FLAP SETTING TO 30 DEGREES AND AN AMENDMENT TO THE FAA-APPROVED AIRPLANE FLIGHT MANUAL. NPRM (98-NM-84-AD) APPLIES TO THE LOCKHEED L-188A AND L-188C. THIS NP PROPOSES TO REQUIRE THE FLIGHTCREW TO LIMIT THE FLAP SETTINGS DURING CERTAIN ICING CONDITIONS AND AIR TEMPERATURES. COMMENT PERIOD ENDS 9/28/98. 14 CFR PART 23 AD 93-01-02, EFFECTIVE 1/22/93, APPLIES TO JETSTREAM 3101 SERIES AIRPLANES. THIS AD PREVENTS TAILPLANE DEICING SYSTEM FAILURE. AD 95-02-06, EFFECTIVE 3/10/95, APPLIES TO JETSTREAM 3101 AIRPLANES (ALL SERIAL NUMBERS). THIS AD SUPERSEDES AD 91-08-01 AND REQUIRES FLAP JACK EXTENSION LIMIT TO 35 DEGREES. AD 82-20-02, EFFECTIVE 12/30/82, APPLIES TO EMBRAER EMB 3-11OP1 AND 11OP2. THIS AD SUPERSEDES AD 82-15-06 AND REQUIRES PNEUMATIC SYSTEM MODIFICATION TO PREVENT LOSS OF CONTROL OF THE AIRPLANE, DURING APPROACH AND LANDING IN ICING CONDITIONS. AD 86-01-01 R2, EFFECTIVE 7/13/87, APPLIES TO CESSNA T303. THIS AD REQUIRES AERODYNAMIC MODIFICATION OF THE AIRPLANE, DUE TO ACCUMULATION OF ICE AT THE UNPROTECTED JUNCTURES OF THE HORIZONTAL AND VERTICAL TAIL. I BELIEVE THAT THE REVIEW OF AIRFRAME ICING CERTIFICATION DATA REQUESTED BY THE BOARD HAS BEEN COMPLETED AND THAT THE INTENT OF THIS SAFETY RECOMMENDATION HAS BEEN MET. I HAVE ENCLOSED COPIES OF ALL DOCUMENTS MENTIONED ABOVE, AND I CONSIDER THE FAA'S ACTION TO BE COMPLETED ON THIS SAFETY RECOMMENDATION.

1/7/1999	NTSB	THE FAA STATED THAT IT DEVELOPED A COMPREHENSIVE PROGRAM TO SCREEN AND RANK THE TURBOPROPELLER FLEET BASED ON THE TAILPLANE STALL MARGIN UNDER CERTAIN AERODYNAMIC AND ICE ACCRETION CONDITIONS AND THAT FAA CERTIFICATION OFFICES REVIEWED THE RESULTS OF THE STUDY AND, WHERE APPROPIATE, TOOK CORRECTIVE ACTION. BECAUSE A REVIEW OF THE SUPPORTING DOCUMENTS PERTAINING TO THE ISSUE INDICATES THAT THE ITEMS OF CONCERN IN A-91-88 HAVE BEEN ADDRESSED, IT IS CLASSIFIED "CLOSED--ACCEPTABLE ACTION."

Recommendation # A-91-090

Overall Status **CAAA**

Priority **CLASS II**

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: REVISE ADVISORY CIRCULAR (AC) 20-73, "AIRCRAFT ICE PROTECTION," AND AC 23.1419-1, "CERTIFICATION OF SMALL AIRPLANES FOR FLIGHT IN ICING CONDITIONS," TO INCLUDED GUIDANCE FOR THE FULFILLMENT OF 14 CFR PARTS 23.1416(C) AND 25.1416(C) BY ENSURING THAT PNEUMATIC PRESSURE THRESHOLD AT WHICH EACH DEICE BOOT INDICATION LIGHT IS DESINGED TO ILLUMINATE IS SUFFICIENT PRESSURE FOR EFFECTIVE PNEUMATIC DEICE BOOT OPERATION.

FAA	Closed - Acceptable Alternate Action	1/12/2000

1/31/1992	Addressee	THE FAA AGREES THAT GUIDANCE MATERIAL RELATED TO THIS REQUIREMENT SHOULD BE INCLUDED IN ADVISORY MATERIALS FOR USE IN FINDING COMPLIANCE WITH THE ICING REQUIREMENTS OF 14 CFR PARTS 23 AND 25. THE FAA WILL PUBLISH ADVISORY MATERIAL TO PROVIDE CRITERIA FOR CERTIFICATION OF THE CAUTION ASSOCIATED WITH ABNORMAL FUNCTIONING OF THE ANTI-ICE OR DEICE BOOT SYSTEMS.
4/10/1992	NTSB	Safety Recommendations A-91-88 through -90 and A-91-122 also pertain to aircraft ice protection. We note that the FAA agrees with these safety recommendations and is taking action towards their satisfactory resolution. Pending the FAA's further response, these safety recommendations are classified as "Open--Acceptable Response."
2/13/1996	Addressee	THE BOARD NOTES THAT THE FAA PLANS TO REVIEW APPENDIX C OF 14 CFR PART 25, REVISIONS TO AC'S 25-7 & 23.1419, & THE DEVELOPMENT OF A NEW AC 25.1419 WHICH WILL ADDRESS THE CERTIFICATION OF 14 CFR PART 25 AIRPLANES FOR FLIGHT IN ICING CONDITIONS.
7/19/1996	NTSB	THE BOARD NOTES THAT THE FAA PLANS TO REVIEW APPENDIX C OF 14 CFR PART 25, REVISE ACS 25-7 & 23.1419, & DEVELOP A NEW AC 25-1419 TO ADDRESS THE CERTIFICATION OF 14 CFR PART 25 AIRPLANES FOR FLIGHT IN ICING CONDITIONS. THE BOARD ALSO NOTES THAT THE FAA AGREED, IN A 1/31/92, LETTER, THAT ADVISORY MATERIALS FOR USE IN FINDING COMPLIANCE WITH THE ICING REQUIREMENTS OF 14 CFR PARTS 23 & 25 SHOULD INCLUDE GUIDANCE MATERIAL TO ENSURE THAT THE PNEUMATIC PRESSURE THRESHOLD AT WHICH EACH DEICE BOOT INDICATION LIGHT SHOULD ILLUMINATE IS SUFFICIENT FOR EFFECTIVE PNEUMATIC DEICE BOOT OPERATION. PENDING THE COMPLETION OF THE FAA'S REVISIONS TO THE ACS, A-91-90 IS CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."
12/11/1998	Addressee	Letter Mail Controlled 02/19/1999 10:03:45 AM MC# 981470 ON 8/19/98, THE FAA PUBLISHED AC 23.1419-2A, CERTIFICATION OF SMALL AIRPLANES FOR FLIGHT IN ICING CONDITIONS. THE AC INCLUDES GUIDANCE TO ENSURE THAT THE PNEUMATIC PRESSURE THRESHOLD AT WHICH EACH DE-ICE BOOT INDICATION LIGHT IS DESIGNED TO ILLUMINATE IS SUFFICIENT PRESSURE FOR EFFECTIVE PNEUMATIC DE-ICE BOOT OPERATION. I HAVE ENCLOSED A COPY OF AC 23.1419-2A FOR THE BOARD'S INFORMATION. IN LIEU OF REVISING AC 20-73, THE FAA INCORPORATED APPROPRIATE INFORMATION ON 14 CFR PART 25 AIRPLANES IN DRAFT AC 25.1419-1X, CERTIFICATION OF TRANSPORT CATEGORY AIRPLANES FOR FLIGHT IN ICING CONDITIONS. A NOTICE ANNOUNCING PROPOSED AC 25.1419-1X WAS PUBLISHED IN THE FEDERAL REGISTER ON 10/5/98. THE COMMENT PERIOD ENDS 12/4/98. I HAVE ENCLOSED A COPY OF THE APPLICABLE INFORMATION IN THE AC THAT ADDRESSES THIS SUBJECT.

3/1/1999	NTSB	A-91-90 ASKED THE FAA TO REVISE AC 20-73, "AIRCRAFT ICE PROTECTION," AND AC 23.1419-1, "CERTIFICATION OF SMALL AIRPLANES FOR FLIGHT IN ICING CONDITIONS," TO INCLUDE GUIDANCE FOR THE FULFILLMENT OF 14 CFR PARTS 23.1416 (C) AND 25.1416(C) BY ENSURING THAT THE PNEUMATIC PRESSURE THRESHOLD AT WHICH EACH DEICE BOOT INDICATION LIGHT IS DESIGNED TO ILLUMINATE IS SUFFICIENT PRESSURE FOR EFFECTIVE PNEUMATIC DEICE BOOT OPERATION. THE FAA'S ACTION TO INCORPORATE IMPROVEMENTS TO THE ICING CERTIFICATION TESTING PROCESS BY REVISING ITS GUIDANCE MATERIAL IS A POSITIVE STEP IN CLARIFYING THIS IMPORTANT AREA OF THE CERTIFICATION PROCESS. PENDING FINAL ISSUANCE OF AC 25.1419-1X, A-91-90 IS CLASSIFIED "OPEN--ACCEPTABLE ALTERNATE RESPONSE."
9/15/1999	Addressee	ON 8/19/98, THE FAA ISSUED ADVISORY CIRCULAR (AC) 23.1419-2A, CERTIFICATION OF SMALL AIRPLANES FOR FLIGHT IN ICING CONDITIONS. THE AC INCLUDES GUIDANCE TO ENSURE THAT THE PNEUMATIC PRESSURE THRESHOLD AT WHICH EACH DEICE BOOT INDICATION LIGHT IS DESIGNED TO ILLUMINATE IS SUFFICIENT PRESSURE FOR EFFECTIVE PNEUMATIC DEICE BOOT OPERATION. A COPY OF AC 23.1419-2A WAS PROVIDED TO THE BOARD ON 12/11/98. ON 12/11/98, THE FAA ALSO INFORMED THE BOARD THAT IT WOULD INCORPORATE APPROPRIATE INFORMATION ON 14 CFR PART 25 AIRPLANES IN AC 25.1419-1, CERTIFICATION OF TRANSPORT CATEGORY AIRPLANES FOR FLIGHT IN ICING CONDITIONS, IN LIEU OF REVISING AC 20-73. ON 3/1/99, THE BOARD AGREED WITH THIS ACTION AND CLASSIFIED THIS RECOMMENDATION AS "OPEN ACCEPTABLE ALTERNATE ALTERNATE RESPONSE" PENDING ISSUANCE OF AC 25.1419-1. ON 8/18/99, THE FAA ISSUED AC 25.1419-1, WHICH INCLUDES GUIDANCE TO ENSURE THAT THE PNEUMATIC PRESSURE THRESHOLD AT WHICH EACH DEICE BOOT INDICATION LIGHT IS DESIGNED TO ILLUMINATE IS SUFFICIENT PRESSURE FOR EFFECTIVE PNEUMATIC DEICE BOOT OPERATION. I HAVE ENCLOSED A COPY OF AC 25.1419-1 FOR THE BOARD'S INFORMATION. I BELIEVE THAT THE ISSUANCE OF AC 25.1419-1 COMPLETES THE FAA'S ACTION IN RESPONSE TO THIS RECOMMENDATION, AND I PLAN NO FURTHER ACTION.
1/12/2000	NTSB	THE SAFETY BOARD HAS REVIEWED THESE AC'S AND FINDS THAT THEIR ISSUANCE MEETS THE INTENT OF A-91-90; THEREFORE, IT IS CLASSIFIED "CLOSED--ACCEPTABLE ALTERNATE ACTION."

Recommendation # A-91-122

Overall Status
CAAS

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: ISSUE AN OPERATIONS BULLETIN TO THE PRINCIPAL OPERATIONS INSPECTORS OF 14 CFR 121 AND PART 135 AIR CARRIERS TO VERIFY THAT AIR CARRIERS HAVE ESTABLISHED PROCEDURES FOR FLIGHTCREWS TO TAKE APPROPRIATE ACTIONS WHEN THEY HAVE ENCOUNTERED ICING CONDITIONS DURING A FLIGHT, TO CHECK FOR THE PRESENCE OF, AND TO RIP AIRPLANES OF ACCUMULATED AIRFRAME ICE PRIOR TO INITIATING FINAL APPROACH, IN ACCORDANCE WITH AIRPLANE MANUFACTURERS' RECOMMENDATIONS ON THE USE OF DEICE SYSTEMS

FAA	Closed - Acceptable Action/Superseded	3/29/1994

1/31/1992	Addressee	THE FAA AGREES WITH THIS SAFETY RECOMMENDATION AND IS DEVELOPING AN AIR CARRIER OPERATIONS BULLETIN TO ADDRESS THIS SAFETY RECOMMENDATION.
4/10/1992	NTSB	Safety Recommendations A-91-88 through -90 and A-91-122 also pertain to aircraft ice protection. We note that the FAA agrees with these safety recommendations and is taking action towards their satisfactory resolution. Pending the FAA's further response, these safety recommendations are classified as "Open--Acceptable Response."
3/17/1994	NTSB	THE BOARD IS ALSO CONCERNED THAT OTHER ACOBS ISSUED IN THE RECENT PAST MIGHT NOT HAVE RESULTED IN THE INTENDED CORRECTIVE ACTIONS. MANY OF THE BOARD'S PREVIOUS RECOMMENDATIONS HAVE URGED CORRECTIVE ACTIONS THAT WERE REPORTEDLY IMPLEMENTED BY MEANS OF ACOBS THAT DIRECTED POIS TO ACCOMPLISH SPECIFIC TASKS. IN MOST CASES, THE BOARD CLASSIFIED RECOMMENDATIONS A-91-122, A-92-59, A-92-60, AND A-92-61 AS "CLOSED--ACCEPTABLE ACTION/SUPERSEDED" BY A-94-71. BASED ON A REVIEW OF THE GUIDANCE CONTAINED IN THE PUBLISHED ACOBS AND ASSUMING THAT THE ACTIONS DIRECTED AT POIS HAD BEEN ACCOMPLISHED. THE BOARD HAS NOT PREVIOUSLY ATTEMPTED TO VERIFY WHETHER THE ACTIONS DIRECTED BY THE ACOBS HAD ACTUALLY BEEN TAKEN. IN VIEW OF THE FINDINGS OF THE CURRENT INVESTIGATIONS, THE BOARD BELIEVES THAT THE FAA SHOULD UNDERTAKE A PROGRAM TO REVIEW ALL ACOBS THAT HAVE BEEN ISSUED IN THE PAST FEW YEARS TO ENSURE THAT THE INTENDED ACTIONS HAVE ACTUALLY BEEN TAKEN.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Log Number 2350

Issue Date 7/22/1992 **BECKLEY WV** **1/30/1991**

ON JANUARY 30, 1991, A BRITISH AEROSPACE JETSTREAM BA-3101 AIRPLANE, OPERATED UNDER 14 CODE OF FEDERAL REGULATIONS (CFR) PART 135, BY CCAIR, IN., USAIR EXPRESS FLIGHT 4743, CRASHED ON ITS FINAL APPROACH TO RUNWAY 19 AT BECKLEY AIRPORT, WEST VIRGINIA. THE TWIN TURBOPROP COMMUTER HIT THE RUNWAY AFTER A STEEP DESCENT AND WAS DESTROYED. THE 2 CREWMEMBERS AND 17 PASSENGERS SURVIVED, BUT SOME OF THEM SUSTAINED SERIOUS INJURIES. THE COMMUTER AIRPLANE WAS ON A SCHEDULED PASSENGER FLIGHT FROM CHARLOTTE, NORTH CAROLINA, TO BECKLEY, WEST VIRGINIA.

Recommendation # A-92-061

Overall Status
CAAS

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: ISSUE AN AIR CARRIER OPERATIONS BULLETIN DIRECTING ALL PRINCIPAL OPERATIONS INSPECTORS TO EXAMINE THE METEOROLOGICAL TRAINING CURRICULA OF 14 CFR PART 135 OPERATORS UNDER THEIR PURVIEW AND ENSURE THAT THEY PROVIDE ADEQUATE INFORMATION REGARDING ICING CONDITIONS AND COLD WEATHER OPERATIONG LIMITATIONS APPLICABLE TO THEIR PARTICULAR AIRCRAFT, AS WELL AS PREFLIGHT AND IN-FLIGHT DEICING PROCEDURES.

FAA	Closed - Acceptable Action/Superseded	12/22/1993

10/16/1992	Addressee	THE FAA AGREES WITH THIS SAFETY RECOMMENDATION AND IS DEVELOPING AN ACOB TO ADDRESS THIS SAFETY ISSUE. THE ACOB WILL DIRECT ALL PRINCIPAL OPERATIONS INSPECTORS TO EXAMINE THE METEOROLOGICAL TRAINING CURRICULA OF THEIR ASSIGNED 14 CFR PART 135 OPERATORS TO ENSURE THAT THERE IS ADEQUATE INFORMATION REGARDING ICING CONDITIONS AND COLD WEATHER OPERATING LIMITATIONS APPLICABLE TO THEIR PARTICULAR AIRCRAFT, AS WELL AS PREFLIGHT AND IN-FLIGHT DEICING PROCEDURES.
4/16/1993	NTSB	BASED ON THE FAA'S PLAN TO DEVELOP AN ACOB TO ADDRESS THIS SAFETY ISSUE, THE BOARD CLASSIFIES RECOMMENDATION A-92-61 "OPEN--ACCEPTABLE RESPONSE."
12/22/1993	Addressee	NEVERTHELESS, THE TWO RECENT INVESTIGATIONS ILLUSTRATE WHAT APPEARS TO THE BOARD TO BE SERIOUS DEFICIENCIES IN THE FAA'S SYSTEM OF COMMUNICATING IMPORTANT SAFETY-RELATED MATERIAL TO AIR CARRIERS THAT IS CONTAINED IN ACOBS. THE BOARD IS CONCERNED THAT THE SYSTEM OF PROCESSING THE INFORMATION CONTAINED IN ACOBS IS NOT BEING GIVEN SUFFICIENT EMPHASIS BY THE FLIGHT STANDARDS PERSONNEL RESPONSIBLE FOR THE OVERSIGHT OF AIRLINE SAFETY. ALTHOUGH THE INADEQUATE PROCESSING OF ACOB 8-93-4 BY THE FSDOS HAS NOT BEEN DETERMINED TO BE A FACTOR IN THE RECENT ACCIDENTS, APPARENTLY, NEITHER THE CONTENT OF THE ACOB NOR THE INTENT OF ITS CONTENT HAS BEEN SATISFIED. THEREFORE, THE BOARD URGES THE FAA TO DIRECT IMMEDIATE GUIDANCE TO ALL POIS THAT REQUIRES VERIFICATION THAT THE ACTIONS CONTAINED IN ACOB 8-93-4 HAVE BEEN TAKEN.
3/17/1994	NTSB	THE BOARD IS ALSO CONCERNED THAT OTHER ACOBS ISSUED IN THE RECENT PAST MIGHT NOT HAVE RESULTED IN THE INTENDED CORRECTIVE ACTIONS. MANY OF THE BOARD'S PREVIOUS RECOMMENDATIONS HAVE URGED CORRECTIVE ACTIONS THAT WERE REPORTEDLY IMPLEMENTED BY MEANS OF ACOBS THAT DIRECTED POIS TO ACCOMPLISH SPECIFIC TASKS. IN MOST CASES, THE BOARD CLASSIFIED RECOMMENDATIONS A-91-122, A-92-59, A-92-60, AND A-92-61 AS "CLOSED--ACCEPTABLE ACTION/SUPERSEDED" BY A-94-71. BASED ON A REVIEW OF THE GUIDANCE CONTAINED IN THE PUBLISHED ACOBS AND ASSUMING THAT THE ACTIONS DIRECTED AT POIS HAD BEEN ACCOMPLISHED. THE BOARD HAS NOT PREVIOUSLY ATTEMPTED TO VERIFY WHETHER THE ACTIONS DIRECTED BY THE ACOBS HAD ACTUALLY BEEN TAKEN. IN VIEW OF THE FINDINGS OF THE CURRENT INVESTIGATIONS, THE BOARD BELIEVES THAT THE FAA SHOULD UNDERTAKE A PROGRAM TO REVIEW ALL ACOBS THAT HAVE BEEN ISSUED IN THE PAST FEW YEARS TO ENSURE THAT THE INTENDED ACTIONS HAVE ACTUALLY BEEN TAKEN.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Recommendation # A-92-062

Overall Status
CAA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: REQUIRE BRITISH AEROSPACE, INC. TO SHOW, BY FLIGHT TEST, THAT THE LIMITATION TO FLAPS 35 DEGREES, CURRENTLY INCORPORATED INTO ALL BA-3200 AIRPLANES AND AVAILABLE IN KIT FORM FOR INSTALLATION ON BA-3100 AIRPLANES, PROVIDES AN ADEQUATE SAFETY MARGIN AGAINST TAILPLANE STALL IN ICING CONDITIONS; AND IF THE MARGIN IS ADEQUATE, REQUIRE OPERATORS OF BA-3100 AIRPLANES TO INSTALL THE FLAP EXTENSION LIMITATION MODIFICATION ON THE AIRPLANE. IF THE MARGIN IS INADEQUATE, REQUIRE APPROPRIATE CHANGES TO ASSURE ITS ADEQUACY.

FAA	Closed - Acceptable Action	5/2/1995

10/16/1992	Addressee	THE FAA DOES NOT AGREE WITH THIS RECOMMENDATION AT THIS TIME. WITH REGARD TO THE JETSTREAM 3101, AIRWORTHINESS DIRECTIVE (AD) 91-08-01 LIMITS THE MAXIMUM INDICATED AIR SPEED FOR LANDING WITH 50 DEGREE FLAP TO 130 KNOTS. THE AD ALSO LIMITS THE MAXIMUM FLAP EXTENSION TO 20 DEGREES WHEN ICE IS VISIBLE ON ANY PART OF THE AIRPLANE. THESE ACTIONS INCREASE THE TAILPLANE STALL MARGIN. NO INCIDENTS OR ACCIDENTS HAVE BEEN REPORTED FOR AIRPLANES USING THE 20 DEGREE FLAP SETTING; THEREFORE, WE BELIEVE THE 20 DEGREE FLAP SETTING PROVIDES AN ACCEPTABLE STALL MARGIN. THE PRESENT FEDERAL AVIATION REGULATIONS DO NOT SPECIFY A REQUIREMENT TO DETERMINE A MARGIN OF STALL FOR THE TAILPLANE EITHER WITH OR WITHOUT ICE. WITHOUT SPECIFIC AND APPROPRIATE CRITERIA, DEFINING "ADEQUATE" WOULD NOT BE CONCLUSIVE. A PROGRM IS IN PROGRESS TO DETERMINE "SUSCEPTIBILITY" OF TURBOPROP AIRPLANES USED IN AIRLINE SERVICE TO ICE-INDUCED TAILPLANE STALL. ONCE THIS PROGRAM IS COMPLETED AND REQUIREMENTS AND CRITERIA ARE DEVELOPED, THE EXISTING JETSTREAM 3101 AND 3102 FLIGHT TEST DATA WILL BE REVIEWED FOR ADEQUACY AND APPROPRIATE ACTION WILL BE TAKEN. HOWEVER, THE JETSTREAM 3200 FLEET HAS MADE OVER 600,000 LANDINGS USING THE 35 DEGREE LANDING FLAP SETTING. NO ACCIDENTS OR INCIDENTS INVOLVING ICE-INDUCED TAILPLANE STALL HAVE BEEN REPORTED. WITH REGARD TO REQUIRING THE JETSTREAM 3100 AIRCRAFT TO BE MODIFIED TO LAND WITH A MAXIMUM 35 DEGREE FLAP SETTING, A NOTICE OF PROPOSED RUELMAKING (NPRM) WAS PUBLISHED IN THE FEDERAL REGISTER ADDRESSING THIS MODIFICATION. THE COMMENT PERIOD CLOSED 9/18/92. THE NPRM, IF ADOPTED, WILL SUPERSEDE THE PROVISIONS OF AD 91-08-01. ANY JETSTREAM 310-1 AIRPLANES THAT HAVE BEEN MODIFIED WITH THE 35 DEGREE LANDING FLAP SETTING WIL BE RELIEVED FROM THE LANDING SPEED AND FLAP RESTRICTIONS IN AD 91-08-01.
3/19/1993	Addressee	THE FAA HAS REVIEWED THE BRITISH AEROSPACE, INC., (BAE) TEST REPORT ON THE EFFECT OF TAILPLANE ICING ON THE JETSTREAM 3100 AIRPLANE AND PRELIMINARY FINDINGS FROM A RESEARCH PROJECT INVESTIGATING THE CONTAMINATED TAILPLANE STALL (CTS). AS A RESULT OF THIS REVIEW, THE FAA DOES NOT AGREE THAT ADDITIONAL ACTION IS NECESSARY.
4/16/1993	NTSB	THE BOARD NOTES THAT THE FAA PROGRAM TO DETERMINE THE SUSCEPTIBILITY OF TURBOPROP AIRPLANES TO ICE-INDUCED TAILPLANE STALL, COMBINED WITH THE JETSTREAM CERTIFICATION DATA REVIEW FOR ADEQUACY, IS A POSITIVE STEP TOWARD MEETING THE INTENT OF THIS RECOMMENDATION. BASED ON THIS INFO, THE BOARD CLASSIFIES A-92-62 "OPEN--ACCEPTABLE ALTERNATE RESPONSE."
10/28/1993	NTSB	THE BOARD NOTES THAT THE FAA HAS CONCLUDED THAT BAE FLIGHT TESTS HAVE DEMONSTRATED THAT THE JETSTREAM 3101 AND THE JETSTREAM 3201 HAVE ACCEPTABLE STABILITY AND CONTROL CHARACTERISTICS IN THE 35-DEGREE LANDING FLAP CONFIGURATION WITH ICE ACCRETION. ADDITIONALLY, THE FAA HAD ISSUED AILRWORTHINESS DIRECTIVE (AD) 91-08-01, EFFECTIVE ON JUNE 10, 1991, WHICH PERTAINS TO JETSTREAM 3101 AIRPLANES THAT DO NOT HAVE A 35-DEGREE FLAP SETTING CAPABILITY. THE AD STATES, "DO NOT EXTEND THE FLAPS BEYOND THE 20 DEGREE POSITION IF ANY ICE IS VISIBLE ON THE AIRPLANE..." THE FAA BELIEVES THAT THE 20-DEGREE FLAP SETTING PROVIDES AN ACCEPTABLE STALL MARGIN. THE BOARD IS AWARE THAT THIS AD MANDATED A PROCEDURAL CHANGE BEFORE THE BOARD ISSUED THIS RECOMMENDATION. THE BOARD CLASSIFIES RECOMMENDATION A-92-62 "OPEN--UNACCEPTABLE RESPONSE" AND ASKS THE FAA TO RECONSIDER ITS POSITION CONCERNING A REQUIREMENT FOR OPERATORS OF BA-3100 AIRPLANES TO INSTALL THE FLAP EXTENSION LIMITATION MODIFICATION.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

7/7/1994	Addressee	THE FAA HAS RECONSIDERED ITS POSITION & BELIEVES THAT THE FLAPS 35 DEGREE MODIFICATION WILL PROVIDE A HIGHER LEVEL OF SAFETY THAN THE 20 DEGREE OPERATIONAL LIMITATION. THE FAA IS CONSIDERING THE ISSUANCE OF A NOTICE OF PROPOSED RULEMAKING PROPOSING MANDATORY MODIFICATION OF THE JETSTREAM 3101 SERIES AIRPLANE TO INCORPORATE THE MAXIMUM FLAP SETTING OF 35 DEGREES.
10/11/1994	NTSB	THE BOARD NOTES THAT THE FAA MAY ISSUE A NOTICE OF PROPOSED RULEMAKING (NPRM) PROPOSING MANDATORY MODIFICATION OF THE JETSTREAM 3101 SERIES AIRPLANE TO INCORPORATE THE MAXIMUM FLAP SETTING 35 DEGREES. PENDING ADDITIONAL INFO ON THIS ISSUE, THE BOARD CLASSIFIES H-92-062 "OPEN--ACCEPTABLE RESPONSE."
5/2/1995	Addressee	IN THE BOARD'S LETTER, DATED 10/28/93, IT STATED THAT THE INTENT OF THIS RECOMMENDATION WAS TO REQUIRE THE INSTALLATION OF THE 35 DEGREE FLAP MODIFICATION ON ALL BA-3100 SERIES AIRPLANE. CONSEQUENTLY, ON 1/18/95, THE FAA ISSUED AIRWORTHINESS DIRECTIVE 95-02-06 TO REQUIRE THE 35 DEGREE FLAP MODIFICATION ON ALL JETSTREAM MODEL 3100 SERIES AIRPLANES. I CONSIDER THE FAA'S ACTION TO BE COMPLETED WITH THE ISSURANCE OF THIS AD, & I PLAN NO FURTHER ACTION ON THIS RECOMMENDATION.
6/20/1995	NTSB	THE BOARD NOTES THE THE FAA ISSUED AIRWORTHINESS DIRECTIVE 95-02-06 TO REQUIRE THE 35-DEGREE FLAP MODIFICAITON ON ALL BA-3100 SERIES AIRPLANES. BECAUSE THIS ACTION IS RESPONSIVE TO THE INTENT OF THE RECOMMENDATION, A-92-62 IS CLASSIFIED "CLOSED--ACCEPTABLE ACTION."

Recommendation Report

Thursday, March 05, 2009

Log Number 2384
Issue Date 9/21/1992

THE NATIONAL TRANSPORTATION SAFETY BOARD RECENTLY COMPLETED A SPECIAL INVESTIGATION AND ANALYSIS OF A SERIES OF PIPER AIRCRAFT CORPORATION (PAC) MODEL PA-46 AIRPLANE ACCIDENTS THAT OCCURRED FROM MAY 31, 1989 THROUGH MARCH 17, 1991. DURING THIS PERIOD, FIVE FATAL PA-46 ACCIDENTS OCCURRED IN THE UNITED STATES, ONE IN MEXICO AND IN JAPAN. ALSO, A SIGNIFICANT INCIDENT OCCURRED DURING THE PERIOD WHICH WAS ALMOST A FATAL ACCIDENT.

Recommendation # A-92-084

Overall Status
CAA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: REQUIRE MODIFICATIONS TO PIPER AIRCRAFT CORPORATION'S AIRPLANE FLIGHT MANUAL AND PILOT'S OPERATING HANDBOOK FOR THE PA-46 SERIES AIRPLANE TO ADD WARNINGS IN THE NORMAL PROCEDURES CHECKLIST FOR CLIMB, CRUISE, AND DESCENT FLIGHT THAT PERTINENT ICE PROTECTION EQUIPMENT SHOULD BE TURNED ON IF INSTRUMENT METEOROLOGICAL CONDITIONS ARE ENCOUNTERED NEAR AND ABOVE THE FREEZING LEVEL.

FAA	Closed - Acceptable Action	1/11/1993

11/30/1992	Addressee	The FAA is reviewing the Piper PA-46 Airplane Flight Manual to determine if modifications are necessary to meet the intent of this safety recommendation. The Piper Aircraft Corporation had revised the PA-46 manual on October 14, 1992, and incorporated a change to the Normal Procedures Section 4-10. This change added the note to conduct a preflight check of the icing system per Supplement No. 10, Ice Protection System, if flight into icing conditions is anticipated. I will keep the Board apprised of the FAA's action on this safety recommendation.
10/20/1993	NTSB	THE BOARD NOTES THAT THE FAA IS REVIEWING THE PIPER PA-46 AIRPLANE FLIGHT MANUAL TO DETERMINE IF MODIFICATIONS ARE NECESSARY. PENDING FURTHER INFORMATION, THE BOARD CLASSIFIES RECOMMENDATION A-92-84 "OPEN--AWAIT RESPONSE."
1/11/1994	Addressee	THE FAA AGREES WITH THIS RECOMMENDATION. THE PIPER AIRCRAFT CORPORATION HAS ADDED A WARNING NOTE TO THE "BEFORE TAKEOFF" SECTION OF THE ABBREVIATED AND EXPANDED AIRPLANE FLIGHT MANUAL CHECKLISTS. THE WARNING NOTE STATES THAT IF FLIGHT INTO KNOWN ICING CONDITIONS IS ANTICIPATED OR ENCOUNTERED DURING CLIMB, CRUISE, OR DESCENT, ACTIVATE THE AIRCRAFT ICE PROTECTION SYSTEM, INCLUDING THE PILOT HEAT, AS DESCRIBED IN SUPPLEMENT NO. 10, ICE PROTECTION SYSTEM.
4/1/1994	NTSB	THE BOARD NOTES THAT THE PIPER AIRCRAFT CORPORATION HAS ADDED A WARNING NOTE TO THE "BEFORE TAKEOFF" SECTION OF THE ABBREVIATED & EXPANDED AFM CHECKLISTS FOR PIPER PA-46-310P & PA-46-350P AIRPLANES. THE WARNING NOTE STATES THAT IF FLIGHT INTO KNOWN ICING CONDITIONS IS ANTICIPATED OR ENCOUNTERED DURING CLIMB, CRUISE, OR DESCENT, THE PILOT IS TO ACTIVATE THE AIRCRAFT ICE PROTECTION SYSTEM, INCLUDING THE PILOT HEAT, AS DESCRIBED IN SUPPLEMENT NUMBER 10, "ICE PROTECTION SYSTEM." BASED ON THIS INFO, THE BOARD CLASSIFIES A-92-84 "CLOSED-- ACCEPTABLE ACTION."

Recommendation # A-92-085

Overall Status
CUA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: REQUIRE MODIFICATION TO THE PA-46 SERIES AIRPLANES TO PROVIDE FOR A PITOT HEAD OPERATING LIGHT SIMILAR TO THE LIGHT REQUIRED BY 14 CFR 25.1326 FOR TRANSPORT CATEGORY AIRPLANES.

FAA	Closed - Unacceptable Action	9/26/1994

11/30/1992	Addressee	The FAA does not believe that the design or operating characteristics of the PA-46 are so unlike other designs not incorporating a pitot heat operating light to warrant retroactive action. The FAA is considering a revision to 14 CFR 23.1326 to include a requirement for a pitot heat operating light similar to the light required by 14 CFR 25.1326.

10/20/1993	NTSB	THE BOARD NOTES THAT THE FAA DOES NOT BELIEVE THAT THE DESIGN OR OPERATING CHARACTERISTICS OF THE PA-46 WARRANT RETROACTIVE ACTION IN REGARD TO A PITOT HEAT OPERATING LIGHT. ALTHOUGH THE FAA IS CONSIDERING A REVISION TO 14 CFR 23.1326 TO INCLUDE A REQUIREMENT FOR A PITOT HEAT OPERATING LIGHT SIMILAR TO THE LIGHT REQUIRED BY 14 CFR 25.1326, THE BOARD BELIEVES THAT THE COCKPIT WORKLOAD REQUIREMENTS OF THE PA-46 WARRANT RETROACTIVE ACTION. THEREFORE, THE BOARD REQUESTS THAT THE FAA RECONSIDER ITS POSITION CONCERNING RECOMMENDATION A-92-85 AND CLASSIFIES IT "OPEN--UNACCEPTABLE RESPONSE."
9/26/1994	Addressee	THE FAA IS CONSIDERING A REVISION TO 14 CFR 23.1326 TO INCLUDE A REQUIREMENT FOR A PITOT HEAT OPERATING LIGHT SIMILAR TO THE REQUIREMENTS OF 14 CFR 25.1326. HOWEVER, THE FAA DOES NOT AGREE WITH THE BOARD'S ASSERTION THAT THE COCKPIT WORKLOAD REQUIREMENTS OF THE PA-46 SERIES AIRPLANES WARRANT RETROACTIVE ACTION.
3/6/1995	NTSB	THE BOARD NOTES THAT THE FAA MAY REVISE 14 CFR 23.1326 TO INCLUDE SUCH A REQUIREMENT BUT DISAGREES WITH THE BOARD'S BELIEF THAT THE PA-46 SERIES AIRPLANES WARRANT RETROACTIVE ACTION. AS INDICATED IN ITS RECOMMENDATION LETTER OF 9/21/92, THE BOARD'S ANALYSIS OF THE PA-46 ACCIDENTS & INCIDENT INDICATES THAT FOUR OF THE FIVE U.S. ACCIDENTS PROBABLY INVOLVED ICE BLOCKAGE OF THE PITOT TUBES. AS A RESULT, THE BOARD CONTINUES TO BELIEVE, CONSIDERING THE TYPICAL OPERATING ENVIRONMENT & COCKPIT WORKLOAD REQUIREMENTS OF THESE AIRPLANES, THAT A REQUIREMENT MANDATING INSTALLATION OF A PITOT HEAT OPERATING LIGHT IS THE MOST APPROPRIATE REMEDIAL ACTION. THEREFORE, A-92-85 IS CLASSIFIED "CLOSED--UNACCEPTABLE ACTION."

Recommendation # A-92-086

Overall Status
CAAA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: CONSIDER APPLICATION OF SAFETY RECOMMENDATIONS A-92-84 AND A-92-85 ABOVE TO ALL MODELS OF SMALL AIRPLANES CERTIFICATED TO OPERATE IN ICING CONDITIONS AND AT ALTITUDES OF 18,000 FEET MEAN SEA LEVEL AND ABOVE.

FAA	Closed - Acceptable Alternate Action	6/28/1996

11/30/1992	Addressee	THE FAA DOES NOT BELIEVE THAT THE IMPLEMENTATION OF SAFETY RECOMMENDATION A-92-84 CAN BE JUSTIFIED FOR ALL MODELS OF SMALL AIRPLANES CERTIFICATED TO OPERATE IN ICING CONDITIONS AND AT ALTITUDES OF 18,000 FEET MEAN SEA LEVEL(MSL) AND ABOVE. AS AN ALTERNATE ACTION, THE FAA WILL REVISE ADVISORY CIRCULAR (AC) 23.1419-CERTIFICATION OF SMALL AIRPLANES FOR FLIGHT IN ICING CONDITIONS, SO THAT THE OPERATING PROCEDURES SECTION OF THE AIRPLANE FLIGHT MANUAL WILL INCLUDE A WARNING TO ADVISE THE PILOT TO ACTIVATE THE ICE PROTECTION EQUIPMENT IF INSTRUMENT METEOROLOGICAL CONDITIONS ARE ENCOUNTERED NEAR OR ABOVE FREEZING LEVEL.
10/20/1993	NTSB	THE BOARD NOTES THAT THE FAA BELIEVES THAT THE IMPLEMENTATION OF RECOMMENDATION A-92-86 CANNOT BE JUSTIFIED. AS AN ALTERNATE ACTION, THE FAA WILL REVISE ADVISORY CIRCULAR (AC) 23.1419-2, "CERTIFICATION OF SMALL AIRPLANES FOR FLIGHT IN ICING CONDITIONS," TO INCLUDE IN THE AIRPLANE FLIGHT MANUAL A WARNING TO ADVISE THE PILOT TO ACTIVATE THE ICE PROTECTION EQUIPMENT IF IMC ARE ENCOUNTERED NEAR OR ABOVE THE FREEZING LEVEL. ADDITIONALLY, THE FAA IS CONSIDERING ACTION TO INCORPORATE WORDING SIMILAR TO 14 CFR 25.1326 INTO 14 CFR 23.1326 THAT WILL REQUIRE A WARNING TO THE FLIGHTCREW IF THE PITOT HEAT IS SWITCHED "OFF" OR IF A HEATER ELEMENT HAS FAILED. BASED ON THIS INFORMATION, THE BOARD CLASSIFIES RECOMMENDATION A-92-86 "OPEN--ACCEPTABLE ALTERNATE RESPONSE."

Recommendation Report

Thursday, March 05, 2009

9/26/1994	Addressee	THE FAA DOES NOT BELIEVE THAT THE IMPLEMENTATION OF A-92-084 CAN BE JUSTIFIED FOR ALL MODELS OF SMALL AIRPLANES CERTIFICATED TO OPERATE IN ICING CONDITIONS & AT ALTITUDES OF 18,000 FEET MEAN SEA LEVEL & ABOVE. SERVICE EXPERIENCE ON THESE AIRPLANES DOES REVEAL THAT PITOT TUBE ICING IS A PROBLEM AS A RESULT OF PILOT FAILURE TO ACTUATE PITOT HEAT BEFORE FLYING INTO FREEZING INSTRUMENT METEOROLOGICAL CONDITIONS. AS AN ALTERNATE ACTION, THE FAA WILL REVISE ADVISORY CIRCULAR (AC) 23-1419-2, CERTIFICATION OF SMALL AIRPLANES FOR FLIGHT IN ICING CONDITION, SO THAT THE OPERATING PROCEDURES SECTION OF THE AIRPLANE FLIGHT MANUAL WILL INCLUDE A WARNING TO ADVISE THE PILOT TO ACTIVATE THE ICE PROTECTION EQUIPMENT IF INSTRUMENT METEOROLOGICAL CONDITIONS ARE ENCOUNTERED NEAR OR ABOVE THE FREEZING LEVEL. THE FAA IS ALSO CONSIDERING ACTION TO INCORPORATE WORDING SIMILAR TO 14 CFR 25.1326 INTO 14 CFR 23-1326. THIS CHANGE, IF ADOPTED, WILL REQUIRE THAT THE FLIGHTCREW BE WARNED IF THE PITOT HEAT IS SWITCHED OFF OR IF A HEATER ELEMENT HAS FAILED.
3/6/1995	NTSB	THE BOARD NOTES THAT THE FAA'S RESPONSE OF 9/26/94, REGARDING RECOMMENDATIONS A-92-86 THROUGH -89 ELABORATES FURTHER ON ITS RESPONSE OF 11/30/92, REGARDING THESE RECOMMENDATIONS. THE CURRENT RESPONSE OUTLINES FAA'S ONGOING EFFORTS TO FULFILL THESE RECOMMENDATIONS BY REVISING SEVERAL ADVISORY CIRCULARS (ACS), AMENDING 14 CFR PARTS 23 & 61, & ISSUING A NOTICE OF PROPOSED RULEMAKING. THE BOARD BELIEVES THAT IT IS ESSENTIAL FOR THE FAA TO EXPEDITE COMPLETION OF ALL OF THESE ACTIONS. AS A RESULT OF THE EARLIER RESPONSE, THE BOARD CLASSIFIED A-92-86 "OPEN--ACCEPTABLE ALTERNATE RESPONSE" & RECOMMENDATIONS A-92-87 THROUGH -89 "OPEN--ACCEPTABLE RESPONSE." THESE RECOMMENDATIONS REMAIN SO CLASSIFIED PENDING TIMELY RECEIPT OF FURTHER INFO, I.E., COPIES OF REVISED ACS OR REGULATORY CHANGES.
11/17/1995	Addressee	THE FAA'S EFFORTS TO FULFILL THESE RECOMMENDATIONS ARE CONTINUING & INCLUDE: REVISING SEVERAL ADVISORY CIRCULARS, AMENDING 14 CFR 23 & 61, ISSUING AN INTERIM POLICY LETTER TO NOTIFY THE CERTIFICATION FIELD OFFICES OF THE PROPOSED CHANGES TO AC 22.1419-2 & OF THE PENDING RULEMAKING ACTION. THE FINAL RULE IS TO BE PUBLISHED IN DECEMBER 1995. THESE ACTIONS, WHEN COMPLETED, WILL FULFILL THE INTENT OF THE RECOMMENDATIONS.
12/12/1995	NTSB	THE BOARD NOTES THAT THE FAA HAS OUTLINED ITS ONGOING EFFORTS TO FULFILL THESE RECOMMENDATIONS. THE FAA IS REVISING SEVERAL ADVISORY CIRCULARS, AMENDING 14 CFR PARTS 23 & 61, ISSUING A NOTICE OF PROSED RULEMAKING, & ISSUING AN INTERIM POLICY LETTER TO NOTIFY THE CERTIFICATION FIELD OFFICES OF THE PROPOSED CHANGES TO AC 23.1419-2 & OF THE PENDING RULEMAKING ACTION. THESE ACTIONS, WHEN COMPLETED, WILL FULFILL THE INTENT OF THE SUBJECT RECOMMENDATIONS. AS A RESULT OF THESE ACTIONS, THE BOARD CLASSIFIES A-92-86 "OPEN--ACCEPTABLE ALTERNATE RESPONSE" & A-92-89 "OPEN--ACCEPTABLE RESPONSE," PENDING TIMELY RECEIPT OF FURTHER INFO, I.E., COPIES OF REVISED ACS & REGULATORY CHANGES.

Recommendation Report

Thursday, March 05, 2009

5/3/1996	Addressee	THE FAA HAS INITIATED ACTION TO REVISE ADVISORY CIRCULAR 23.1419-2. CERTIFICATION TO SMALL AIRPLANES FOR FLIGHT IN ICING CONDITIONS, SO THAT THE OPERATING PROCEDURES SECTION OF THE AIRPLANE FLIGHT MANUAL (AFM) WILL INCLUDE A WARNING TO ADVISE THE PILOT TO ACTIVATE THE ICE PROTECTION EQUIPMENT IF INSTRUMENT METEOROLOGICAL CONDITIONS ARE ENCOUNTERED NEAR OR ABOVE THE FREEZING LEVEL. THIS PARTICULAR ISSUE IS ONE OF MANY ICING ISSUES THAT WILL BE INCLUDED IN THE REVISED AC. PENDING ISSUANCE OF THE AC, THE FAA DEVELOPED A POLICY LETTER ON 11/28/94, WHICH DIRECTS CERTIFICATION FIELD OFFICES TO ENSURE THAT APPROPRIATE PROCEDURES FOR SAFE OPERATION IN AN ICING ENVIRONMENT BE INCLUDED IN THE FAA-APPROVED AFM (OR AFM REVISION OR SUPPLEMENT). THESE PROCEDURES SHOULD INCLUDE PROPER PILOT RESPONSE TO COCKPIT WARNINGS, DIAGNOSIS OF SYSTEM FAILURES, DISCUSSION OF POSSIBLE PILOT-INDUCED FLIGHT CONTROL SYSTEM PROBLEMS, & USE OF THE SYSTEM IN A SAFE MANNER. THE POLICY LETTER ALSO DIRECTS CERTIFICATION FIELD OFFICES TO ENSURE THAT THE AFM INCLUDE PROCEDURES TO ADVISE THE PILOT TO ACTIVATE THE ICE PROTECTION EQUIPMENT IF INSTRUMENT METEOROLOGICAL CONDITIONS ARE ENCOUNTERED NEAR OR ABOVE THE FREEZING LEVEL. ON 1/29/96. THE FAA ISSUED ITS FINAL RULE INTRODUCING A NEW 14 CFR 23.1326 TO REQUIRE THAT A PITOT HEAT OPERATING LIGHT BE INSTALLED TO WARN THE FLIGHTCREW IF THE PITOT HEAT IS SWITCHED OFF OR IF A HEATER ELEMENT HAS FAILED. THE REVISION TO THIS PARAGRAPH INCORPORATES WORDING SIMILAR TO 14 CFR 25-1326. FAA BELIEVES THAT THE FINAL RULE & THE POLICY LETTER WHICH HAS ALREADY DISSEMINATED THE INFO THAT WILL BE CONTAINED IN AC ADDRESS THE FULL INTENT OF THIS RECOMMENDATION & REQUESTS THAT THE BOARD CLASSIFY THIS RECOMMENDATION IN A CLOSED ACCEPTABLE ALTERNATE STATUS.
6/28/1996	NTSB	THE BOARD NOTES THAT ON 1/21/96, THE FAA REVISED 14 CFR 23-1326 TO REQUIRE THAT A PITOT HEAT OPERATING LIGHT BE INSTALLED TO WARN THE FLIGHTCREW IF THE PITOT HEAT IS SWITCHED OFF OR IF A HEATER ELEMENT HAS FAILED. THIS ACTION, TOGETHER WITH THE 11/28/94, INTERIM POLICY LETTER ON ICING CERTIFICATION THAT WAS SENT TO CERTIFICATION FIELD OFFICE, PROVIDES AN ALTERNATE MEANS OF FULFILLING THIS RECOMMENDATION. THEREFORE, THE BOARD CLASSIFIES A-92-86 "CLOSED--ACCEPTABLE ALTERNATE ACTION."

Total Number of Recommendations for Recommendation Report: 3

Selection for Report:

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Log Number 2470

Issue Date 7/25/1994 **SNOQUALMIE PASS WA** **11/21/1992**

ON NOVEMBER 21, 1992, A BEECHCRAFT DUKE MODEL A60, CRASHED ABOUT 2 MILES WEST OF SNOQUALMIE PASS, WASHINGTON. ON OCTOBER 2, 1980, A BEECHCRAFT DUKE MODEL A60, WAS INVOLVED IN A LOSS OF CONTROL INCIDENT IN ICING CONDITIONS NEAR LEAKSVILLE, MISSISSIPPI. BEECHCRAFT DUKE MODELS 60 AND A60 WERE PRODUCED FROM 1986 TO 1973 WHILE THE DUKE MODEL B60 WAS PRODUCED FROM 1974 TO 1982. THE SAFETY BOARD IS UNAWARE OF ANY ACCIDENTS IN ICING CONDITIONS INVOLVING THE DUKE MODEL B60. HOWEER, TWO OTHER ACCIDENTS INVOLVING DUKE MODEL 60 AIRPLANES IN ICING CONDITIONS HAVE CLAIMED THE LIVES OF 14 OTHER PERSONS. THESE ACCIDENTS OCCURRED NEAR JACKSON, MISSISSIPPI, ON NOVEMBER 6, 1978 AND AT HATCH, UTAH, ON JANUARY 20, 1974.

Recommendation # A-94-137

Overall Status
CAA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: REQUIRE THAT ALL PILOT OPERATING HANDBOOKS/AIRPLANE FLIGHT MANUALS APPLICABLE TO AIRCRAFT CERTIFIED FOR FLIGHT IN ICING CONDITIONS CONTAIN PRECAUTIONARY OPERATIONAL INFORMATION TO HELP ENSURE THAT ICE WILL NOT ACCUMULATE ON THE UNDESURFACE OF THE WING AFT OF THE AREA PROTECTED BY THE DEICER BOOTS OR ON OTHER UNPROTECTED AREAS OF THE AIRPLANE. THE INFORMATION SHOULD INCLUDE SPECIFICATION OF A MINIMUM INDICATED AIRSPEED THAT SHOULD BE MAINTAINED DURING SUSTAINED OPERATIONS IN ICING CONDITIONS.

FAA	Closed - Acceptable Action	1/26/1996

10/7/1994	Addressee	THE FAA AGREES THAT PILOT OPERATING HANDBOOK & AIRPLANE FLIGHT MANUALS FOR AIRPLANES APPROVED FOR SUSTAINED FLIGHT INTO KNOWN ICING CONDITIONS SHOULD INCLUDE A MINIMUM INDICATED AIRSPEED & AN EXPLANATION THAT ICE WILL ACCUMULATE ON THE BOTTOM SURFACES OF THE AIRPLANE BELOW THIS MINIMUM AIRSPEED. THE FAA WILL PROPOSE APPROPRIATE AIRWORTHINESS DIRECTIVES APPLICABLE TO AIRPLANES DETERMINED TO HAVE AN UNSAFE CONDITION DUE TO INSUFFICIENT MINIMUM AIRSPEEDS DURING SUSTAINED OPERATIONS IN ICING CONDITIONS. THE NOTICES OF PROPOSED RULEMAKING WILL PROPOSE THAT MINIMUM INDICATED AIRSPEEDS BE ADDED TO THE LIMITATIONS SECTION OF THE POH & AFM FOR AIRPLANES DETERMINED TO HAVE UNSAFE CONDITION DUE TO INSUFFICIENT MINIMUM AIRSPEEDS DURING SUSTAINED OPERATIONS IN ICING CONDITIONS.
1/18/1995	NTSB	THE BOARD NOTES THAT THE FAA AGREES WITH THIS RECOMMENDATION & WILL PROPOSE APPROPRIATE AIRWORTHINESS DIRECTIVES TO REQUIRE SPECIFICATION OF SUCH AIRSPEEDS IN THE "LIMITATION" SECTIONS OF APPLICABLE POH/AFMS. THEREFORE, A-94-137 IS CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."
8/23/1995	Addressee	THE FAA HAS REVIEWED THIS RECOMMENDATION WITH AIRPLANE MANUFACTURERS & OTHER AIRWORTHINESS AUTHORITIES & HAS DETERMINED THAT THE BEECH 60 & A60 SERIES AIRPLANES ARE THE ONLY AIRPLANES THAT HAVE AN UNSAFE CONDITION REQUIRING AIRWORTHINESS DIRECTIVE ACTION. THE REVIEW REVEALED THAT MANY AIRPLANES ALREADY HAVE A MINIMUM AIRSPEED FOR FLIGHT INTO KNOWN ICING CONDITIONS SPECIFIED IN THE PILOT OPERATING HANDBOOK & AIRPLANE FLIGHT MANUAL. OTHER AIRPLANE MANUFACTURERS SUCH AS CESSNA AIRCRAFT COMPANY HAVE AGREED TO ADD THIS INFO TO THE NEXT REVISION OF THE POH'S & AFM'S. SOME AIRPLANE MANUFACTURERS HAVE DETERMINED THAT THE SERVICE HISTORY OF THEIR AIRCRAFT INDICATES THAT NO UNSAFE CONDITIONS EXIST & THAT SUFFICIENT DATA IS CONTAINED IN THE RESPECTIVE POH'S & AFM'S. BASED ON THE ABOVE INFO, THE FAA ISSUED A NOTICE OF PROPOSE RULEMAKING ON 5/26/95, PROPOSING TO ADOPT AN AD APPLICABLE TO BEECH 60 A60 SERIES AIRPLANES. THE NPRM PROPOSES TO REQUIRE THAT THE MINIMUM AIRSPEED CONTAINED IN BEECHCRAFT PAMPHLET "BEECHCRAFT TWIN ENGINE (PISTON) AIRPLANE SAFETY INFORMATION" BE INCLUDED IN THE LIMITATIONS SECTION OF THE BEECH 60 A60 POH'S & AFM'S.
11/7/1995	NTSB	THE BOARD NOTES THAT THE FAA HAS REVIEWED THIS RECOMMENDATION WITH AIRPLANE MANUFACTURERS & DETERMINED THAT THE BEECH 60 & A60 SERIES AIRPLANES ARE THE ONLY AIRPLANES THAT HAVE AN UNSAFE CONDITION REQUIRING AIRWORTHINESS DIRECTIVE ACTION. BASED ON THIS REVIEW, THE FAA ISSUED A NOTICE OF PROPOSED RULEMAKING ON 5/26/95, PROPOSING AN AD FOR THOSE SERIES AIRPLANES. THEREFORE, PENDING ISSUANCE OF THE AD CONCERNING THE BEECH 60 & A60 SERIES AIRPLANES, THE BOARD CLASSIFIES A-94-137 "OPEN--ACCEPTABLE RESPONSE."

12/15/1995	Addressee	ON OCTOBER 13, 1995, THE FAA ISSUED AD 95-22-03 APPLICABLE TO BEECH 60 & A60 SERIES AIRPLANES. THIS AD REQUIRES THAT THE MINIMUM AIRSPEED BE INCLUDED IN THE LIMITATIONS SECTION OF THE BEECH 60 A60 POH/AFM SUPPLEMENT. IN A RESPONSE DATED 8/23/95, THE FAA NOTED THAT THEY REVIEWED THIS RECOMMENDATION WITH AIRPLANE MANUFACTURERS & OTHER AIRWORTHINESS AUTHORITIES & DETERMINED THAT THE BEECH 60 A60 SERIES AIRPLANES WERE THE ONLY AIRPLANES FOUND TO HAVE AN UNSAFE CONDITION REQUIRING AD ACTION. THEY ALSO STATED THAT THEY ISSUED A NOTICE OF PROPOSED RULEMAKING ON 5/26/95. THE BOARD ACKNOWLEDGED THAT RESPONSE ON 11/7/95, WITH THE STATEMENT "OPEN--ACCEPTABLE RESPONSE."
1/26/1996	NTSB	THE BOARD NOTES THAT THE FAA REVIEWED THIS RECOMMENDATION WITH AIRPLANE MANUFACTURERS & DETERMINED THAT THE BEECH 60 A60 SERIES AIRPLANES ARE THE ONLY AIRPLANES THAT HAVE AN UNSAFE CONDITION REQUIRING AIRWORTHINESS DIRECTIVE ACTION. THEREFORE, ON 10/12/95, THE FAA ISSUED AD 95-22-03, APPLICABLE TO THESE AIRPLANES, WHICH REQUIRES THAT THE MINIMUM AIRSPEED BE INCLUDED IN THE LIMITATIONS SECTION OF THE BEECH 60 & 60A POH/AFM SUPPLEMENT. BASED ON THIS ACTION, THE BOARD CLASSIFIES A-94-137 "CLOSED--ACCEPTABLE ACTION."

Recommendation # A-94-138

Overall Status
CAA

Priority
CLASS II

THE NSTB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: ISSUE AN ADVISORY CIRCULAR CONCERNING THE FLIGHT OF SMALL GENERAL AVIATION AIRPLANES IN ICING CONDITIONS. THE AC SHOULD CONTAIN CURRENT TECHNOLOGICAL/OPERATIONAL INFORMATION AIMED AT HELPING PILOTS MINIMIZE THE POTENTIAL HAZARDS OF AN ICING ENCOUNTER AND INCLUDE SPECIFIC EXPLANATORY MATERIAL RELATED TO THE IMPORTANCE OF MAINTAINING AN APPROPRIATE MINIMUM AIRSPEED DURING SUSTAINED FLIGHT IN ICING CONDITIONS; THE HAZARDS OF AN ICE-INDUCED TAILPLANE STALL, THE EFFECTS OF FLAP EXTENSION AND AIRSPEED ON AN ICE-CONTAMINATED AIRPLANE; AIRCRAFT PERFORMANCE DEGRADATION DUE TO ICING BECAUSE OF INCREASED DRAG AND STALLING SPEEDS; THE RELATIVELY HIGH ICE COLLECTION EFFICIENCY OF TAILPLANE SURFACES; WAYS AND MEANS OF RELIABLY DETERMINING THE EXISTENCE AND EXTENT OF TAILPLANE ICING; AND THE LIMITATIONS OF AIRCRAFT CERTIFIED FOR FLIGHT IN ICING CONDITIONS TO PROVIDE PROTECTION AGAINST FREEZING RAIN, FREEZING DRIZZLE, AND MIXED ICING CONDITIONS.

FAA	Closed - Acceptable Action	11/26/1996

10/7/1994	Addressee	THE FAA IS REVISING AC 91-51, AIRPLANE DEICE & ANTI-ICE SYSTEMS, TO INCLUDE INFO CONCERNING ICE PROTECTION SYSTEM FOR GENERAL AVIATION AIRCRAFT. THE NATIONAL AERONAUTICS & SPACE ADMINISTRATION'S LEWIS RESEARCH CENTER IS CURRENTLY CONDUCTING A RESEARCH PROJECT IN CONJUNCTION WITH INDUSTRY & THE FAA. THIS RESEARCH PROJECT WILL ADDRESS, IN PART, ICE PROTECTION SYSTEMS. IT IS THE FAA'S INTENT TO INCLUDE THE INFO FROM THIS RESEARCH PROJECT IN ITS REVISED AC. IN THE INTERIM, THE FAA WILL PUBLISH AN ARTICLE ON AIRCRAFT ICING IN THE NOVEMBER/DECEMBER ISSUE OF THE FAA AVIATION NEWS. REPRINTS OF THIS ARTICLE WILL ALSO BE USE BY THE AVIATION SAFETY PROGRAM MANAGERS IN THEIR PROGRAMS.
1/18/1995	NTSB	THE BOARD NOTES THAT THE FAA IS REVISING AC 91-51, "AIRPLANE DEICE & ANTI-ICE SYSTEMS," TO INCLUDE INFO (INCLUDING CURRENT NASA RESEARCH DATA) CONCERNING ICE PROTECTION SYSTEMS FOR GENERAL AVIATION AIRCRAFT. HOWEVER, THE BOARD BELIEVES THAT IF THE REVISED AC IS TO BE FULLY COMPLIANT WITH THIS RECOMMENDATION, IT SHOULD ALSO CONTAIN THE OTHER OPERATIONAL EXPLANATORY MATERIAL CONCERNING ICING REFERRED TO IN A-94-138. THEREFORE, PENDING RECEIPT OF FURTHER INFO, A-94-138 IS CLASSIFIED "OPEN-ACCEPTABLE ALTERNATE RESPONSE."
9/11/1996	Addressee	ON 7/17/96, THE FAA ISSUED ADVISORY CIRCULAR (AC) 91-51A, EFFECT OF ICING ON AIRCRAFT CONTROL & AIRPLANE DEICE & ANTI-ICE SYSTEMS. THE AC PROVIDES INFO FOR PILOTS REGARDING THE HAZARDS OF AIRCRAFT ICING & THE USE OF AIRPLANE DEICE & ANTI-ICE SYSTEMS.
11/26/1996	NTSB	ON 7/17/96, THE FAA ISSUED AC 91-51A, "EFFECT OF ICING ON AIRCRAFT CONTROL & AIRPLANE DEICE & ANTI-ICE SYSTEMS." THIS AC PROVIDE INFO FOR PILOTS REGARDING THE HAZARDS OF AIRCRAFT ICING & THE USE OF AIRPLANE DEICE & ANTI-ICE SYSTEMS, & CONTAINS THE OPERATIONAL EXPLANATORY MATERIAL CONCERNING ICING CONTAINED IN THE RECOMMENDATION. THEREFORE, A-94-138 IS CLASSIFIED "CLOSED--ACCEPTABLE ACTION."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Log Number 2504

Issue Date 6/13/1994 **HIBBING MN** **12/1/1993**

ON DECEMBER 1, 1993, EXPRESS II FLIGHT 5719, A JETSTREAM BA-3100, REGISTRATION N334PX, WAS OPERATING AS A REGULARLY SCHEDULED FLIGHT UNDER 14 CODE OF FEDERAL REGULATIONS (CFR), PART 135, FROM MINNEAPOLIS/ST. PAUL INTERNATIONAL AIRPORT, ST. PAUL, MINNESOTA, TO INTERNATIONAL FALLS, MINNESOTA, WITH EN ROUTE STOP AT HIBBING, MINNESOTA (HIB). THE FLIGHT WAS OPERATED BY EXPRESS AIRLINES II, INC., UNDER THE TERMS OF A MARKETING AGREEMENT WITH NORTHWEST AIRLINES, INC., AS NORTHWEST AIRLINK. ABOUT 1950 CENTRAL STANDARD TIME, THE AIRPLANE COLLIDED WITH TERRAIN WHILE ON THE LOCALIZER BACK COURSE APPROACH TO RUNWAY 13 AT HIB. THE 2 FLIGHTCREW MEMBERS AND ALL 16 PASSENGERS WERE FATALLY INJURED IN THE ACCIDENT. THE AIRPLANE WAS DESTROYED.

Recommendation # A-94-114

Overall Status
CAA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: ISSUE AN AIR CARRIER OPERATIONS BULLETIN DIRECTING PRINCIPAL OPERATIONS INSPECTORS TO ADVISE AIR CARRIERS TO REEMPHASIZE IN PILOT TRAINING MATERIALS THE NECESSITY FOR ADHERING TO THE MAXIMUM DESCENT RATE OF 1,000 FEET PER MINUTE AFTER PASSING THE FINAL APPROACH FIX, REGARDLESS OF THE EXISTENCE OF ICING CONDITIONS.

FAA	Closed - Acceptable Action	6/2/1995

8/29/1994	Addressee	THE FAA WILL ISSUE A FLIGHT STANDARDS INFO BULLETIN DIRECTING ALL PRINCIPAL OPERATIONS INSPECTORS TO ADVISE AIR CARRIERS TO REEMPHASIZE IN PILOT TRAINING MATERIALS THE NECESSITY FOR ADHERING TO THE MAXIMUM DESCENT RATE OF 1,000 FEET PER MINUTE AFTER PASSING THE FINAL APPROACH FIX, REGARDLESS OF THE EXISTENCE OF ICING CONDITIONS.
3/6/1995	NTSB	THE BOARD NOTES THAT THE FAA WILL ISSUE A FLIGHT STANDARDS INFO BULLETIN (FSIB) DIRECTING ALL POIS TO DO AS THE BOARD'S RECOMMENDATION REQUESTED. THEREFORE, THE BOARD CLASSIFIES A-94-114 "OPEN--ACCEPTABLE RESPONSE" & AWAITS RECEIPT OF A COPY OF THE SUBJECT BULLETIN.
6/2/1995	Addressee	THE FAA ISSUED FLIGHT STANDARDS INFO BULLETIN FOR AIR TRANSPORTATION 95-07, INSTRUMENT APPROACH PROCEDURES & TRAINING. THIS BULLETIN DIRECTS ALL PRINCIPAL OPERATIONS INSPECTORS TO ADVISE AIR CARRIERS TO REEMPHASIZE IN PILOT TRAINING MATERIALS THE IMPORTANCE OF NOT EXCEEDING MAXIMUM DESCENT RATE OF 1,000 FEET PER MINUTE AFTER PASSING THE FINAL APPROACH FIX REGARDLESS OF THE EXISTENCE OF ICING CONDITIONS.
8/29/1995	NTSB	THE BOARD NOTES THAT THE FAA ISSUED FLIGHT STANDARDS INFO BULLETIN FOR AIR TRANSPORTATION 95-07, "INSTRUMENT APPROACH PROCEDURES & TRAINING," THIS BULLETIN DIRECTS ALL POIS TO ADVISE AIR CARRIERS TO REEMPHASIZE IN PILOT TRAINING MATERIALS THE NECESSITY FOR ADHERING TO THE MAXIMUM DESCENT RATE OF 1,000 FPM AFTER PASSING THE FINAL APPROACH FIX, REGARDLESS OF THE EXISTENCE OF ICING CONDITIONS. THIS ACTION FULLY COMPLIES WITH THE INTENT OF A-94-114, WHICH IS THEREFORE CLASSIFIED "CLOSED--ACCEPTABLE ACTION."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Log Number 2529

Issue Date 11/7/1994 **ROSELAWN IN** **10/31/1994**

ON OCTOBER 31, 1994, ABOUT 1600 CENTRAL STANDARD TIME A SIMMONS AIRLINES AVIONS DE TRANSPORT REGIONAL ATR-72-210, OPERATING AS AMERICAN EAGLE FLIGHT 4184, CRASHED INTO A SOYBEAN FIELD 3 MILES SOUTH OF ROSELAWN, INDIANA. THE FLIGHT WAS ON AN INSTRUMENT FLIGHT RULES FLIGHT PLAN FROM INDIANAPOLIS, INDIANA, TO O'HARE INTERNATIONAL AIRPORT, CHICAGO, ILLINOIS, AND HAD BEEN PLACED IN A HOLDING PATTERN OVER ROSELAWN BECAUSE OF WEATHER DELAYS BEING EXPERIENCED AT O'HARE. THE AIRPLANE'S PRIMARY AND SECONDARY RADAR RETURNS DISAPPEARED FROM THE AIR TRAFFIC CONTROL RADAR SHORTLY AFTER THE FLIGHT WAS CLEARED TO CONTINUE THE HOLDING PATTERN AND TO DESCEND FROM 10,000 TO 8,000 FEET. WITNESSES OBSERVED THE AIRPLANE DESCEND OUT OF A LOW OVERCAST AND STRIKE THE GROUND IN A STEEP NOSE-DOWN ATTITUDE. ALL 64 PASSENGERS AND 4 CREWMEMBERS WERE KILLED IN THE ACCIDENT. THE SAFETY BOARD INVESTIGATED ONE SUCH EVENT THAT OCCURRED ON DECEMBER 22, 1988, AT MOSINEE, WISCONSIN.

Recommendation # A-94-181

Overall Status **Priority**

CAA **CLASS I**

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: CONDUCT A SPECIAL CERTIFICATION REVIEW OF THE ATR-42 AND ATR-72 AIRPLANES, INCLUDING FLIGHT TESTS AND/OR WIND TUNNEL TESTS, TO DETERMINE THE AILERON HINGE MOMENT CHARACTERISTICS OF THE AIRPLANES OPERATING WITH DIFFERENT AIRSPEEDS AND CONFIGURATIONS DURING ICE ACCUMULATION AND WITH VARYING ANGLES OF ATTACH FOLLOWING ICE ACCRETION. AS A RESULT OF THE REVIEW, REQUIRE MODIFICATIONS AS NECESSARY TO ASSURE SATISFACTORY FLYING QUALITIES AND CONTROL SYSTEM STABILITY IN ICING CONDITIONS.

FAA	Closed - Acceptable Action	7/9/1996

12/2/1994	Addressee	THE FAA AGREE WITH THIS RECOMMENDATION & ESTABLISHED A SPECIAL CERTIFICATION REVIEW TEAM COMPRISED OF REPRESENTATIVES FROM THE FAA & THE DIRECTION GENERAL D L'AVIATION CIVIL. THE TEAM WILL CONDUCT A SPECIAL CERIFICATION REVIEW OF THE ATR-42 & ATR-72 SERIES AIRPLANES. THE TEAM WILL ALSO REQUIRE FLIGHT TESTS &/OR WIND TUNNEL TESTS AS NECESSARY TO DETERMINE CONTROL SYSTEM PERFORMANCE, PARTICULARLY IN ROLL, OF AIRPLANES OPERATING WITH DIFFERENT AIRSPEEDS & CONFIGURATIONS DURING ICE ACCRETION. INCLUDED IN THE REVIEW WILL BE AN EVALUTION OF AILERON HINGE MOMENT CHARACTERISTICS. AS A RESULT TO THE REVIEW, THE FAA WILL REQUIRE MODIFICATIONS, AS NECESSARY, TO ENSURE SATISFACTORY FLYING QUALITIES & CONTROL SYSTEM STABILITY IN ICING CONDITIONS. THE TEAM IS EXPECTED TO PREPARE A FORMAL REPORT BY 2/1/95. ON 11/16/94, THE FAA ISSUED TELEGRAPHIC AIRWORTHINESS DIRECTIVE (AD) T9424-51 APPLICABLE TO ALL MODEL ATR-42 & ATR-72 SERIES AIRPLANES. THE AD REQUIRE A REVISION TO THE FAA-APPROVED AIRPLANE FLIGHT MANUAL TO PROHIBIT OPERATION OF THE AUTOPILOT IN ICING CONDITIONS WHEN THE AIRPLANE IS OPERATED IN MODERATE OR GREATER TURBULENCE, OR IF ANY UNUSUAL LATERAL TRIM SITUATION IS OBSERVED.
1/9/1995	NTSB	THE CERTIFICATION REVIEW TEAM EXPECTS TO COMPLETE ITS FORMAL REPORT BY FEBRUARY 1, 1995. BASED ON THESE ACTIONS THE BOARD CLASSIFIES A-94-181 "OPEN--ACCEPTABLE RESPONSE." THE BOARD AWAITS COMPLETION OF THE WORK OF THE SPECIAL CERTIFICATION TEAM & LOOKS FORWARD TO RECEIVING THE RESULTS CONTAINED IN ITS FORMAL REPORT.

4/19/1996	Addressee	The Federal Aviation Administration (FAA) conducted a special certification review (SCR) of the ATR-42 and ATR-72 airplanes. On September 29, 1995, the SCR team issued its final report. I have enclosed a copy of the SCR report for the Board's information. A copy of the report was also provided to the Board's staff on October 5, 1995. I consider the FAA's action to be completed on this safety recommendation. However, the Board has classified this safety recommendation in an open status pending its review of the FAA's SCR report and verification of the viability of the flight operations restrictions imposed on the ATR-42 and ATR-72. Note to File: This safety recommendation was classified as "closed acceptable" action in the ATR accident report, Roselawn, Indiana. The report was adopted in 1996.
7/9/1996	NTSB	THE FINAL REPORT CONTAINED THE WORDS: THE FAA CONDUCTED AN SCR OF THE ATR 42 AND ATR 72 AIRPLANES. A FINAL REPORT WAS ISSUED BY THE FAA ON SEPTEMBER 29, 1995. BASED ON THE BOARD'S REVIEW OF THE FINAL SCR REPORT, THE BOARD CLASSIFIES A-94-181 AS "CLOSED--ACCEPTABLE ACTION."

Recommendation # A-94-182

Overall Status
CAA

Priority
CLASS I

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: PROHIBIT THE INTENTIONAL OPERATION OF ATR-42 AND ATR-72 AIRPLANES IN KNOWN OR REPORTED ICING CONDITIONS UNTIL THE EFFECT OF UPPER WING SURFACE ICE ON THE FLYING QUALITIES AND AILERON HINGE MOMENT CHARACTERISTICS ARE EXAMINED FURTHER AS RECOMMENDED IN A-94-181 AND IT IS DETERMINED THAT THE AIRPLANES EXHIBIT SATISFACTORY FLIGHT CHARACTERISTICS.

FAA	Closed - Acceptable Action	7/9/1996

12/2/1994	Addressee	ON 11/14/94, ATR ISSUED AN ART-42-/72 ALL OPERATORS INFO MESSAGE WHICH RECOMMENDED AIRPLANE CONFIGURATION, SPEEDS & PROCEDURES FOR OPERATION OF THE ATR-42 & ATR-72 IN ICING CONDITIONS. 11/16/94, TELEGRAPHIC AD T9424-51 WAS ISSUED (SUPERSEDING AD T9402351 & AD T94023-51 R1) APPLICABLE TO ALL MODEL ATR-42 AND ATR-72 SERIES AIRPLANES. THE AD, WHICH REQUIRED COMPLIANCE WITHIN 24 HOURS OF RECEIPT, PROHIBITS THE USE OF AUTOPILOT IN ICING CONDITIONS OR IN MODERATE OR GREATER TURBULENCE. IT FURTHER CONTAINS PROCEDURES IN THE EVENT OF UNUSUAL TRIM SITUATIONS. ON 11/18/94, FLIGHT STANDARDS INFO BULLETIN (FSIB) 94-16, ATR-42 & ATR-72 OPERATING PROCEDURES IN ICING CONDITIONS, WAS ISSUED TO PROVIDE A DISCUSSION OF THE ABOVE ACTIONS & TO DIRECT PRINCIPAL OPERATIONS INSPECTORS TO ENSURE THAT THE FOLLOWING ACTIONS WERE ACCOMPLISHED IMMEDIATELY: THAT THE ACTIONS CONTAINED IN AD T94-24-51 ARE ACCOMPLISHED. THAT THE OPERATING PROCEDURES ESTABLISHED IN THE ATR ALL OPERATOR MESSAGE ARE IMPLEMENTED. THAT SPECIAL DISPATCH PROCEDURES FOR OPERATIONS IN ICING CONDITIONS ARE IMPLEMENTED. THAT THE OPERATOR'S MINIMUM EQUIPMENT LIST BE REVISED TO REFLECT LIMITATIONS IMPOSED BY THE MMEL & AD REQUIREMENTS. BEGINNING 11/29/94, DAILY TELECONS WITH EACH DISTRICT OFFICE RESPONSIBLE FOR SAFETY INVESTIGATION OF ATR OPERATORS WERE CONDUCTED TO RELAY INFO & TO DISCUSS ISSUES OR PROBLEMS.
1/9/1995	NTSB	A-94-182 ASKED THE FAA TO PROHIBIT THE INTENTIONAL OPERATION OF ATR-42 & ATR-72 AIRPLANES IS KNOWN OR REPORTED ICING CONDITIONS UNTIL THE EFFECT OF UPPER WING SURFACE ICE ON THE FLYING QUALITIES & AILERON HINGE MOMENT CHARACTERISTICS ARE EXAMINED FURTHER AS RECOMMENDED IN SAFETY A-94-181 & IT IS DETERMINE THAT THE AIRPLANES EXHIBIT SATISFACTORY FLIGHT CHARACTERISTICS. IT WILL REMAIN IN EFFECT UNTIL CORRECTIVE ACTIONS ARE IDENTIFIED & IMPLEMENTED, BASED ON THE SPECIAL CERTIFICATION REVIEW TEAM, AS RECOMMENDED IN A-94-181. BASED ON THESE ACTIONS, THE BOARD CLASSIFIES A-94-182 "OPEN--ACCEPTABLE RESPONSE."

1/18/1995	Addressee	On January 11, 1995, the Federal Aviation Administration (FAA) issued Airworthiness Directive (AD) T95-02-051 and Flight Standards Information Bulletin (FSIB) 95-01, ATR-42 and ATR-72 Airworthiness Directive T95-02-51 Compliance Procedures, in response to these safety recommendations. I have enclosed copies of the AD and FSIB for the Board's information. I have also enclosed a copy of the FAA memorandum dated January 11, 1995, which provides a chronological summary of the AD's and other actions that have been taken to date to address this safety issue. I believe that these actions address the full intent of these safety recommendations.
4/19/1996	Addressee	On December 9, 1994, the FAA issued Airworthiness Directive (AD) T94-25-51 applicable to the ATR fleet to prohibit flight into icing conditions. On February 24, 1995, the Board stated that this action exceeded the intent of this safety recommendation which urged prohibiting the intentional operation of the airplanes in known or reported icing conditions. I consider the FAA's action to be completed on this safety recommendation. Note to File: This safety recommendation was classified as "closed acceptable" action in the ATR accident report, Roselawn, Indiana. The report was adopted in 1996.
7/9/1996	NTSB	BASED ON THE RESULTS OF THE SCR, WHICH WAS ENCLOSED WITH A LETTER FROM THE FAA DATED APRIL 19, 1996, AND THE VERIFICATION OF THE VIABILITY OF THE FLIGHT OPERATIONS RESTRICTIONS IMPOSED ON THE ATR AIRPLANES, THE SAFETY BOARD CLASSIFIES A-94-182 "CLOSED--ACCEPTABLE ACTION."

Recommendation # A-94-183

Overall Status
CAA

Priority
CLASS I

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: ISSUE A GENERAL NOTICE TO ATC PERSONNEL TO PROVIDE EXPEDITED SERVICE TO ATR-42 AND ATR-72 PILOTS WHO REQUEST ROUTE, ALTITUDE, OR AIRSPEED DEVIATIONS TO AVOID ICING CONDITIONS. WAIVE THE 175 KNOT HOLDING AIR SPEED RESTRICTION FOR ATR-42 AND ATR-72 AIRPLANES PENDING ACCEPTABLE OUTCOME OF THE SPECIAL CERTIFICATION EFFORT.

FAA	Closed - Acceptable Action	12/2/1994

12/2/1994	Addressee	THE FAA ISSUED GENERAL NOTICE (GENOT) RWA 4/85 DATED 11/11/94, IN RESPONSE TO THIS RECOMMENDATION. THE GENOT STATED: ON 10/31/94, AN ATR-72- WAS INVOLVED IN A FATAL ACCIDENT. PENDING A SPECIAL CERTIFICATION REVIEW OF THE AIRCRAFT, ATR-42 & ATR-72 PILOTS HAVE BEEN ADVISED TO AVOID EXTENDED EXPOSURE TO ICING CONDITIONS & FLY AT INDICATED AIRSPEEDS IN EXCESS OF 175 KNOTS WHILE HOLDING. THE FOLLOWING PROCEDURES ARE EFFECTIVE IMMEDIATELY: ATC PERSONNEL SHALL PROVIDE PRIORITY HOLDING TO ATR-42 & ATR-72 PILOTS WHEN THEY REQUEST ROUTE, ALTITUDE, OR AIRSPEED DEVIATIONS TO AVOID ICING CONDITIONS. ATC PERSONNEL SHOULD BE AWARE THAT WHEN THE ATR-43 & ATR-72 USE SPEED IN EXCESS OF 175 KNOTS, THEY MAY NOT BE ABLE TO REMAIN WITHIN THE CONFINES OF HOLDING PATTERN AIRSPACE. THE ART-42 & ATR-72 HAVE A RECOMMENDED HOLDING AIRSPEED OF 175 KNOTS. TIS AIRSPEED IS NOT AN AIRSPEED RESTRICTION, & AIR TRAFFIC CONTROLLERS HAVE BEEN INSTRUCTED TO HONOR ANY HOLDING AIRSPEEDS REQUESTED BY ATR PILOTS. FAA BELIEVES THAT THIS ACTION ADDRESS THIS RECOMMENDATION.

1/9/1995	NTSB	THE BOARD NOTES THAT ON 11/11/94, THE FAA ISSUED GENOT NO. RWA 4/85 DIRECTING AIR TRAFFIC PERSONNEL TO PROVIDE PRIORITY HANDLING TO PILOTS OF ATR-42 & ATR-72 AIPLANES WHEN THEY REQUEST ROUTE, ALTITUDE OR AIRSPEED DEVIATIONS TO AVOID ICING CONDITIONS. THE GENOT ALSO ADVISED THAT AIR TRAFFIC PERSONNEL SHOULD BE AWARE THAT THE NORMAL HOLDING AIRSPEEDS FOR THE ATR-42 & ATR-72 AIRPLANES HAVE BEEN WAIVED & THAT, WHEN SPEEDS IN EXCESS OF 175 KNOTS ARE USED, THE AIRPLANES MAY NOT REMAIN WITHIN THE CONFINES OF THE HOLDING PATTERN AIRSPACE. THE BOARD APPRECIATES THE PROMPT ACTION IN RESPONSE TO THIS RECOMMENDATION. THE BOARD UNDERSTANDS THAT THE FAA HAS SENT INSPECTORS TO SEVERAL AIR TRAFFIC FACILITIES TO VERIFY FULL UNDERSTANDING & IMPLEMENTATION OF THE GENOT. THEREFORE, THE BOARD CLASSIFIES A-94-183 "CLOSED--ACCEPTABLE ACTION."

Recommendation # A-94-184

Overall Status
CAA

Priority
CLASS I

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: PROVIDE GUIDANCE AND DIRECTION TO PILOTS OF ATR-42 AND ATR-72 AIRPLANES IN THE EVENT OF INADVERTENT ENCOUNTER WITH ICING CONDITIONS BY THE FOLLOWING ACTIONS: (1) DEFINE OPTIMUM AIRPLANE CONFIGURATION AND SPEED INFORMATION; (2) PROHIBIT THE USE OF AUTOPILOT; (3) REQUIRE THE MONITORING OF LATERAL CONTROL FORCES; (4) AND DEFINE A POSITIVE PROCEDURE FOR REDUCING ANGLE OF ATTACK.

FAA	Closed - Acceptable Action	1/27/1997

12/2/1994	Addressee	ON 11/14/94, ATR ISSUED AN ART-42-/72 ALL OPERATORS INFO MESSAGE WHICH RECOMMENDED AIRPLANE CONFIGURATION, SPEEDS & PROCEDURES FOR OPERATION OF THE ATR-42 & ATR-72 IN ICING CONDITIONS. 11/16/94, TELEGRAPHIC AD T9424-51 WAS ISSUED (SUPERSEDING AD T9402351 & AD T94023-51 R1) APPLICABLE TO ALL MODEL ATR-42 AND ATR-72 SERIES AIRPLANES. THE AD, WHICH REQUIRED COMPLIANCE WITHIN 24 HOURS OF RECEIPT, PROHIBITS THE USE OF AUTOPILOT IN ICING CONDITIONS OR IN MODERATE OR GREATER TURBULENCE. IT FURTHER CONTAINS PROCEDURES IN THE EVENT OF UNUSUAL TRIM SITUATIONS. ON 11/18/94, FLIGHT STANDARDS INFO BULLETIN (FSIB) 94-16, ATR-42 & ATR-72 OPERATING PROCEDURES IN ICING CONDITIONS, WAS ISSUED TO PROVIDE A DISCUSSION OF THE ABOVE ACTIONS & TO DIRECT PRINCIPAL OPERATIONS INSPECTORS TO ENSURE THAT THE FOLLOWING ACTIONS WERE ACCOMPLISEHD IMMEDIATELY: THAT THE ACTIONS CONTAINED IN AD T94-24-51 ARE ACCOMPLISHED. THAT THE OPERATING PROCEDURES ESTABLISHED IN THE ATR ALL OPERATOR MESSAGE ARE IMPLEMENTED. THAT SPECIAL DISPATCH PROCEDURES FOR OPERATIONS IN ICING CONDITIONS ARE IMPLEMENTED. THAT THE OPERATOR'S MINIMUM EQUIPMENT LIST BE REVISED TO REFLECT LIMITATIONS IMPOSED BY THE MMEL & AD REQUIREMENTS. BEGINNING 11/29/94, DAILY TELECONS WITH EACH DISTRICT OFFICE RESPONSIBLE FOR SAFETY INVESTIGATION OF ATR OPERATORS WERE CONDUCTED TO RELAY INFO & TO DISCUSS ISSUES OR PROBLEMS.
1/9/1995	NTSB	THE BOARD STAFF HELD SEVERAL DISCUSSIONS WITH FAA STAFF ABOUT THE CONTENTS OF FSIB 94-16 TO DEVELOP CLEAR & SPECIFIC GUIDANCE TO ATR-42 & ATR-72 PILOTS & FLIGHT DISPATCHERS & TO VERIFY A FULL UNDERSTANDING OF THE MEASURES TO TAKE TO AVOID IN-FLIGHT ICING CONDITIONS & MEASURES TO TAKE SHOULD INADVERTENT ENCOUNTERS WITH ICING OCCUR. THE BOARD REMAINED CONCERNED ABOUT THE CONTINUED OPERATION OF THE AIRPLANE IN ICING CONDITIONS, PENDING THE RESULTS OF THE SPECIAL CERTIFICATION REVIEW TEAM. THE BOARD CLASSIFIES A-94-184 "OPEN--ACCEPTABLE RESPONSE," PENDING CONFIRMATION FROM THE FAA THAT THE VARIOUS ACTIONS TAKEN HAVE BEEN FULLY IMPLEMENTED BY ATR-42 AND ATR-72 OPERATORS, & FOLLOWING THE RESULTS OF THE SPECIAL CERTIFICATION REVIEW & THE POSSIBLE LIFTING OF RESTRICTIONS CONTAINED IN AD T94-25-51.
1/18/1995	Addressee	On January 11, 1995, the Federal Aviation Administration (FAA) issued Airworthiness Directive (AD) T95-02-051 and Flight Standards Information Bulletin (FSIB) 95-01, ATR-42 and ATR-72 Airworthiness Directive T95-020-51 Compliance Procedures, in response to these safety recommendations. I have enclosed copies of the AD and FSIB for the Board's information. I have also enclosed a copy of the FAA memorandum dated January 11, 1995, which provides a chronological summary of the AD's and other actions that have been taken to date to address this safety issue. I believe that these actions address the full intent of these safety recommendations.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

2/24/1995 NTSB

The Safety Board notes that the FAA has issued AD T95-02-051 and FSIB 95-01 in response to these recommendations. AD T95-02-051 superseded AD T94-25-51, issued December 9, 1994, and lifted certain restrictions that had been imposed on the ATR-42 and ATR-72 airplanes by that AD. AD T94-25-51 was issued following initial wind tunnel and ground tests that suggested an unsafe condition with the airplanes. In general, AD T94-25-51 restricted flight into all icing conditions, "forecast or reported." That action exceeded the intent of Safety Recommendation A-94-182, which urged prohibiting the intentional operation of the airplanes in "known or reported icing conditions...," until the results of a special certification review were available.

As part of the special certification review, ATR contracted with the United States Air Force to conduct a series of flight tests in which an icing tanker sprayed various amounts of water onto an ATR-72 to determine the ice accretion characteristics. In general, Safety Board staff have been advised that the flight tests revealed that the ATR-42 and ATR-72 series airplanes comply with the performance requirements relating to the icing envelope specified in 14 CFR Part 25 for certification of these airplanes. Additional tests conducted with large water droplets (outside the Part 25 icing standards) revealed that ice accretes aft of the deicing boots. The ice accretion under these conditions led to a spanwise ice ridge with the flaps set at 15 degrees. The ice ridge was found to disrupt the air flow over the aileron when the flaps were raised to O degrees". The disruption of air flow caused uncommanded aileron deflection and unusual control wheel forces.

The tanker icing tests also revealed that ice formed on the unheated portion of the pilots' side window when the airplane was operating in freezing drizzle that was outside the certification envelope. The ice did not form on the window when the icing conditions were within the certification envelope.

As a result of the finding from the tanker icing tests, ATR developed procedures to be followed if the airplane encounters freezing rain or drizzle conditions. The procedures prohibit dispatch or operation in known or forecast freezing rain and freezing drizzle, provide flightcrews with a means to identify inadvertent encounters with such conditions, and provide appropriate actions to take should such an encounter occur.

The procedures developed by ATR have been incorporated into several documents, including the ATR-42 and ATR-72 Airplane Flight Manuals and the Flight Crew Operation Manuals. Additionally, ATR developed a special brochure for each pilot that outlines procedures and methods to comply with the special operating procedures.

AD T95-02-51 directed that operators of ATR-42 and ATR-72 airplanes establish an FAA-approved system to provide forecasts and reports of freezing rain and freezing drizzle at en route altitudes along the route of flight and at all airports considered in the flight planning process. It directed training for both pilots and dispatchers regarding the use of such icing forecasts in accordance with FSIB 95-01. FSIB 95-01 contains guidance and information for Principal Operations Inspectors (POI) of ATR-42 and ATR-72 operators.

FSIB 95-01 directs POIs to ensure that all relevant material from AD T95-02-51 and applicable MMEL changes are incorporated into operators' company manuals. It also directs POIs to verify that operators' weather and flight dispatch systems are appropriately organized to (tope with the special restrictions for the airplanes. And, it contains the details of the approved training program required for dispatchers and pilots.

Lastly, AD T95-02-51 specifies that the above procedures and requirements are interim actions, until June 1, 1995. In the meantime, a modification of the airplane design [installation of larger deicer boots] that would constitute terminating action for this rulemaking is undergoing design, testing, and certification.

The Safety Board understands that the special operating restrictions might be lifted following additional flight testing approval of the modified deicer boot design.

The Safety Board believes that the actions specified in AD T-95-02-51 and FSIB 95-01 comply, in part, with the intent of Safety Recommendations A-94-182 and -184. The

Safety Board has not reviewed all of the results of the special certification review team and it has not independently verified the viability of the flight operations restrictions imposed on the ATR-42 and ATR-72 airplanes. However, these actions appear to be acceptable interim actions, pending the approval and completion of terminating actions to correct the characteristics that led to the special flight restrictions on the airplanes.

Therefore, the Safety Board classifies Safety Recommendations A-94-182 and -184, "Open--Acceptable Action," pending notification from the FAA that terminating actions have been taken and the results of the special certification review team have been published.

4/19/1996 Addressee

On January 11, 1995, the FAA issued telegraphic AD T95-02-51 which restored flight into icing conditions provided certain flightcrew and dispatcher procedures were followed. This approval, based on the revised operational procedures, was authorized until June 1, 1995, at which time an FAA-approved modification to the airplane to address the unsafe condition was to have been installed.

On March 20, 1995, the FAA approved new, enlarged deicing boots for the ATR fleet. On May 26, 1995, the FAA issued an alternative method of compliance letter which stated that the new boots, together with the revised operational procedures, provided an increase in the margin of safety during an inadvertent encounter with large supercooled water droplets. This action justified operation of the ATR fleet in icing conditions beyond the June 1, 1995, deadline. The FAA formalized these procedures through the issuance of a notice of proposed rulemaking (NPRM) on October 12, 1995. I have enclosed a copy of the NPRM for the Board's information.

On January 19, 1996, the FAA issued a supplemental NPRM proposing to require revised flightcrew procedures with respect to flight in large droplet freezing precipitation (freezing drizzle) conditions. These revised flightcrew procedures for the ATR are identical to all other affected airplanes.

The FAA will issue one final regulatory document that will incorporate the NPRM and Supplemental NPRM. I will provide the Board with a copy of the final document as soon as it is issued.

9/23/1996 Addressee

On April 24, 1996, the FAA issued Airworthiness Directive (AD) 96-09-28 (Docket 95-NM-146-AD, Amendment 39-9604). This AD, effective June 11, 1996, supersedes an existing AD, as subsequently supplemented, applicable to all Aerospatiale Model ATR-42 and ATR-72 series airplanes. The superseded AD stipulated that unless modifications were accomplished or alternative procedures and training adopted, operation of the airplane would be prohibited in certain icing conditions. It also required restrictions on the use of the autopilot in certain conditions. AD 96-09-28 modifies the requirements of the superseded AD by both adding requirements for modification of the deicing boots on the leading edge of the wing and various follow-on actions, and by removing certain limitations and procedures. I have enclosed a copy of AD 96-09-28 for the Board's information.

I consider the FAA's action to be completed on this safety recommendation, and I plan no further action.

1/27/1997 NTSB

The Safety Board acknowledges that the FAA issued AD 96-09-28 on April 24, 1996. The Safety Board believes that the AD is acceptable in meeting the intent of this Recommendation. Safety Recommendation A-94-184 is classified "Closed--Acceptable Action."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Recommendation # A-94-185

Overall Status
CAA

Priority
CLASS I

THE NTSB RECOMMENDS THAT THE FEDERAL AVIATION ADMINISTRATION: CAUTION PILOTS OF ATR-42 AN ATR-72 AIRPLNES THAT RAPID DESCENTS AT LOW ALTITUDE OR DURING LANDING APPROACHES OR OTHER DEVIATIONS FROM PRESCRIBED OPERATING PROCEDURES ARE NOT AN ACCEPTABLE MEANS OF MINIMIZING EXPOSURE TO ICING CONDITIONS.

FAA	Closed - Acceptable Action	12/2/1994

12/2/1994	Addressee	FSIB CAUTIONS PILOTS THAT RAPID DESCENTS AT LOW ALTITUDE OR DURING LANDING APPROACHES OR ANY DEVIATIONS FROM THESE APPROVED PROCEDURES AS A MEANS OF MINIMIZING EXPOSURE TO ICING CONDITION SHOULD BE AVOIDED. STRICT ADHERENCE TO AD LIMITATIONS & APPROVED PROCEDURES IS REQUIRED. FAA CONSIDERS THEIR ACTION TO BE COMPLETED ON THIS RECOMMENDATION & PLANs NO FURTHER ACTION.
1/9/1995	NTSB	THE BOARD NOTES THAT THE FAA HAS INCLUDED IN FSIB 94-16 SPECIFIC PRECAUTIONS TO PILOTS NOT TO USE RAPID DESCENTS AT LOW ALTITUDES OR DURING INSTRUMENT APPROACHES AS A MEANS TO MINIMIZE EXPOSURE TO ICING CONDITIONS. IT ALSO URGED STRICT ADHERENCE TO AD LIMITATIONS REGARDING THE USE OF AUTOPILOT & OTHER APPROVED PROCEDURES. THE BOARD IS AWARE THAT THE FAA HAS TAKEN ACTIONS TO VERIFY PILOT UNDERSTANDING & COMPLIANCE BY CONDUCTING EN ROUTE INSPECTIONS & VISITING AIRLINE OPERATIONS. THEREFORE, THE BOARD CLASSIFIES A-94-185 "CLOSED--ACCEPTABLE ACTION."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Log Number 2529A

Issue Date 8/15/1996 **ROSELAWN IN** **10/31/1994**

ON OCTOBER 31, 1994, ABOUT 1600 CENTRAL STANDARD TIME A SIMMONS AIRLINES AVIONS DE TRANSPORT REGIONAL ATR-72-210, OPERATING AS AMERICAN EAGLE FLIGHT 4184, CRASHED INTO A SOYBEAN FIELD 3 MILES SOUTH OF ROSELAWN, INDIANA. THE FLIGHT WAS ON AN INSTRUMENT FLIGHT RULES FLIGHT PLAN FROM INDIANAPOLIS, INDIANA, TO O'HARE INTERNATIONAL AIRPORT, CHICAGO, ILLINOIS, AND HAD BEEN PLACED IN A HOLDING PATTERN OVER ROSELAWN BECAUSE OF WEATHER DELAYS BEING EXPERIENCED AT O'HARE. THE AIRPLANE'S PRIMARY AND SECONDARY RADAR RETURNS DISAPPEARED FROM THE AIR TRAFFIC CONTROL RADAR SHORTLY AFTER THE FLIGHT WAS CLEARED TO CONTINUE THE HOLDING PATTERN AND TO DESCEND FROM 10,000 TO 8,000 FEET. WITNESSES OBSERVED THE AIRPLANE DESCEND OUT OF A LOW OVERCAST AND STRIKE THE GROUND IN A STEEP NOSE-DOWN ATTITUDE. ALL 64 PASSENGERS AND 4 CREWMEMBERS WERE KILLED IN THE ACCIDENT. THE SAFETY BOARD INVESTIGATED ONE SUCH EVENT THAT OCCURRED ON DECEMBER 22, 1988, AT MOSINEE, WISCONSIN.

Recommendation # A-96-051

Overall Status
OAA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FAA: REVISE THE EXISTING AIRCRAFT ICING INTENSITY REPORTING CRITERIA (AS DEFINED IN THE AERONAUTICAL INFO MANUAL (AIM) AND OTHER FAA LITERATURE) BY INCLUDING NOMENCLATURE THAT IS RELATED TO SPECIFIC TYPES OF AIRCRAFT, AND THAT IS IN LOGICAL AGREEMENT WITH EXISTING FEDERAL AVIATION REGULATION (FARS).

FAA	Open - Acceptable Response

10/30/1996	Addressee	The FAA is developing an FAA In-flight Icing Plan which will address the recommendations and issues raised at the May 1996 International Conference on Aircraft In-flight Icing. One major issue identified at the conference was the need to harmonize icing terminology and criteria. This initiative will be addressed by a working group that will review, revise, develop the necessary advisory and guidance materials and handbook changes, and revise the appropriate regulations. This project will address the intent of this safety recommendation. The working group will be chaired by the FAA and will include representatives from appropriate FAA offices, the National Weather Service (NWS), the Aviation Weather Center in Kansas City, Missouri, and the William J. Hughes Technical Center in Atlantic City, New Jersey. I will keep the Board apprised of the FAA's progress on these safety recommendations.
6/27/1997	Addressee	THE FAA PUBLISHED ITS INFLIGHT AIRCRAFT ICING PLAN IN APRIL 1997. THE PLAN ADDDRESS RECOMMENDATIONS AND ISSUES RAISED AT THE MAY 1996 INTERNATIONAL CONFERENCE ON AIRCRAFT INFLIGHT ICING. THE PLAN DESCRIBES VARIOUS ACTIVITIES INCLUDING RULEMAKING, DEVELOPMENT OF AND REVISIONS TO ADVISORY MATERIALS, RESEARCH PROGRAMS, AND OTHER INITIATIVES TO ACHIEVE SAFETY WHEN OPERATING IN ICING CONDITIONS. THE MOST CURRENT INFO WAS USED IN THE DEVELOPMENT OF THE TASKS & SCHEDULES CONTAINED IN THE PLAN. HOWEVER, BECAUSE OF THE COMPLEX NATURE OF THE TASKS AND THE INTERRELATIONSHIPS BETWEEN TASKS, THE PLAN MAY NEED TO BE REVISED PERIODICALLY TO REFLECT CHANGES IN SCOPE OR SCHEDULE. THE INTENT OF THIS RECOMENDATION IS ADDRESSED IN THE PLAN. THE FAA WILL KEEP THE BOARD APPRISED OF THE FAA'S PROGRESS ON THIS RECOMMENDATION.
8/20/1997	NTSB	A-96-51 ASKED THE FAA TO REVISE THE EXISTING AIRCRAFT ICING INTENSITY REPORTING CRITERIA (AS DEFINED IN THE AERONAUTICAL INFO MANUAL (AIM) & OTHER FAA LITERATURE) BY INCLUDING NOMENCLATURE THAT IS RELATED TO SPECIFIC TYPES OF AIRCRAFT, & THAT IS IN LOGICAL AGREEMENT WITH EXISTING FEDERAL AVIATION REGULATIONS (FARS). PENDING COMPLETION & EVALUATION OF THE ACTIONS PLANNED THEREIN, THE BOARD CLASSIFIES A-96-51, -52, & -60 "OPEN--ACCEPTABLE RESPONSE."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

5/18/2000	Addressee	Letter Mail Controlled 05/22/2000 3:41:13 PM MC# 2000651 ON 6/27/97, THE FAA ADVISED THE BOARD THAT THE AIRCRAFT ICING PLAN ISSUED IN APRIL 1997 ADDRESSED RECOMMENDATIONS AND ISSUES RAISED AT THE MAY 1996 INTERNATIONAL CONFERENCE ON AIRCRAFT IN-FLIGHT ICING. THE ICING PLAN DESCRIBED VARIOUS ACTIVITIES INCLUDING RULEMAKING, DEVELOPMENT OF AND REVISIONS TO ADVISORY MATERIALS, RESEARCH PROGRAMS, AND OTHER INITIATIVES TO ACHIEVE SAFETY WHEN OPERATING IN ICING CONDITIONS. THE FAA FURTHER STATED THAT A WORKING GROUP WAS BEING FORMED TO REVIEW, REVISE, AND DEVELOP NECESSARY REGULATIONS AND GUIDANCE MATERIALS RELATED TO ICING. THE BOARD CLASSIFIED THESE RECOMMENDATIONS IN AN "OPEN ACCEPTABLE" STATUS PENDING COMPLETION AND EVALUATION OF THE ACTIONS IN THE ICING PLAN. THE FAA'S IN-FLIGHT ICING PLAN, FORMERLY KNOWN AS THE AIRCRAFT ICING PLAN, CONSISTS OF 14 TASKS. EACH TASK HAS A WORKING TEAM TO ADDRESS VARIOUS ISSUES RELATED TO ICING. TASK 1B TEAM HAS DEVELOPED A LIST OF NEW ICING TERMINOLOGY, WHICH WILL INCLUDE "ICING IN PRECIPITATION," AND A TABLE OF ICING EFFECTS ON AIRCRAFT. THE ICING TERMINOLOGY WILL BE INCORPORATED INTO ALL EXISTING AND FUTURE GUIDANCE AND RELEVANT DOCUMENTS. THE TABLE PROVIDES INFORMATION TO PILOTS IN THE FORM OF FOUR LEVELS OF EFFECTS WITH LEVEL FOUR HAVING THE MOST SEVERE EFFECT ON POWER, CLIMB, SPEED, CONTROL, AND STALL CHARACTERISTICS. THE FAA HAS INCLUDED IN ITS PROPOSAL OF NEW ICING TERMINOLOGY A REQUIREMENT THAT THE LEVEL OF EFFECTS BE INCLUDED IN THE PILOT'S ICING REPORT FORMAT SO THAT OTHER PILOTS CAN MAKE A REASONABLE JUDGEMENT REGARDING THE EFFECTS THAT THE REPORTED ICING MAY HAVE ON THEIR AIRCRAFT. IT IS KNOWN THROUGHOUT MUCH OF THE AVIATION COMMUNITY THAT ICE EFFECTS DIFFERENT TYPES OF AIRPLANES DIFFERENTLY. FOR EXAMPLE, AIRPLANES WITH THINNER AIRFOIL SHAPES ARE MORE EFFICIENT COLLECTORS OF ICE THAN AIRPLANES WITH THICKER AIRFOIL SHAPES. THE FAA IS ATTEMPTING TO BROADEN AND REINFORCE THIS KNOWLEDGE THROUGH THE PUBLICATION OF AN ADVISORY CIRCULAR (AC) ENTITLED, "PILOT GUIDE - FLIGHT IN ICING CONDITIONS." CURRENTLY, THE TECHNOLOGY TO FORECAST CLOUD LIQUID WATER CONTENT AND SUPERCOOLED LARGE DROPLETS SO THAT THEY CAN BE USED TO PREDICT THE PERFORMANCE EFFECTS ON AN AIRPLANE IS NOT AVAILABLE. IT IS ANTICIPATED THAT THE AC WILL BE PUBLISHED IN DECEMBER 2000. I WILL PROVIDE THE BOARD WITH A COPY OF THE AC AS SOON AS IT IS ISSUED. AS A RESULT OF THE IN-FLIGHT ICING CONFERENCE, THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), IN COOPERATION WITH THE FAA, PRODUCED TWO VIDEOS ENTITLED "TAILPLANE ICING" AND "ICING FOR REGIONAL AND CORPORATE PILOTS." THE FAA HAS DISTRIBUTED COPIES OF THESE VIDEOS TO ALL REGIONAL AND FLIGHT STANDARDS DISTRICTS OFFICES AND HAS MADE THEM AVAILABLE TO THE PUBLIC. I HAVE ENCLOSED COPIES OF THE VIDEOS FOR THE BOARD'S INFORMATION. THE VIDEO ENTITLED "TAILPLANE ICING" IS AN EDUCATIONAL VIDEO THAT PROVIDES INFORMATION ABOUT ICE-CONTAMINATED HORIZONTAL STABILIZERS. THE VIDEO PRESENTS A PHYSICAL DESCRIPTION OF THE TAILPLANE ICING PROBLEM, SYMPTOMS OF ICE CONTAMINATION, AND SUGGESTED RECOVERY PROCEDURES. THE VIDEO ENTITLED "ICING FOR REGIONAL AND CORPORATE PILOTS" IS INTENDED FOR PILOTS OF TURBOPROP AIRCRAFT. THIS VIDEO DISCUSSES ICE PROTECTION SYSTEMS, HOW ICE ACCRETES ON THE AIRCRAFT, THE EFFECTS OF ICE ON BOTH THE PERFORMANCE DEGRADATION AND HANDLING QUALITIES, SUGGESTED RECOVERY TECHNIQUES FROM ROLL OR PITCH UPSET, AND THE HAZARDS OF SUPERCOOLED LIQUID DROPLETS. THE FAA IS CONTINUING TO WORK WITH NASA ON TWO ADDITIONAL VIDEOS DEALING WITH OTHER ASPECTS OF ICING. I WILL KEEP THE BOARD INFORMED OF THE FAA'S PROGRESS ON THESE RECOMMENDATIONS.
11/14/2000	NTSB	THE SAFETY BOARD IS PLEASED WITH THE FAA'S ACTIONS ON THESE RECOMMENDATIONS. PENDING REVIEW OF THE AC AND REVISIONS TO THE AIM AND OTHER RELEVANT DOCUMENTS, A-96-51 AND -52 ARE CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

3/21/2001	Addressee	Letter Mail Controlled 03/26/2001 8:26:49 PM MC# 2010261 The Federal Aviation Administration (FAA) is continuing its efforts in response to these safety recommendations. One of the tasks in the FAA's In-Flight Icing Plan is to develop a list of new icing terminology, which will include "icing in precipitation," and a table of icing effects on aircraft. The icing terminology will be incorporated into all existing and future guidance and relevant documents. The table will provide information to pilots in the form of four levels of effects with level four having the most severe effect on power, climb, speed, control, and stall characteristics. The FAA has included in its proposal of new icing terminology a requirement that the level of effects be included in the pilot's icing report format so that other pilots can make a reasonable judgment regarding the effects that the reported icing may have on their aircraft. It is anticipated that the icing terminology will be approved by May 2001. The FAA will revise the Aeronautical Information Manual (AIM) once the terminology is approved. It is known throughout much of the aviation community that ice effects different types of airplanes differently. For example, airplanes with thinner airfoil shapes are more efficient collectors of ice than airplanes with thicker airfoil shapes. The FAA is attempting to broaden and reinforce this knowledge through the publication of an Advisory Circular (AC) entitled, "Pilot Guide - Flight In Icing Conditions." Currently, the technology to forecast cloud liquid water content and supercooled large droplets so that they can be used to predict the performance effects on an airplane is not available. It is anticipated that the AC would be published in May 2001. I will provide the Board with a copy of the AC as soon as it is issued.
6/5/2001	NTSB	The FAA is taking the actions recommended. Pending issuance of revisions to the AIM and issuance of the AC, Safety Recommendations A-96-51 and -52 remain classified Open--Acceptable Response."
8/29/2003	Addressee	Letter Mail Controlled 9/2/2003 2:47:32 PM MC# 2030440 The Federal Aviation Administration (FAA) is continuing its efforts in response to these safety recommendations. As part of the FAA's In-Flight Icing Plan the FAA revised Pilot Reports (PIREP) relating to airframe icing. The revised PIREP contains the aircraft type and a report of the level of icing effects experienced by the aircraft. Consequently, to complete the PIREP properly, the FAA is creating a "Level of Icing Effects" table that will provide information to pilots in the form of four levels of effects with level four having the most severe effect on power, climb, speed, control, and stall characteristics. The FAA is also developing a set of new icing terminology that will include "icing in precipitation," and the terminology will be incorporated into all existing and future guidance and relevant documents. The FAA plans to include the revised PIREP and new icing terminology in the next revision to the AIM, which will be published in February 2004. Additionally, the FAA and the National Aeronautics and Space Administration (NASA) are developing four additional videos dealing with icing effects for the aviation community. NASA has completed the video entitled "Icing for General Aviation Pilots," which is specific to general aviation. I have enclosed a copy of the video for the Board's information. The other three videos will be specific to large transport aircraft, helicopters, and supercooled large droplets. The FAA is providing technical assistance in the production of these videos, but the completion of these videos is dependent on NASA funding. As the videos become available, the FAA will distribute them through the FAA regional and flight standards district offices for distribution and use in air carrier flight training programs and general aviation training. I will keep the Board informed of the FAA's progress on these efforts to address these safety recommendations.
4/9/2004	NTSB	The Safety Board notes that the FAA has revised pilot reports (PIREP) related to airframe icing. The revised PIREP contains the aircraft type and a report of the level of icing effects experienced by the aircraft. To help complete the PIREP properly, the FAA is creating a "Level of Icing Effects" table that will provide information to pilots in the form of four levels of effects on power, climb, speed, control, and stall characteristics. The FAA is also developing a set of new icing terminology that will include "icing in precipitation," which will be incorporated into all existing and future guidance and other relevant documents. The FAA plans to include the revised PIREP and new icing terminology in the next revision to the AIM. Pending issuance of revisions to the AIM, Safety Recommendations A-96-51 and -52 remain classified "Open--Acceptable Response."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

2/8/2005	Addressee	Letter Mail Controlled 2/24/2005 1:47:17 PM MC# 2050078 The Federal Aviation Administration (FAA) is continuing its efforts in response to these safety recommendations. As part of the FAA's In-Flight Icing Plan, the FAA revised Pilot Reports (PIREP) relating to airframe icing. The revised PIREP contains the aircraft type and a report of the level of icing effects experienced by the aircraft. Consequently, to complete the PIREP properly, the FAA is creating a "Level of Icing Effects" table that will provide information to pilots in the form of four levels of effects with level four having the most severe effect on power, climb, speed, control, and stall characteristics. The FAA has developed a set of new icing terminology that includes "icing in precipitation," and the terminology will be incorporated into relevant existing and future guidance documents. The FAA has included the new icing terminology in the next revision to the AIM, which will be published in February 2005, and the revised PIREP format will be published in the August 2005 revision of the AIM. Additionally, the National Aeronautics and Space Administration (NASA), with technical assistance from the FAA, is developing videos dealing with icing effects for the aviation community. NASA has completed two videos-one entitled "Icing for General Aviation Pilots," which was provided in prcvious correspondence. NASA has completed its second video entitled "Supercooled Large Droplet Icins." I have enclosed a copy of the video for the Board's information. The remaining two videos will be specific to large transport aircraft and helicopters. As the videos become available, the FAA will distribute them through the FAA regional and flight standards district offices for distribution and use in air carrier flight training programs and general aviation training. I will keep the Board informed of the FAA's progress on these efforts to address these safety recommendations.
5/31/2005	NTSB	The Safety Board reviewed a copy of the February 17, 2005, revision to the AIM and notes that Section 7-1-22, "[Pilot Reports] PIREPs Relating to Airframe Icing," contains the same four-level icing severity rating scale (trace, light, moderate, and severe) but now indicates that a report to air traffic control of icing should include the aircraft type. The FAA has indicated that the August 2005 revision to the AIM will contain the final revisions to PIREP procedures for reporting icing. The Safety Board is concerned that the proposed revisions may not be able to fully address the issues raised in Safety Recommendation A-96-51. The letter that transmitted this recommendation to the FAA contained the following information: The investigation revealed that although the icing definitions in the Aeronautical Information Manual (AIM) provide some basis for assessing ice accumulation in PIREPs, they are subjective and of limited use to pilots of different aircraft types. For example, using these definitions, "light" icing for a B-727 could be "severe" icing for an ATR 72 or a Piper Malibu. The icing report provided by the captain of the A-320 Airbus that was holding at the HALIE intersection near Roselawn indicated that he observed about 1 inch of ice accumulate rapidly on his aircraft's icing probe. The captain provided a PIREP to air traffic control (ATC) and reported the icing as "light rime." After the accident, he stated that the anti-ice equipment on the airplane "handled the icing adequately," and that he believed the icing intensity to have been "light to moderate." The Safety Board is uncertain how the new system for icing PIREPs would have served on the night of the Roselawn accident to alert ATR-72 or Piper Malibu pilots that they would encounter severe icing based on a report of "light to moderate" from an A-320. Safety Board staff will schedule a SWAT (Safety With A Team) meeting to discuss this concern. Pending clarification of this concern and completion of revisions to procedures for PIREPs of airframe icing, Safety Recommendation A-96-51 remains classified "Open--Acceptable Response."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Recommendation # A-96-052

Overall Status
CAA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FAA: PUBLISH THE DEFINITION OF THE PHRASE "ICING IN PRECIPITATION" IN THE APPROPRIATE AERONAUTICAL PUBLICATIONS, EMPHASIZING THAT THE CONDITION MAY EXIST BOTH NEAR THE GROUND AND AT ALTITUDE.

FAA	Closed - Acceptable Action	5/31/2005

10/30/1996	Addressee	The FAA is developing an FAA In-flight Icing Plan which will address the recommendations and issues raised at the May 1996 International Conference on Aircraft In-flight Icing. One major issue identified at the conference was the need to harmonize icing terminology and criteria. This initiative will be addressed by a working group that will review, revise, develop the necessary advisory and guidance materials and handbook changes, and revise the appropriate regulations. This project will address the intent of this safety recommendation. The working group will be chaired by the FAA and will include representatives from appropriate FAA offices, the National Weather Service (NWS), the Aviation Weather Center in Kansas City, Missouri, and the William J. Hughes Technical Center in Atlantic City, New Jersey. I will keep the Board apprised of the FAA's progress on these safety recommendations.
6/27/1997	Addressee	THE FAA PUBLISHED ITS INFLIGHT AIRCRAFT ICING PLAN IN APRIL 1997. THE PLAN ADDDRESS RECOMMENDATIONS & ISSUES RAISED AT THE MAY 1996 INTERNATIONAL CONFERENCE ON AIRCRAFT INFLIGHT ICING. THE PLAN DESCRIBES VARIOUS ACTIVITIES INCLUDING RULEMAKING, DEVELOPMENT OF & REVISIONS TO ADVISORY MATERIALS, RESEARCH PROGRAMS, & OTHER INITIATIVES TO ACHIEVE SAFETY WHEN OPERATING IN ICING CONDITIONS. THE MOST CURRENT INFO WAS USED IN THE DEVELOPMENT OF THE TASKS & SCHEDULES CONTAINED IN THE PLAN. HOWEVER, BECAUSE OF THE COMPLEX NATURE OF THE TASKS & THE INTERRELATIONSHIPS BETWEEN TASKS, THE PLAN MAY NEED TO BE REVISED PERIODICALLY TO REFLECT CHANGES IN SCOPE OR SCHEDULE. THE INTENT OF THIS RECOMENDATION IS ADDRESSED IN THE PLAN. THE FAA WILL KEEP THE BOARD APPRISED OF THE FAA'S PROGRESS ON THIS RECOMMENDATION.
8/20/1997	NTSB	A-96-52 ENCOURAGES THE FAA TO PUBLISH THE DEFINITION OF THE PHASE "ICING" IN THE PRECIPITATION" IN THE APPROPRIATE AERONAUTICAL PUBLICTION, EMPHASIZING THAT THE CONDITION MAY EXIST BOTH NEAR THE GROUND & AT ALTITUDE. PENDING COMPLETION & EVALUATION OF THE ACTIONS PLANNED THEREIN, THE BOARD CLASSIFIES A-96-51-52, & -60 "OPEN--ACCEPTABLE RESPONSE."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

5/18/2000	Addressee	Letter Mail Controlled 05/22/2000 3:41:13 PM MC# 2000651 ON 6/27/97, THE FAA ADVISED THE BOARD THAT THE AIRCRAFT ICING PLAN ISSUED IN APRIL 1997 ADDRESSED RECOMMENDATIONS AND ISSUES RAISED AT THE MAY 1996 INTERNATIONAL CONFERENCE ON AIRCRAFT IN-FLIGHT ICING. THE ICING PLAN DESCRIBED VARIOUS ACTIVITIES INCLUDING RULEMAKING, DEVELOPMENT OF AND REVISIONS TO ADVISORY MATERIALS, RESEARCH PROGRAMS, AND OTHER INITIATIVES TO ACHIEVE SAFETY WHEN OPERATING IN ICING CONDITIONS. THE FAA FURTHER STATED THAT A WORKING GROUP WAS BEING FORMED TO REVIEW, REVISE, AND DEVELOP NECESSARY REGULATIONS AND GUIDANCE MATERIALS RELATED TO ICING. THE BOARD CLASSIFIED THESE RECOMMENDATIONS IN AN "OPEN ACCEPTABLE" STATUS PENDING COMPLETION AND EVALUATION OF THE ACTIONS IN THE ICING PLAN. THE FAA'S IN-FLIGHT ICING PLAN, FORMERLY KNOWN AS THE AIRCRAFT ICING PLAN, CONSISTS OF 14 TASKS. EACH TASK HAS A WORKING TEAM TO ADDRESS VARIOUS ISSUES RELATED TO ICING. TASK 1B TEAM HAS DEVELOPED A LIST OF NEW ICING TERMINOLOGY, WHICH WILL INCLUDE "ICING IN PRECIPITATION," AND A TABLE OF ICING EFFECTS ON AIRCRAFT. THE ICING TERMINOLOGY WILL BE INCORPORATED INTO ALL EXISTING AND FUTURE GUIDANCE AND RELEVANT DOCUMENTS. THE TABLE PROVIDES INFORMATION TO PILOTS IN THE FORM OF FOUR LEVELS OF EFFECTS WITH LEVEL FOUR HAVING THE MOST SEVERE EFFECT ON POWER, CLIMB, SPEED, CONTROL, AND STALL CHARASTERISTICS. THE FAA HAS INCLUDED IN ITS PROPOSAL OF NEW ICING TERMINOLOGY A REQUIREMENT THAT THE LEVEL OF EFFECTS BE INCLUDED IN THE PILOT'S ICING REPORT FORMAT SO THAT OTHER PILOTS CAN MAKE A REASONABLE JUDGEMENT REGARDING THE EFFECTS THAT THE REPORTED ICING MAY HAVE ON THEIR AIRCRAFT. IT IS KNOWN THROUGHOUT MUCH OF THE AVIATION COMMUNITY THAT ICE AFFECTS DIFFERENT TYPES OF AIRPLANES DIFFERENTLY. FOR EXAMPLE, AIRPLANES WITH THINNER AIRFOIL SHAPES ARE MORE EFFICIENT COLLECTORS OF ICE THAN AIRPLANES WITH THICKER AIRFOIL SHAPES. THE FAA IS ATTEMPTING TO BROADEN AND REINFORCE THIS KNOWLEDGE THROUGH THE PUBLICATION OF AN ADVISORY CIRCULAR (AC) ENTITLED, "PILOT GUIDE - FLIGHT IN ICING CONDITIONS." CURRENTLY, THE TECHNOLOGY TO FORECAST CLOUD LIQUID WATER CONTENT AND SUPERCOOLED LARGE DROPLETS SO THAT THEY CAN BE USED TO PREDICT THE PERFORMANCE EFFECTS ON AN AIRPLANE IS NOT AVAILABLE. IT IS ANTICIPATED THAT THE AC WILL BE PUBLISHED IN DECEMBER 2000. I WILL PROVIDE THE BOARD WITH A COPY OF THE AC AS SOON AS IT IS ISSUED. AS A RESULT OF THE IN-FLIGHT ICING CONFERENCE, THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), IN COOPERATION WITH THE FAA, PRODUCED TWO VIDEOS ENTITLED "TAILPLANE ICING" AND "ICING FOR REGIONAL AND CORPORATE PILOTS." THE FAA HAS DISTRIBUTED COPIES OF THESE VIDEOS TO ALL REGIONAL AND FLIGHT STANDARDS DISTRICTS OFFICES AND HAS MADE THEM AVAILABLE TO THE PUBLIC. I HAVE ENCLOSED COPIES OF THE VIDEOS FOR THE BOARD'S INFORMATION. THE VIDEO ENTITLED "TAILPLANE ICING" IS AN EDUCATIONAL VIDEO THAT PROVIDES INFORMATION ABOUT ICE-CONTAMINATED HORIZONTAL STABILIZERS. THE VIDEO PRESENTS A PHYSICAL DESCRIPTION OF THE TAILPLANE ICING PROBLEM, SYMPTOMS OF ICE CONTAMINATION, AND SUGGESTED RECOVERY PROCEDURES. THE VIDEO ENTITLED "ICING FOR REGIONAL AND CORPORATE PILOTS" IS INTENDED FOR PILOTS OF TURBOPROP AIRCRAFT. THIS VIDEO DISCUSSES ICE PROTECTION SYSTEMS, HOW ICE ACCRETES ON THE AIRCRAFT, THE EFFECTS OF ICE ON BOTH THE PERFORMANCE DEGRADATION AND HANDLING QUALITIES, SUGGESTED RECOVERY TECHNIQUES FROM ROLL OR PITCH UPSET, AND THE HAZARDS OF SUPERCOOLED LIQUID DROPLETS. THE FAA IS CONTINUING TO WORK WITH NASA ON TWO ADDITIONAL VIDEOS DEALING WITH OTHER ASPECTS OF ICING. I WILL KEEP THE BOARD INFORMED OF THE FAA'S PROGRESS ON THESE RECOMMENDATIONS.
11/14/2000	NTSB	THE SAFETY BOARD IS PLEASED WITH THE FAA'S ACTIONS ON THESE RECOMMENDATIONS. PENDING REVIEW OF THE AC AND REVISIONS TO THE AIM AND OTHER RELEVANT DOCUMENTS, A-96-51 AND -52 ARE CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

3/21/2001	Addressee	Letter Mail Controlled 03/26/2001 8:26:49 PM MC# 2010261 The Federal Aviation Administration (FAA) is continuing its efforts in response to these safety recommendations. One of the tasks in the FAA's In-Flight Icing Plan is to develop a list of new icing terminology, which will include "icing in precipitation," and a table of icing effects on aircraft. The icing terminology will be incorporated into all existing and future guidance and relevant documents. The table will provide information to pilots in the form of four levels of effects with level four having the most severe effect on power, climb, speed, control, and stall characteristics. The FAA has included in its proposal of new icing terminology a requirement that the level of effects be included in the pilot's icing report format so that other pilots can make a reasonable judgment regarding the effects that the reported icing may have on their aircraft. It is anticipated that the icing terminology will be approved by May 2001. The FAA will revise the Aeronautical Information Manual (AIM) once the terminology is approved. It is known throughout much of the aviation community that ice effects different types of airplanes differently. For example, airplanes with thinner airfoil shapes are more efficient collectors of ice than airplanes with thicker airfoil shapes. The FAA is attempting to broaden and reinforce this knowledge through the publication of an Advisory Circular (AC) entitled, "Pilot Guide - Flight In Icing Conditions." Currently, the technology to forecast cloud liquid water content and supercooled large droplets so that they can be used to predict the performance effects on an airplane is not available. It is anticipated that the AC would be published in May 2001. I will provide the Board with a copy of the AC as soon as it is issued.
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8/29/2003	Addressee	Letter Mail Controlled 9/2/2003 2:47:32 PM MC# 2030440 The Federal Aviation Administration (FAA) is continuing its efforts in response to these safety recommendations. As part of the FAA's In-Flight Icing Plan the FAA revised Pilot Reports (PIREP) relating to airframe icing. The revised PIREP contains the aircraft type and a report of the level of icing effects experienced by the aircraft. Consequently, to complete the PIREP properly, the FAA is creating a "Level of Icing Effects" table that will provide information to pilots in the form of four levels of effects with level four having the most severe effect on power, climb, speed, control, and stall characteristics. The FAA is also developing a set of new icing terminology that will include "icing in precipitation," and the terminology will be incorporated into all existing and future guidance and relevant documents. The FAA plans to include the revised PIREP and new icing terminology in the next revision to the AIM, which will be published in February 2004. Additionally, the FAA and the National Aeronautics and Space Administration (NASA) are developing four additional videos dealing with icing effects for the aviation community. NASA has completed the video entitled "Icing for General Aviation Pilots," which is specific to general aviation. I have enclosed a copy of the video for the Board's information. The other three videos will be specific to large transport aircraft, helicopters, and supercooled large droplets. The FAA is providing technical assistance in the production of these videos, but the completion of these videos is dependent on NASA funding. As the videos become available, the FAA will distribute them through the FAA regional and flight standards district offices for distribution and use in air carrier flight training programs and general aviation training. I will keep the Board informed of the FAA's progress on these efforts to address these safety recommendations.
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2/8/2005	Addressee	Letter Mail Controlled 2/24/2005 1:47:17 PM MC# 2050078 The Federal Aviation Administration (FAA) is continuing its efforts in response to these safety recommendations. As part of the FAA's In-Flight Icing Plan, the FAA revised Pilot Reports (PIREP) relating to airframe icing. The revised PIREP contains the aircraft type and a report of the level of icing effects experienced by the aircraft. Consequently, to complete the PIREP properly, the FAA is creating a "Level of Icing Effects" table that will provide information to pilots in the form of four levels of effects with level four having the most severe effect on power, climb, speed, control, and stall characteristics. The FAA has developed a set of new icing terminology that includes "icing in precipitation," and the terminology will be incorporated into relevant existing and future guidance documents. The FAA has included the new icing terminology in the next revision to the AIM, which will be published in February 2005, and the revised PIREP format will be published in the August 2005 revision of the AIM. Additionally, the National Aeronautics and Space Administration (NASA), with technical assistance from the FAA, is developing videos dealing with icing effects for the aviation community. NASA has completed two videos-one entitled "Icing for General Aviation Pilots," which was provided in prcvious correspondence. NASA has completed its second video entitled "Supercooled Large Droplet Icins." I have enclosed a copy of the video for the Board's information. The remaining two videos will be specific to large transport aircraft and helicopters. As the videos become available, the FAA will distribute them through the FAA regional and flight standards district offices for distribution and use in air carrier flight training programs and general aviation training. I will keep the Board informed of the FAA's progress on these efforts to address these safety recommendations.
5/31/2005	NTSB	The Safety Board notes that Section 7-1-23, "Definition of Inflight Icing Terms," of the February 17, 2005, revision to the AIM contains a definition of "icing in precipitation"; consequently, Safety Recommendation A-96-52 is classified "Closed--Acceptable Action."

Recommendation # A-96-053

Overall Status **Priority**

CAA **CLASS II**

THE NTSB RECOMMENDS THAT THE FAA: CONTINUE TO SPONSOR THE DEVELOPMENT OF METHODS TO PRODUCE WEATHER FORECASTS THAT BOTH DEFINE SPECIFIC LOCATIONS OF ATMOSPHERIC ICING CONDITIONS (INCLUDING FREEZING DRIZZLE & FREEZING RAIN) & PRODUCE SHORT-RANGE FORECASTS ("NOWCASTS") THAT IDENTIFY ICING CONDITIONS FOR A SPECIFIC GEOGRAPHIC AREA WITH A VALID TIME OF 2 HOURS OR LESS.

FAA	Closed - Acceptable Action	8/20/1997

10/30/1996	Addressee	THE FAA CONTINUES TO SPONSOR THE DEVELOPMENT OF METHODS TO DETECT & FORECAST HAZARDOUS WEATHER. IN-FLIGHT ICING IS CURRENTLY THE FAA'S TOP WEATHER RESEARCH PRIORITY, $1.2 MILLION HAS BEEN FUNDED FOR FISCAL YEAR 1997. RESEARCHERS WORKING THIS PROJECT REPRESENT THE NOAA/NWS, THE NATIONAL CENTER FOR ATMOSPHERIC RESEARCH (NCAR), THE NATIONAL AERONAUTICS & SPACE ADMINISTRATION (NASA), THE PURDUE UNIVERSITY. RESEARCH EFFORTS ARE CONTINUING TO REFINE THE DATA & INFO BEING PROVIDED TO FORECASTERS AT THE AVIATION WEATHER CENTER. INVESTMENTS IN SATELLITE & RADAR ALGORITHMS, ENHANCED NUMBERICAL PREDICTION. MODELS, A NEW METEOROLOGICAL ICING SEVERITY INDEX, & THE NASA FREEZING DRIZZLE RESEARCH PROGRAM ARE JUST A SAMPLE OF THOS EFFORTS. SEVERAL OTHER EFFORTS ARE UNDERWAY. ONE INITIATIVE WILL IMPROVE THE ABILITY TO FORECAST THE SPECIFIC TYPE OF IN-FLIGHT ICING AS WELL AS ITS SEVERITY, ESPECIALLY IN THE CASES OF FREEZING RAIN, FREEZING DRIZZLE, & SUPERCOOLED LARGE DROPLETS ALOFT. ANOTHER EFFORT WILL INCORPORATE ADDITIONAL TYPES OF DATA SUCH AS GEOSTATIONARY OPERATIONAL ENVIRONMENTAL SATELLITE (GOES) OBERVATIONS AND DATA FROM THE NWS WIND PROFILER DEMONSTRATION NETWORK INTO THE FORCAST PROCESS. A THIRD PROJECT ADDRESSES THE FEASIBILITY OF INCORPORATING NEXT GENERATION WEATHER RADAR & TERMINAL DOPPLER WEATHER RADAR DATA INTO ICING DIAGNOSES & CONDUCTING REAL-TIME DROPLET SIZE RETRIEVAL STUDIES USING GOES-8/9 SATELLITE DATA. THE FAA WILL CONTINUE TO SPONSOR PROGRAMS THAT WILL ADDRESS THE INTENT OF THIS RECOMMENDATION.
8/20/1997	NTSB	A-96-53 ASKED THE FAA TO CONTINUE TO SPONSOR THE DEVELOPMENT OF METHODS TO PRODUCE WEATHER FORECASTS THAT BOTH DEFINE SPECIFIC LOCATIONS OF ATMOSPHERIC ICING CONDITIONS (INCLUDING FREEZING DRIZZLE & FREEZING RAIN) & PRODUCE SHORT-RANGE FORECASTS ("NOWCAST") THAT IDENTIFY ICING CONDITIONS FOR A SPECIFIC GEOGRAPHIC AREA WITH A VALID TIME OF 2 HOURS OR LESS. BASED ON THE FAA'S CONTINUING IN-FLIGHT ICING RESEARCH EFFORTS & ITS COMMITMENT TO KEEP THE BOARD APPRISED OF ITS PROGRESS, THE BOARD CLASSIFIES A-96-53 "CLOSED--ACCEPTABLE ACTION."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Recommendation # A-96-054

Overall Status
OUA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FAA: REVISE THE ICING CRITERIA PUBLISHED IN 14 CODE OF FEDERAL REGULATIONS (CFR), PART 23 AND 25, IN LIGHT OF BOTH RECENT RESEARCH INTO AIRCRAFT ICE ACCRETION UNDER VARYING CONDITIONS OF LIQUID WATER CONTENT, DROP SIZE DISTRIBUTION, AND TEMPERATURE, AND RECENT DEVELOPMENT IN BOTH THE DESIGN AND USE OF AIRCRAFT. ALSO, EXPAND THE APPENDIX C ICING CERTIFICATION ENVELOP TO INCLUDE FREEZING DRIZZLE/FREEZING RAIN AND MIXED WATER/ICE CRYSTAL CONDITIONS, AS NECESSARY. A-96-54 SUPERSEDES RECOMMENDATIONS A-81-116 AND 118.

FAA	Open - Unacceptable Response

10/30/1996	Addressee	THE FAA WILL TASK AN AVIATION RULEMAKING AVISORY COMMITTEE (ARAC) WORKING GROUP TO DEVELOP CERTIFICATION CRITERIA FOR THE SAFE OPERATION OF AIRPLANE IN ICING CONDITIONS CONTAINING DROPLETS LARGER THAN CURRENT REQUIREMENT & IN MIXED-PHASE CONDITIONS CONTAINING SUPERCOOLED LIQUID WATER & ICE CRYSTALS IS SUCH CONDITIONS ARE DETERMINED TO BE MORE HAZARDOUS THAN THE LIQUID PHASE ICING ENVIRONMENT CONTAINING SUPERCOOLED WATER DROPLET. CURRENTLY THERE IS A LIMITED AMOUNT OF CLOUD PHYSICS DATA TO CHARACTERIZE SUPERCOOLED LARGE DROPLET ICING. THE FAA WILL SUPPORT A RESEARCH EFFORT (PENDING AVAILABILITY OF FUNDS) TO GATHER SUPERCOOLED LIQUID DROPLET DATA & TO INCREASE THE SUPERCOOLED LIQUID DROPLET CHARACTERIZATION DATA BASE. THE FAA WILL ALSO LEAD AN EFFORT TO COLLECT. CONSOLIDATE, & ANALYZE EXISTING SUPERCOOLED LIQUID DROPLET DATA. THE FAA WILL ALSO UNDERTAKE A STUDY (PENDING AVAILABILITY OF FUNDS) TO DETERMINE THE MAGNITUDE OF THE HAZARD POSED BY OPERATIONS IN MIXED-PHASE CONDITIONS. THE FAA WILL KEEP THE BOARD APPRISED OF THE FAA'S PROGRESS ON THIS RECOMMENDATION.
8/20/1997	NTSB	THE BOARD STRONGLY ENCOURAGES THE FAA TO MAKE EVERY EFFORT TO FUND THESE IMPORTANT IN-FLIGHT ICING RESEARCH PROJECTS. PENDING COMPLETION OF THESE ACTION ITEMS, THE BOARD CLASSIFIES A-96-54 "OPEN--ACCEPTABLE RESPONSE."
7/1/1998	Addressee	(Letter Mail Controlled 7/7/98 4:01:11 PM MC# 980846) THE FAA HAS TASKED THE AVIATION REGULATORY ADVISORY COMMITTEE (ARAC) TO FORM AN ICE PROTECTION HARMONIZATION WORKING GROUP. THE TERMS OF REFERENCE (TOR) DOCUMENT WAS APPROVED BY THE ARAC ON OCTOBER 1997 & PUBLISHED IN THE FEDERAL REGISTER ON 12/8/97. THE TOR DOCUMENT IDENTIFIES SEVERAL TASKS ASSIGNED TO THE ICE PROTECTION HARMONIZATION WORKING GROUP. ONE TASK IS TO " DEFINE AN ICING ENVIRONMENT THAT INCLUDES SUPERCOOLED LARGE DROPLETS (SLD), & DEVISE REQUIREMENTS TO ASSESS THE ABILITY OF AIRCRAFT TO SAFELY OPERATE EITHER FOR THE PERIOD OF TIME TO EXIT OR TO OPERATE WITHOUT RESTRICTION IN SLD ALOFT, IN SLD AT OR NEAR THE SURFACE, & IN MIXED PHASE CONDITIONS IF SUCH CONDITIONS ARE DETERMINED TO BE MORE HAZARDOUS THAN THE LIQUID PHASE ICING ENVIRONMENT CONTAINING SUPERCOOLED WATER DROPLETS. " DATA FROM THE RESEARCH ACTIVITIES LISTED BELOW WILL BE PROVIDED TO THE ICE PROTECTION HARMONIZATION WORKING GROUP IN SUPPORT OF THE TOR TASKS TO DEFINE AN ICING ENVIRONMENT. A RESEARCH EFFORT TO GATHER SLD DATA IN THE GREAT LAKE REGION WAS ACCOMPLISHED DURING THE WINTERS OF 1996-1998. THE DATA WILL BE ANALYZED & FORWARDED TO THE ARAC WORKING GROUP IN THE SECOND QUARTER OF FISCAL YEAR (FY) 1999. THE EFFORT TO COLLECT, CONSOLIDATE, & ANALYZE EXISTING SLD DATA IN UNDERWAY. THE FAA PLANS TO PROVIDE THE RESULT OF THIS EFFORT TO THE ARAC IN THE FIRST QUARTER OF FY 1999. THE FAA, COMPLETED A DRAFT REPORT, WHICH SURVEYS PUBLICLY AVAILABLE EVIDENCE BEARING ON THE POSSIBLE SAFETY HAZARDS POSED BY OPERATIONS IN MIXED-PHASE CONDITIONS. THE FAA PLANS TO PROVIDE ARAC WITH A FINAL REPORT IN THE THIRD QUARTER OF FY 1998.
11/9/1998	NTSB	A-96- 54 ASKED THE FAA TO REVISE THE ICING CRITERIA PUBLISHED IN 14 CODE OF FEDERAL REGULATIONS (CFR), PARTS 23 & 25, IN LIGHT OF BOTH RECENT RESEARCH INTO AIRCRAFT ICE ACCRETION UNDER VARYING CONDITIONS OF LIQUID WATER CONTENT (LWC), DROP SIZE DISTRIBUTION & TEMPERATURE, & RECENT DEVELOPMENTS IN BOTH THE DESIGN & USE OF AIRCRAFT. ALSO, EXPAND THE APPENDIX C ICING CERTIFICATION ENVELOPE TO INCLUDE FREEZING DRIZZLE/FREEZING RAIN & MIXED WATER/ICE CRYSTAL CONDITIONS, AS NECESSARY. PENDING THE COMPLETION OF THE ICE PROTECTION HARMONIZATION WORKING GROUP'S TASKS & SUBSEQUENT CHANGES TO APPROPRIATE REGULATIONS & ADVISORY MATERIAL A-96-54 IS CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

4/15/1999	Addressee	Letter Mail Controlled 4/21/99 4:25:45 PM MC# 990438 THE FAA TASKED THE AVIATION REGULATORY ADVISORY COMMITTEE (ARAC) TO FORM AN ICE PROTECTION HARMONIZATION WORKING GROUP. ONE TASK ASSIGNED TO THE WORKING GROUP WAS TO DEFINE AN ICING ENVIRONMENT THAT INCLUDES SUPERCOOLED LARGE DROPLETS (SLD), AND DEVISE REQUIREMENTS TO ASSESS THE ABILITY OF AIRCRAFT TO SAFELY OPERATE EITHER FOR THE PERIOD OF TIME TO EXIT OR TO OPERATE WITHOUT RESTRICTION IN SLD ALOFT, IN SLD AT OR NEAR THE SURFACE, AND IN MIXED PHASE CONDITIONS IF SUCH CONDITIONS ARE DETERMINED TO BE MORE HAZARDOUS THAN THE LIQUID PHASE ICING ENVIRONMENT CONTAINING SUPERCOOLED WATER DROPLETS. THE FOLLOWING IS A STATUS UPDATE ON THE RESEARCH ACTIVITIES RELATED TO THE ICE PROTECTION HARMONIZATION WORKING GROUP TASK: *AVAILABLE SLD DATA FROM THE GREAT LAKES REGION AND OTHER NORTH AMERICAN AREAS ARE BEING COLLECTED AND ANALYZED AT THE FAA WILLIAM J. HUGHES TECHNICAL CENTER. RESULTS TO DATE WERE PRESENTED TO THE ARAC WORKING GROUP IN FEBRUARY 1999. THE WORK IS STILL IN PRGRESS AND UPDATES WILL BE DELIVERED PERIODICALLY TO THE ARAC WORKING GROUP. THE DRAFT MIXED-PHASE REPORT WAS SUBMITTED TO THE ARAC WORKING GROUP IN SEPTEMBER 1998. THE FINAL REPORT WAS PUBLISHED IN DECEMBER 1998. IN DECEMBER 1998, THE FAA HELD A MIXED-PHASE AND GLACIATED ICING CONDITIONS WORKSHOP TO DISCUSS THE FOLLOWING SUBJECTS: ICE ACCRETION PROCESS IN MIXED-PHASE AND GLACIATED CONDITIONS; CHARACTERIZATION OF MIXED-PHASE AND GLACIATED CONDITIONS; AND METHODS OF SIMULATING MIXED-PHASE AND GLACIATED ICING CONDITIONS. THE PROCEEDINGS FROM THE DECEMBER 1998 WORKSHOP WILL BE GIVEN TO THE ICE PROTECTION HARMONIZATION WORKING GROUP FOR DISCUSSION REGARDING THE POSSIBILITY OF DEVELOPING CERTIFICATION CRITERIA FOR FLIGHT IN THESE CONDITIONS.
2/16/2000	NTSB	THE SAFETY BOARD URGES THE FAA TO EXPEDITE THE ARAC WORK AND WOULD APPRECIATE ANY SIGNIFICANT UPDATES REGARDING PROPOSED REVISIONS TO THE ICING CERTIFICATION CRITERIA IN 14 CFR, PARTS 23 AND 25. PENDING THESE ACTIONS, A-96-54 IS CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."
10/16/2000	Addressee	Letter Mail Controlled 10/19/2000 3:19:55 PM MC# 2001561 The Ice Protection Harmonization Working Group (IPHWG) is continuing its efforts to define an icing environment that includes supercooled large droplets (SLD). The IPHWG began work on these tasks in February 1999. The IPHWG has received SLD data from the Federal Aviation Administration (FAA), National Aeronautics and Space Administration (NASA), Canada's Atmospheric Environment Service, and The Boeing Company. The FAA collected and consolidated SLD data from the atmosphere around the Great Lakes Region and existing SLD data and provided analyses of the SLD data to the IPHWG. The IPHWG will use these data to define an icing environment that includes SLD. The icing environment definition will support the development of a proposed icing regulation by the IPHWG. Presentations by the FAA's William J. Hughes Technical Center, NASA, Canada's Atmospheric Environment Service, and The Boeing Company on SLD analytical methods have been given to the IPHWG. The IPHWG has identified potential shortcomings of these analytical methods when applied to ice accretions, which form in SLD conditions. The IPHWG will consider potential shortcomings when determining an acceptable means to assess the ability of aircraft to operate safely in an icing environment either for the period of time to exit or to operate without restriction in SLD aloft and in SLD at or near the surface. The FAA provided a draft mixed?phase report to the IPHWG in September 1998. The final report was published in December 1998. Proceedings from the FAA?sponsored Mixed Phase and Glaciated Icing Conditions Workshop, which was held in December 1998, were published in July 1999 and subsequently provided to the IPHWG. The IPHWG will consider this information in determining the need for a rulemaking initiative to address mixed?phase conditions. The IPHWG anticipates having an adequate data set available define an atmosphere that includes SLD by February 2001. I will keep the Board informed of the FAA's progress on this safety recommendation.
3/26/2001	NTSB	The Safety Board is concerned about the pace at which the reported actions are being taken. In the 4 1/2 years since this recommendation was issued, the IPHWG (not the FAA) is only now moving to define an atmosphere that includes SLD. Considerable work remains to assess the ability of aircraft to operate safely in an icing environment and to determine the need for rulemaking to address mixed-phase conditions. Once the IPHWG issues its report and recommendations, more work remains for the FAA to implement any new regulations. The Safety Board urges the FAA to expedite this work. Pending issuance of the IPHWG's report and recommendations on an atmosphere that includes SLD, Safety Recommendation A-96-54 remains classified "Open--Acceptable Response."

Recommendation Report

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MODE:AVIATION KEYWORD 1:icing

8/22/2001	Addressee	Letter Mail Controlled 08/29/2001 3:49:24 PM MC# 2010693: The Aviation Rulemaking Advisory Committee's (ARAC) Ice Protection Harmonization Working Group is continuing its effort to define an icing environment that includes supercooled large droplets (SLD) and mixed phase conditions if they are more hazardous than the liquid phase. Sufficient data have been gathered to define the SLD environment for certification conditions. However, limited data available to the working group does not provide compelling evidence that mixed phase icing conditions are more hazardous than liquid phase icing environment. The FAA, in cooperation with the National Aeronautics and Space Administration, is supporting research on empirical data clarifying the effects of mixed phase icing conditions on thermal anti-icing energy requirements. Testing should occur in the spring 2002, and a report is expected by the end of 2002. This research is needed to determine whether rulemaking is needed to address mixed phase icing conditions. The original task to ARAC included airplanes certificated to 14 CFR Parts 23 and 25 standards. The task was revised in June 2000 to address 14 CFR Part 25 only. The FAA will promulgate similar 14 CFR Part 23 rules after completion of the 14 CFR Part 25 rulemaking. I will keep the Board informed of the FAA's progress on this safety recommendation.
1/27/2003	NTSB	Although the IPHWG appears to be making progress in responding to this recommendation, the Safety Board remains concerned about the slow pace of this work. The Board notes that the IPHWG's report is not scheduled for completion until sometime in 2003, about 6 1/2 years after the recommendation was issued, and then the FAA will still need to develop and issue any related regulatory amendments. The Board urges the FAA to act expeditiously on this recommendation. The Board would also appreciate the opportunity to review a draft copy of the contractor's report. Pending the revisions of 14 CFR Parts 23 and 25 and the expansion of the Appendix C design certification envelope, Safety Recommendation A-96-54 remains classified "Open--Acceptable Response."
5/19/2003	Addressee	Letter Mail Controlled 5/28/2003 2:42:21 PM MC# 2030262 In March 2002 the Aviation Rulemaking Advisory Committee (ARAC) approved a concept developed by the Ice Protection Harmonization Working Group for a 14 CFR Part 25 rule that includes regulatory requirements to demonstrate an airplane can safely operate in certain supercooled large droplets for an unrestricted time or can detect the supercooled large droplets environment and safely exit icing conditions. The Ice Protection Harmonization Working Group is continuing to develop its recommendations for a rule and the associated advisory material. Upon receipt of the recommendations, the Federal Aviation Administration (FAA) will determine the priority that should be assigned to this rulemaking project. In June 2002, research to clarify the effects of mixed phase icing conditions was completed. The report is expected during the second quarter of 2003. Upon receipt of the report, an evaluation will be made to determine if there is evidence that the mixed phase icing condition is more hazardous than the liquid phase icing environment.
9/15/2003	NTSB	Although the IPHWG appears to be making progress in responding to these recommendations, the Safety Board remains concerned about the slow pace of this work. The Board notes that the IPHWG's report is not scheduled for completion until more than 7 years after these recommendations were issued, after which the FAA will need more time to develop and issue any related regulatory amendments. The Board urges the FAA to give this rulemaking project a high priority. The Board would also appreciate the opportunity to review a draft copy of the report on mixed phase icing conditions. Pending the revisions of 14 CFR Parts 23 and 25 and the expansion of the Appendix C design certification envelope, Safety Recommendation A-96-54 remains classified "Open--Acceptable Response."
11/9/2004	NTSB	As part of its November 9, 2004 meeting addressing the Safety Board's Most Wanted List of safety improvements, the Board voted to reclassify this recommendation from "Open-Acceptable Response" to "Open-Unacceptable Response."

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MODE:AVIATION KEYWORD 1:icing

2/1/2005	Addressee	In its 2/1/2005 annual report to Congress, Regulatory Status of the National Transportation Safety Board's "Most Wanted" Recommendations to the Department of Transportation, the DOT wrote:The FAA's Aviation Rulemaking Advisory Committee's (ARAC's) Ice Protection Harmonization Working Group (IPHWG) approved a concept for a 14 CFR Part 25 rule that includes regulatory requirements to demonstrate an airplane can safely operate in super-cooled large droplets for an unrestricted time or can detect the super-cooled large droplets environment and safely exit icing conditions. The IPHWG is continuing to develop its recommendations for a rule and the associated advisory material. When the FAA receives the IPHWGs recommendations, the appropriate priority will be assigned to this rulemaking project. The FAA will promulgate similar 14 CFR Part 23 rules after completion of the 14 CFR Part 25 rulemaking. Additionally, research to clarify the effects of mixed phase icing conditions was completed, and a report issued in May 2003. The FAA is evaluating the report to determine whether the mixed phase icing condition is more hazardous than the liquid phase icing environment. An ARAC working group is examining engine icing events believed to have occurred in mixed-phase conditions to determine if there is a need to develop mixed-phase icing requirements for engine inlet (Part 25) and engines (Part 33).
10/26/2005	Addressee	Letter Mail Controlled 10/27/2005 2:12:40 PM MC# 2050501 Marion C. Blakey, Administrator, FAA, 10/26/05 The Aviation Rulemaking Advisory Committee's (ARAC) Ice Protection Harmonization Working Group is continuing to develop a revision to 14 CFR Part 25 that includes regulatory requirements to demonstrate an airplane can safely operate in certain supercooled large drop (SLD) conditions for an unrestricted time or can detect SLD and safely exit icing conditions. In 2002, the FAA sponsored research to clarify the effects of mixed-phase icing conditions. The results are documented in the final report entitled "Assessment of Effects of Mixed-Phase Icing Conditions on Thermal Ice Protection Systems" (DOT/FAA/AR-03/48), dated May 2003. The report is available at the FAA William J. Hughes Technical Center's full-text technical reports web page at actlibrary.tc.gov. The research examined unprotected airfoil surfaces, fully-evaporative systems, and running wet systems. The test results do not suggest that ice accretions on unprotected surfaces in mixed-phase clouds would be more hazardous that those in a pure liquid phase icing environment. For fully-evaporative thermal systems the power required in mixed-phase and glaciated conditions was lower than for purely liquid clouds. This may be attributed to ice particles bouncing from the surface and loss of water due to splashing. Also, the additional heat energy required for melting the adhering ice crystal is minor when compared with the much larger heat energy required for a fully-evaporative thermal ice protection system. For running-wet systems the local power density required at the stagnation areas was higher for mixed phase conditions. The additional local power density is required to melt ice crystals that adhere along the stagnation line of protected surfaces. However, the overall power required was virtually the same for all-liquid and mixed-phase conditions. Although the research raises some questions with regard to running wet systems, there is no history of airframe ice protection system problems in mixed-phase conditions. Therefore, the FAA does not find compelling evidence to include mixed-phase icing conditions in the certification requirements for airframe ice protections systems. An ARAC working group is, however, examining engine icing events believed to have occurred in mixed-phase conditions to determine if there is a need to develop mixed-phase icing requirements for engine inlets (14 CFR Part 25) and engines (14 CFR Part 33). I will keep the Board informed of the FAA's progress on this safety recommendation
3/1/2006	NTSB	In its 3/1/2006 annual report to Congress, Regulatory Status of the National Transportation Safety Board's "Most Wanted" Recommendations to the Department of Transportation, the DOT wrote: The FAA's Aviation Rulemaking Advisory Committee's (ARAC's) Ice Protection Harmonization Working Group (IPHWG) is developing 14 CFR Parts 25 and 33 rules that include regulatory requirements to demonstrate an airplane can safely operate in super-cooled large droplets for an unrestricted time or can detect the super-cooled large droplet environment and safely exit icing conditions. For Part 33 there will also be recommendations for mixed-phase icing rulemaking. The FAA anticipates receiving the ARAC recommendations in 2006. The FAA will promulgate similar 14 CFR Part 23 rules after completion ofthe 14 CFR Part 25 rulemaking.

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MODE:AVIATION KEYWORD 1:icing

5/10/2006 NTSB

The Safety Board appreciates the FAA's summary of the research results from its project to clarify the effects of mixed-phase icing conditions, as documented in the final report titled "Assessment of Effects of Mixed-Phase Icing Conditions on Thermal Ice Protection Systems" (DOT/FAA/AR-03/48), dated May 2003. The Safety Board notes that the FAA's Aviation Rulemaking Advisory Committee's (ARAC's) Ice Protection Harmonization Working Group (IPHWG) is continuing to develop a revision to Part 25 to require a demonstration that an airplane can safely operate in supercooled large drop (SLD) conditions for an unrestricted time or can detect SLD and safely exit icing conditions.

Although the work of the IPHWG is responsive to this recommendation, it is proceeding at an unacceptably slow pace. There does not appear to have been any progress since the FAA previously informed the Board of the status of this recommendation on September 15, 2003. The Board notes that this recommendation is 9 1/2 years old, and the FAA has not yet received the recommendations from the IPHWG, let alone prepared regulatory analyses, issued the NPRM, analyzed comments, or completed the many other tasks involved in issuing new regulations. The Safety Board has previously advised the FAA that the pace of progress on this recommendation is not acceptable. The Board continues to investigate accidents where icing was a consideration, including current investigations of (1) a Cessna 560 which crashed while on approach to Montrose, Colorado, on February 16, 2005, killing eight people and (2) a Bombardier Challenger CL-600 which crashed during takeoff from Montrose, Colorado, on November 28, 2004, killing three people and seriously injuring three other people. In addition, the Board is participating in the investigation of a November 21, 2004, crash during takeoff of a Bombardier RJ200 in Baotou, China, resulting in 53 fatalities. Icing is being investigated as a significant factor that may have caused all three accidents.

The Board notes that although this recommendation specifically asks for action for both Part 23 and Part 25 airplanes, the FAA's activities to date have been only for Part 25 airplanes. Pending development and issuance of regulatory requirements for both Part 23 and Part 25 airplanes to demonstrate that they can safely operate in SLD conditions for an unrestricted time or can detect the SLD environment and safely exit icing conditions, Safety Recommendation A-96-54 remains classified "Open-Unacceptable Response."

Recommendation Report

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MODE:AVIATION KEYWORD 1:icing

2/27/2007 NTSB

The Safety Board has previously identified concerns about inadequate flight test certification requirements. For example, it was revealed during the investigation for the October 31, 1994, accident involving American Eagle flight 4184 in which the airplane crashed during a rapid descent after an uncommanded roll excursion during icing conditions16 that SLD conditions can cause ice accretions that are more aerodynamically detrimental than those accretions that fall within the Part 25, Appendix C envelope.17 As a result, the Board issued Safety Recommendation A-96-54, which asked the FAA to do the following:

Revise the icing criteria published in 14 Code of Federal Regulations Parts 23 and 25, in light of both recent research into aircraft ice accretion under varying conditions of liquid water content, drop size distribution, and temperature, and recent developments in both the design and use of aircraft. Also, expand the Appendix C icing certification envelope to include freezing drizzle/freezing rain and mixed water/ice crystal conditions, as necessary.

Further, icing tunnel tests conducted as part of the Comair flight 3272 accident investigation indicated that the effects of ice accretion on airplane performance could vary widely depending on the size, distribution, and type of ice accumulated on the airplane's surfaces. However, the Board learned that manufacturers are not required to demonstrate an airplane's flight handling characteristics or stall margins using thin, rough ice that can accrete on protected surfaces before the activation of the deice boot system or between activation cycles. As a result of its findings, the Board issued Safety Recommendation A-98-92, which asked the FAA (in cooperation with the National Aeronautics and Space Administration and other interested aviation organizations) to do the following:

[C]onduct additional research to identify realistic ice accumulations, to include intercycle and residual ice accumulations and ice accumulations on unprotected surfaces aft of the deicing boots, and to determine the effects and criticality of such ice accumulations; further, the information developed through such research should be incorporated into aircraft certification requirements and pilot training programs at all levels.

The Safety Board also issued Safety Recommendation A-98-100, which asked the FAA to review the icing certification of all turbopropeller-driven airplanes currently certificated for operation in icing conditions, perform additional testing, and take action as required to ensure that these airplanes fulfill the requirements of the revised icing certification standards asked for in Safety Recommendation A-98-92.

The FAA indicated in a March 6, 2006, response to Safety Recommendation A-96-54 that the ARAC IPHWG is continuing to develop a revision to Part 25 to require a demonstration that an airplane can safely operate in SLD conditions for an unrestricted time or can detect SLD and safely exit icing conditions. However, the FAA has still not received the recommendations from the IPHWG, prepared regulatory analyses, issued the NPRM, analyzed comments, or completed the many other tasks involved in issuing new regulations.

The FAA indicated in an October 26, 2005, response to Safety Recommendation A-98-92 that it had completed and would shortly issue a draft revision to AC 20-73, which included the certification guidance on determining critical ice shapes, descriptions of intercycle and residual ice accretions, and the aerodynamic penalties associated with these ice shapes. Although the FAA issued AC 20-73A on August 16, 2006, it has still not provided the Safety Board with information regarding any new research conducted in response to this recommendation.

Regarding Safety Recommendation A-98-100, the FAA issued a notice of proposed rulemaking (NPRM) in November 2005, which proposed to expand 14 CFR Part 25 to include specific certification requirements for airplane performance or handling qualities for flight in icing conditions and to specify the ice accumulations that must be considered for each phase of flight. Further, the FAA proposed changes to AC 25-1X, which intended to provide guidance for implementing the regulations proposed in the NPRM.

In May 2006, the Safety Board expressed concern that, although it agreed with the proposed regulatory changes, the FAA had not applied the new standards to all in-service turbopropeller-driven aircraft. The FAA further indicated that no airplanes have an unsafe condition in icing environments despite a number of accidents in the 1990s that involved airplanes that had passed the certification standards. The Board stated that, to meet the intent of Safety Recommendation A-98-100, the FAA would need to formally evaluate (perhaps by conducting flight tests) all in-service turbopropeller-driven aircraft to ensure that these aircraft comply with all current icing certification criteria for new aircraft. The Board asked the FAA to provide a list of the aircraft that it had formally evaluated and a summary of the findings and resultant actions. To date, this information has not been received. The circumstances of the Comair flight 3272, American Eagle 4184, and Pueblo accidents and the icing tunnel test data show that the ice shapes used during initial certification flight tests were not adequate because the tests did not account for thin, rough ice on the wing. The 1996 ice shapes

tests on the Cessna 560 were also inadequate because, although tests were conducted with ice shapes on the protected surfaces, tests were not conducted using thin, rough ice. Therefore, additional ice sizes, distribution patterns, and types need to be considered during flight testing to more adequately gauge an airplane's performance in icing conditions.

The Safety Board concludes that existing flight test certification requirements for flight into icing conditions do not test the effects of thin, rough ice on or aft of an airplane's protected surfaces, which can cause severe aerodynamic penalties. The circumstances of this accident clearly show that the actions requested in Safety Recommendations A-96-54 and A-98-92 are needed to improve the safety of all airplanes operating in icing conditions. Therefore, the Safety Board reiterates Safety Recommendations A-96-54 and A-98-92.

Recommendation # A-96-055

Overall Status
CAAA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FAA: REVISE THE FEDERAL AVIATION REGULATIONS (FARS) ICING CERTIFICATION REQUIREMENTS & ADVISORY MATERIAL TO SPECIFY THE NUMERICAL METHODS TO BE USED IN DETERMINING MEDIAN VOLUMETRIC DIAMETER (MVD) & LIQUID WATER CONTENT (LWC) DURING CERTIFICATION TESTS.

FAA	Closed - Acceptable Alternate Action	2/16/2000

10/30/1996	Addressee	THE FAA PLANS TO PROVIDE ADVISORY MATERIAL REGARDING THE MEDIAN VOLUMETRIC DIAMETER & LIQUID WATER CONTENT & WILL CIRCULATE REPRESENTATIVE DROPSIZE INSTRUMENT OUTPUT DATA TO RESEARCH ORGANIZATIONS FOR PROCESSING. PENDING THE AVAILABILITY OF FUNDS, THE PROJECT WILL BE COMPLETED BY THE FALL OF 1997.
8/20/1997	NTSB	THE BOARD UNDERSTANDS THAT ANY FURTHER FAA ACTION ON THIS ISSUE WILL BE ADVISORY RATHER THAN REGULATORY SO THAT FUTURE TECHNOLOGY IMPROVEMENTS CAN BE QUICKLY IMPLEMENTED. PENDING RECEIPT & REVIEW OF THE PROPOSED ADVISORY MATERIAL, THE BOARD CLASSIFIES A-96-55 "OPEN--ACCEPTABLE RESPONSE."
7/1/1998	Addressee	(Letter Mail Controlled 7/7/98 4:01:11 PM MC# 980846) THE FAA IS CONTINUING ITS RESEARCH EFFORT TO DEVELOP ADVISORY MATERIAL REGARDING THE COMPUTATION OF MEDIAN VOLUMETRIC DIAMETER & LIQUID WATER CONTENT. THE FOLLOWING IS A STATUS UPDATE OF THE RESEARCH PROGRAMS: THE NATIONAL AERONAUTICS & SPACE ADMINISTRATION'S LEWIS RESEARCH CENTER & CANADA'S ATMOSPHERIC ENVIRONMENT SERVICE ARE WORKING TOGETHER TO DEVELOP PROCESSING GUIDELINES FOR INSTRUMENT (OR COMBINATIONS OF INSTRUMENTS) COMMONLY USED BY RESEARCH ORGANIZATIONS TO MEASURE SLD CONDITIONS. THE INITIAL PROCESSING GUIDELINES FOR RESEARCH ARE EXPECTED TO BE COMPLETED IN SUMMER 1998. SOME RESEARCH ORGANIZATIONS PLAN TO TEST VARIOUS INSTRUMENTS IN ICING WIND TUNNELS TO COMPARE THE DROPLET SPECTRA DETERMINED BY THE DIFFERENT INSTRUMENTS. TESTING IS PLANNED TO OCCUR IN THE FALL OF 1998. I WANT TO ADD THAT THE ABOVE RESEARCH PROGRAMS ARE NOT CONTROLLED BY THE FAA & ARE SUBJECT TO CHANGE, & THE MILESTONE SCHEDULES ARE BASED ON THE BEST AVAILABLE DATA AT THIS TIME. THE FAA IS REEVALUATING THE NEED TO CIRCULATE REPRESENTATIVE DROPSIZE INSTRUMENT OUTPUT DATA FOR PROCESSING BY RESEARCH ORGANIZATIONS. THE FAA IS CONTINUING TO DEVELOP ADVISORY MATERIAL RELATED TO THE COMPUTATION OF MEDIAN VOLUMETRIC DIAMETER & LIQUID WATER CONTENT FROM ANY DROPSIZE SPECTRUM. THE FAA PLANS TO INCORPORATE THIS MATERIAL IN THE NEXT REVISION OF THE FAA AIRCRAFT ICING HANDBOOK.
11/9/1998	NTSB	THE BOARD UNDERSTANDS THAT THESE RESEARCH PROGRAMS ARE NOT CONTROLLED BY THE FAA & ARE SUBJECT TO CHANGE & THAT THE SCHEDULES ARE BASED ON THE BEST AVAILABLE DATA AT THIS TIME. THE BOARD ALSO REALIZES THAT THE DEVELOPMENT OF APPROPRIATE INSTRUMENTATION WILL REQUIRE SIGNIFICANT EFFORT BY SEVERAL AGENCIES. WE ENCOURAGE THE FAA TO CLOSELY MONITOR THESE PROGRAMS & MAINTAIN ITS INITIATIVE. PENDING THE COMPLETION OF THE RESEARCH & SUBSEQUENT CHANGES TO ADVISORY MATERIALS & CERTIFICATION REQUIREMENTS, A-96-55 IS CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."

Recommendation Report

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4/15/1999	Addressee	Letter Mail Controlled 4/21/99 4:25:45 PM MC# 990438 THE FAA IS CONTINUING ITS EFFORT TO DEVELOP ADVISORY MATERIAL REGARDING THE COMPUTATION OF MEDIAN VOLUMETRIC DIAMETER AND LIQUID WATER CONTENT. THE FAA HAS COMPLETED ADVISORY MATERIAL RELATED TO THE COMPUTATION OF MEDIAN VOLUMETRIC DIAMETER AND LIQUID WATER CONTENT FROM A DROPSIZE SPECTRUM. I HAVE ENCLOSED A COPY OF THE ADVISORY MATERIAL FOR THE BOARD'S INFORMATION. THIS INFORMATION WILL BE INCLUDED IN THE NEXT REVISION OF THE FAA AIRCRAFT ICING HANDBOOK. IN AN EFFORT TO MAKE THE HANDBOOK MORE READILY AVAILABLE, REVISIONS WILL BE PLACED ON THE FAA TECHNICAL CENTER WEBSITE. YOU MAY ACCESS THE WEBSITE AT THE FOLLOWING ADDRESS: HTT,Q://WW.AS,Q.TC.FAA.GOV/FAATC/AAR420/EAIHB/INDEX.HTML. THE FAA ANTICIPATES PLACING THE FINAL ADVISORY MATERIAL ON THE WEBSITE IN SPRING 1999. COPIES OF THE REVISIONS WILL BE AVAILABLE FOR HANDBOOK OWNERS WHO DO NOT HAVE ACCESS TO THE WEBSITE. THE ENCLOSED ADVISORY MATERIAL ADDRESSES THE FULL INTENT OF THIS SAFETY RECOMMENDATION. CONSEQUENTLY, I CONSIDER THE FAA'S ACTION IN RESPONSE TO THIS RECOMMENDATION TO BE COMPLETED.
2/16/2000	NTSB	THE SAFETY BOARD HAS REVIEWED THE FAA'S ADVISORY MATERIAL REGARDING THE NUMERICAL METHODS TO BE USED IN DETERMINE MVD AND LWC FROM A DROP-SIZE SPECTRUM. BECAUSE THIS MATERIAL IS RESPONSIVE TO A-96-55, IT IS CLASSIFIED "CLOSED--ACCEPTABLE ALTERNATE ACTION." ALTHOUGH THE SAFETY BOARD IS CLOSING A-96-55 BASED ON THE FAA'S NEW ADVISORY MATERIAL, THE SLD INSTRUMENT RESEARCH BEING PERFORMED BY NASA AND OTHER AGENCIES IS LIKELY TO PROVIDE ADDITIONAL IMPORTANT INFORMATION REGARDING THE NUMERICAL METHODS USED TO DETERMINE MVD AND LWC DURING ICING CERTIFICATION TESTS, PARTICULARLY WHEN LARGER DROPS AND WARMER TEMPERATURES ARE PRESENT. THE SAFETY BOARD ENCOURAGES THE FAA TO REVIEW AND USE THE RESULTS OF SUCH RESEARCH TO UPDATE ADVISORY MATERIAL AS APPROPRIATE.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Recommendation # A-96-056

Overall Status
OUA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FAA: REVISE THE ICING CERTIFICATION TESTING REGULATION TO ENSURE THAT AIRPLANES ARE PROPERLY TESTED FOR ALL CONDITIONS IN WHICH THEY ARE AUTHORIZED TO OPERATE, OR ARE OTHERWISE SHOWN TO BE CAPABLE OF SAFE FLIGHT INTO SUCH CONDITIONS. IF SAFE OPERATIONS CANNOT BE DEMONSTRATED BY THE MANUFACTURER, OPERATIONAL LIMITATION SHOULD BE IMPOSED TO PROHIBIT FLIGHT IN SUCH CONDITIONS & FLIGHTCREWS SHOULD BE PROVIDED WITH THE MEANS TO POSITIVELY DETERMINE WHEN THEY ARE IN ICING CONDITIONS THAT EXCEED THE LIMITS FOR AIRCRAFT CERTIFICATION.

FAA	Open - Unacceptable Response

10/30/1996	Addressee	CURRENT REGULATIONS ENSURE THAT AIRPLANES ARE SAFE FOR OPERATION IN ICING CONDITIONS THROUGH A THOROUGH EVALUATION USING NUMERICAL ANALYSIS TECHNIQUES, SIMULATED ICING TESTS, DRY-AIR & ARTICIFICAL ICE SHAPE TESTING, & TESTING IN NATURAL ICING CONDITIONS DEFINED BY THE ENVELOPES IN APPENDIX C IN 14 CFR PART 25. THESES ARE THE ONLY ICING CONDITIONS IN WHICH THE AIRPLANES HAVE BEEN CERTIFIED FOR OPERATION & HAVE BEEN DEMONSTRATED TO BE SAFE BY COUNTLESS OPERATIONS . THEREFORE THE FAA DOES NOT BELIEVE THAT THE ICING CERTIFICATION REGULATIONS NEED TO BE CHANGED FOR OPERATION IN ICING CONDITIONS DEFINED BY APPENDIX C. THE FAA ACKNOWLEGES THAT AIRPLANES MANY ENCOUNTER ICING CONDITIONS NOT DEFINED IN APPENDIX C &, AS PREVIOUSLY MENTIONED IN A-96-54, THE FAA IS TAKING STEPS TO PROVIDE CERTIFICATION CRITERIA FOR THOSE CONDITIONS. THE FAA WILL TASK THE ARAC WITH PROJECT TO DEVELOP CERTIFICATION CRITERIA FOR SAFE OPERATION OF AIRPLANES IN SUPERCOOLED LIQUID WATER DROPLETS AT OR NEAR THE SURFACE & IN MIXED-PHASE CONDITIONS IF SUCH CONDITIONS ARE DETERMINED TO BE MORE HAZARDOUS THAN THE LIQUID PHASE ICING ENVIRONMENT CONTAINING SUPERCOOLED WATER DROPLETS. THE ARAC WILL ALSO BE TASKED TO CONSIDER DEVELOPMENT OR A REGULATION THAT REQUIRES THE INSTALLATION OF ICE DETECTERS, AERODYNAMIC PERFORMANCE MONITORS, OR ANOTHER ACCEPTABLE MEANS TO WARN FLIGHTCREWS OF ICE ACCUMULATION ON CRITICAL SURFACES REQUIRING CREW ACTION. THE FAA WILL INITIATE APPROPRIATE ACTIONS REQUIRING CERTAIN AIRCRAFT TO EXIT ICING CONDITIONS WHEN SPECIFIC VISUAL ICING CUES ARE OBSERVED. THE ACTIONS THAT FAA IS CONTEMPLATING WILL BE ACCEPTABLE TO THOSE AIRCRAFT WITH PNEUMATIC DEICING BOOTS & UNPOWERED AILERONS THAT WERE NOT COVERED BY THE ICING AD'S ISSUED ON 4/24/96. GIVEN THE ABSENCE OF ADVANCED TECHNOLOGY, THE FAA DOES NOT BELIEVE AN ADQUATE MEANS EXISTS THAT WOULD PROVIDE PILOTS WITH THE TOOLS TO DETERMINE POSITIVELY WHERE ICING CONDITIONS EXIST THAT EXCEED THE LIMITS OF THE AIRCRAFT CERTIFICATION. CONSEQUENTLY, THE FAA CANNOT STRICTLY COMPLY WITH THIS ASPECT OF THE RECOMMENDATION. HOWEVER, THE FAA BELIEVES THAT THE INTENT OF THIS RECOMMENDATION IS MET WITH CURRENT TESTING, THE ADDITIONAL SUPERCOOLED LARGE DROPLET TESTING, THE CURRENT AIRPLANE FLIGHT MANUAL GUIDANCE CONCERNING THE EXISTING ICING CONDITIONS, THE INFO ON THE IDENTIFICATION & THE PROPOSED ARAC TASKS.
8/20/1997	NTSB	THE BOARD CONCLUDED THAT SUCH DEVICES WOULD PROVIDE A RELIABLE MEANS FOR FLIGHTCREWS TO ASSESS IN-FLIGHT ICING CONDITIONS TO POSITIVELY DETERMINE WHEN THEY ARE FLYING IN INCING CONDITIONS THAT MAY BE BEYOND THE AIRPLANE'S CAPABILITIES OR EXCEED CERTIFICATION LIMITS. SUCH DEVICES WOULD ALSO HELP ELIMINATE MUCH OF THE UNCERTAINTY & INADEQUACIES ASSOCIATED WITH THE SUBJECTIVE VISUAL CUE "DETECT-&-EXIT" PHILOSOPHY USED IN THE FAA'S 18 ICING ADS. THE BOARD WILL CONTINUE TO MONITOR THE FAA'S PROGRESS ON THESE ISSUES. THEREFORE PENDING THE COMPLETION OF THE PLANNED FAA ACTIONS & THE FAA'S RECONSIDERATION OF THE ISSUE OF PROHIBITION OF FLIGHT IN ICING CONDITIONS OUTSIDE CERTIFICATION LIMITED BASED ON THE USE OF ICE DETECTION DEVICES FOR "DETECT-& EXIT" CAPABILITY, A-96-56 IS CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

4/15/1999	Addressee	Letter Mail Controlled 4/21/99 4:25:45 PM MC# 990438 THE FAA'S LETTER DATED 10/30/96, RESPONDED TO THE PORTION OF THE RECOMMENDATION THAT ASKED THAT OPERATIONAL LIMITATIONS BE IMPOSED TO PROHIBIT FLIGHT IN SUCH CONDITIONS. THE FAA ASSUMED THAT THIS MEANT THAT THE AIRPLANE MUST NEVER BE EXPOSED TO ICING CONDITIONS FOR WHICH IT HAS NOT BEEN CERTIFICATED. IN OTHER WORDS, THERE WOULD HAVE TO BE A MEANS TO ASSESS WHETHER THE ICING CONDITIONS THAT THE AIRPLANE HAD NOT YET ENCOUNTERED EXCEEDS THE ICING CONDITIONS FOR WHICH THE AIRPLANE HAD BEEN CERTIFICATED. THE FAA'S OCTOBER 1996 LETTER DISCUSSED THE INADEQUACY OF TECHNOLOGY TO ACCOMPLISH REMOTE DETECTION AND ACCURATE ASSESSMENT OF THE ICING CONDITIONS. AFTER REVIEWING THE BOARD'S LETTER DATED 8/20/97, IT WAS CLEAR THE BOARD'S INTENT WAS TO RECOMMEND RULEMAKING FOR A "DETECT-AND-EXIT" PHILOSOPHY. IN OTHER WORDS, THE FLIGHTCREW WILL ENTER ICING CONDITIONS THEN DETERMINE IF THEY MAY REMAIN IN THE CONDITION OR EXIT THE CONDITION. THE FAA'S TASKING STATEMENT FOR THE ARAC ICE PROTECTION HARMONIZATION WORKING GROUP ADEQUATELY ADDRESSES THE "DETECT-AND-EXIT" PHILOSOPHY. THE TASKING STATEMENT STATES, IN PART, THAT THE WORKING GROUP SHALL "CONSIDER THE NEED FOR A REGULATION THAT REQUIRES INSTALLATION OF ICE DETECTORS, AERODYNAMIC PERFORMANCE MONITORS, OR OTHER ACCEPTABLE MEANS TO WARN CREWS OF ICE ACCUMULATION ON CRITICAL SURFACES AND REQUIRE CREW ACTION (REGARDLESS OF WHETHER THE ICING CONDITIONS ARE INSIDE OR OUTSIDE APPENDIX C OF 14 CFR PART 25)." THE ICE PROTECTION HARMONIZATION WORKING GROUP HELD ITS FIRST MEETING IN FEBRUARY 1998. AFTER A THOROUGH REVIEW OF THE ICING-RELATED ACCIDENT AND INCIDENT HISTORY, THE WORKING GROUP HAS DETERMINED THAT, FOR CERTAIN AIRPLANE TYPES, THERE IS A NEED FOR SUCH AN OPERATIONS REGULATION. THE WORKING GROUP ANTICIPATES PRODUCING A PROPOSED OPERATIONS RULE FOR ARAC APPROVAL IN FALL 1999. THE FAA'S OCTOBER 1996 LETTER IDENTIFIED TWO INTERIM ACITONS WHILE WAITING FOR THE ARAC PROCESS TO BE COMPLETED. THE FOLLOWING IS AN UPDATED STATUS OF THOSE INTERIM ACTIONS: ISSUED AIRWORTHINESS DIRECTIVE (AD) 98-04-38 ON 2/6/98, WHICH IS SIMILAR TO THE 18 ICING-RELATED AD'S ISSUED ON 4/24/96. AD 98-04-38 REFERENCES 23 OTHER SIMILAR AD'S THAT WERE ISSUED SIMULTANEOUSLY. BOTH SETS OF AD'S REQUIRE CERTAIN AIRCRAFT TO EXIT ICING CONDITIONS WHEN SPECIFIC VISUAL ICING CUES ARE OBSERVED. THE FIRST SET OF 18 AD'S FOCUSED ON AIRCRAFT USED IN REVENUE PASSENGER CARRYING AIRCRAFT. THE SECOND SET OF 23 AD'S ADDRESSED ALL 14 CFR PART 25 AIRPLANES AND MANY 14 CFR PART 23 AIRPLANES WITH NON-POWERED ROLL CONTROLS AND PNEUMATIC DEICING BOOTS. A COPY OF AD 98-04-38 IS ENCLOSED FOR THE BOARD'S INFORMATION. ON 7/23/97, FAA DISTRIBUTED A MEMORANDUM TO ALL AIRCRAFT CERTIFICATION OFFICES IDENTIFYING THE POTENTIAL FOR AN UNSAFE CONDITION OF ROLL UPSET DUE TO ICING INVOLVING SUPERCOOLED LARGE DROPLETS. THE AIRCRAFT CERTIFICATION OFFICES WERE INSTRUCTED TO EVALUATE NEW TYPE CERTIFICATES ON 14 CFR PARTS 23 AND 25 AIRCRAFT EQUIPPED WITH PNEUMATIC DEICING BOOTS AND NON-POWERED ROLL CONTROL SYSTEMS. THE EVALUATION SHOULD ALSO BE APPLIED TO SIMILARLY EQUIPPED AIRCRAFT IF THE AMENDED OR SUPPLEMENTAL TYPE CERTIFICATE PROGRAMS INVOLVE ICING APPROVAL, INSTALLATION OF, OR SIGNIFICANT MODIFICATIONS TO, THE WING ICE PROTECTION SYSTEMS. A COPY OF THE MEMORANDUM IS ALSO ENCLOSED FOR THE BOARD'S INFORMATION.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

2/16/2000	NTSB	THE SAFETY BOARD EXPECTED THE FAA TO ENSURE THAT ALL AIRCRAFT ARE PROPERLY CERTIFIED FOR ALL ICING CONDITIONS IN WHICH THEY ARE AUTHORIZED TO OPERATE (INCLUDING THE WARM BOUNDARIES OF THE FAR 25 APPENDIX C ENVELOPE WHERE WORST-CASE ICE SHAPES, RUNBACK ICING, AND ICE SHEDDING/SLIDING CAN OCCUR) TO PROHIBIT FLIGHT IN ALL UNCERTIFIED ICING CONDITIONS AND TO IMPLEMENT THE BEST MEANS OF PILOT IDENTIFICATION OF UNCERTIFIED ICING CONDITIONS. THE SAFETY BOARD'S INTENTION WAS FOR THE FAA TO EXAMINE ALL OPTIONS FOR PREVENTING FLIGHT IN ICING CONDITIONS THAT EXCEED CERTIFICATION LIMITS. THE BOARD RECOGNIZES THAT REMOTE SENSING OF ICING LEVELS IS NOT POSSIBLE WITH PRESENT OR FUTURE TECHNOLOGY; THEREFORE, THE BOARD BELIEVES THAT A "DETECT AND EXIT" PHILOSOPHY IS NECESSARY. THE SAFETY BOARD'S 8/20/97, LETTER REGARDING THIS RECOMMENDATION FURTHER CLARIFIED ITS INTENT BY STATING THAT THE ON BOARD ICE DETECTION DEVICES RECOMMENDED IN A-96-69 SHOULD, IF AND WHEN THEY BECOME AVAILABLE, BE USED TO AUGMENT THE VISUAL CUES CURRENTLY USED ON SOME AIRCRAFT FOR PILOT IDENTIFICATION OF UNCERTIFIED ICING CONDITIONS. THE FAA AND ARAC RESPONSE TO THE OPERATIONAL LIMITATIONS PORTION OF THIS RECOMMENDATION APPEARS TO HAVE FOCUSED ONLY ON TURBOPROPS WITH DEICE BOOTS AND UNPOWERED ROLL CONTROL SYSTEMS; HOWEVER, THIS RECOMMENDATION APPLIES TO ALL AIRCRAFT, NOT JUST TURBOPROPS WITH DEICE BOOTS AND UNPOWERED ROLL CONTROL SYSTEMS. ALTHOUGH HISTORICAL INCIDENT AND ACCIDENT DATA MAY NOT SHOW THAT OTHER TYPES OF AIRCRAFT HAVE HAD PROBLEMS OPERATING IN UNCERTIFIED ICING CONDITIONS, THAT RECORD ALONE DOES NOT PROVIDE AN ADEQUATE BASIS TO EXCLUDE THEM FROM OPERATIONAL LIMITATIONS. THE BOARD IS CONCERNED THAT THE LACK OF OPERATIONAL LIMITATIONS FOR AIRCRAFT NOT AFFECTED BY THE FAA AD'S ESSENTIALLY AUTHORIZES THEIR FLIGHT IN UNCERTIFIED ICING CONDITIONS (SUCH AS FREEZING DRIZZLE AND FREEZING RAIN). THE FAA'S RESPONSES TO DATE HAVE ALSO NOT MENTIONED ANY PLANS TO ADDRESS THE ISSUE OF INADEQUATE CERTIFICATION FOR THE WARM BOUNDARIES OF THE APPENDIX C ICING ENVELOPE (FOR EXAMPLE, THE TYPICAL LACK OF CERTIFICATION FLIGHT TEST DATA POINTS NEAR OR ALONG THOSE BOUNDARIES). ACCORDINGLY, THE SAFETY BOARD BELIEVES THE FAA SHOULD REVISIT ITS PLANS TO ADDRESS THE FULL SCOPE OF THIS RECOMMENDATION. WITH OVER 3 YEARS HAVING ELAPSED SINCE THIS RECOMMENDATION WAS ISSUED, THE BOARD URGES THE FAA TO ACT ON THIS RECOMMENDATION AS RAPIDLY AS POSSIBLE. PENDING THE FAA'S ISSUANCE OF APPROPRIATE REGULATORY AND/OR ADVISORY MATERIAL CHANGES, A-96-56 IS CLASSIFIED AS "OPEN--ACCEPTABLE RESPONSE."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

10/16/2000 Addressee Letter Mail Controlled 10/19/2000 3:19:55 PM MC# 2001561 The FAA has outlined a number of actions taken or initiated in previous letters to the Board on this safety recommendation. However, on February 16, 2000, the Board stated that the FAA and ARAC response to the operational limitations portion of this safety recommendation appears to have focused on turboprops with deice boots and unpowered roll control systems. The Board emphasized that this portion of the safety recommendation applies to all aircraft. The Board also stated that the FAA's previous responses did not mention any plans to address inadequate certification for the warm boundaries of the Appendix C icing envelope. The Board asked that the FAA revisit its plans to address the full scope of this safety recommendation. The Board classified this safety recommendation in an "open acceptable" status pending further response. Regarding the Board's first concern, the airworthiness directives (AD) discussed in the FAA's letters to the Board dated October 30, 1996, and April 15, 1999, address airplanes equipped with deicing boots and unpowered roll control. This group of airplanes was addressed as a priority because the flightcrew of an airplane having an unpowered roll control system must rely solely on physical strength to counteract roll control anomalies. A roll control anomaly that occurs on an airplane having a powered roll control system is offset by the flightcrew with powered assistance. Federal Aviation Regulations require that the FAA make a finding of an unsafe condition before an AD may be issued. The FAA is unaware of a justification that would allow it to make this finding for all airplanes. Therefore, the FAA does not plan on issuing AD's against airplanes that are not equipped with unpowered roll controls and pneumatic deicing boots. I would like to add that in response to Safety Recommendation A-96-54, the FAA is taking actions to expand the certification atmospheric icing conditions through the ARAC process. The resulting icing conditions will be applicable to all airplanes. The FAA does not agree that the lack of operational limitations for airplanes not affected by the AD's authorizes flight in uncertified icing conditions like freezing drizzle and freezing rain. The AD's provide the flightcrew with recognition cues and procedures for exiting from severe icing conditions. The emphasis of the AD's is on severe icing??not freezing drizzle and freezing rain. The Aeronautical Information Manual (AIM) defines severe icing as follows: "The rate of accumulation is such that the deicing/anti?icing equipment fails to reduce or control the hazard. Immediate flight diversion is necessary." The absence of an AD does not negate the information contained in the AIM. With regard to the ARAC effort, the FAA tasked the ARAC to consider the need for a regulation that requires installation of ice detectors, aerodynamic performance monitors, or other acceptable means to warn flightcrews of ice accumulation on critical surfaces and require crew action. The ARAC has identified the need for such a device for certain airplanes, and the FAA is drafting a rule. It is anticipated that the draft rule will be completed by the end of this year. While the ARAC IPHWG has found the need for such a device only on certain airplanes, the FAA believes it is premature to draw conclusions on what the FAA might do. The ARAC has yet to provide any recommendations to the FAA, and working group positions are not necessarily ARAC positions. The FAA also does not agree that detecting and exiting from all conditions, which are not defined by the icing envelope of Appendix C, is warranted. The envelopes are defined by many parameters, including liquid water content, mean effective drop diameter, horizontal extent, temperature, and altitude. Exceeding one of the parameters does not automatically constitute an unsafe condition that must be exited. The FAA believes that it is more important to understand when the airplane is in icing conditions that could result in the inability of the aircraft to operate safely. For example, the mean effective droplet diameter may be within the limits defined by Appendix C, but the droplet distribution could contain large droplets that can impinge behind the protected surfaces. Even though the mean effective droplet diameter is within the limits of Appendix C, there could be ice accretions that can result in the inability of the airplane to operate safely. Requiring an airplane to exit icing conditions simply based on the mean effective drop diameter would not be appropriate. For this reason, the FAA tasked ARAC to consider the need for a regulation that requires the installation of ice detectors, aerodynamic performance monitors, or other acceptable means to warn flightcrews of ice accumulation on critical surfaces and to require flightcrew action, regardless of whether the icing conditions are inside or outside of Appendix C limits. The Board's second concern is that the FAA has not addressed inadequate certification for the warm boundaries of the Appendix C icing envelope. In response, warm icing boundaries are included in the icing cloud envelopes of 14 CFR Part 25, Appendix C, and are addressed during certification. As discussed in the FAA's letter to the Board dated October 30, 1996, the current icing certification regulations ensure that airplanes are safe for operation in icing conditions. This is accomplished through a thorough evaluation using analysis techniques, simulated icing conditions testing methods including icing wind tunnels and icing tankers, dry?air and artificial ice shape flight testing, and flight testing in natural icing conditions within the icing cloud envelopes of 14 CFR Part 25, Appendix C. For ice protected surfaces, 14 CFR 25.1419 requires that the airplane or its components be flight tested in the various operational configurations, in measured natural atmospheric icing conditions and, as found necessary, by other means (i.e., laboratory dry air or simulated icing test and dry air flight test) to verify ice protection analyses and icing anomalies and to demonstrate that the ice protection system and its components are effective. The ability to conduct flight testing in natural atmospheric icing conditions at the boundaries of the icing cloud envelopes of 14 CFR Part 25, Appendix C, is highly unlikely due to the low probability of experiencing an icing condition that is characterized by all the Appendix C envelope parameters and the variable character of natural icing clouds. Therefore, methods such as icing wind tunnel tests and ice accretion analyses (analyses and computer codes) are used to determine critical

		ice accretions within Appendix C limitations, including the boundary icing conditions of Appendix C. For unprotected control surfaces, the critical ice shapes resulting from a continuous exposure to icing conditions are determined based on a continuous exposure to icing conditions for approximately 45 minutes. Extensive flight testing in dry air with these critical ice accretion shapes attached to the airplane is performed to ensure that the airplane can safely operate in icing conditions. The use of dry-air flight testing with artificial critical ice accretion shapes allows airplane performance and handling characteristics to be evaluated in stable dry-air conditions with the ice shape remaining constant (i.e., no change of ice accretion due to erosion, shedding, sublimation, etc., as can occur with natural ice shapes). Upon review of its previous responses, the FAA realizes that it has not mentioned the work accomplished by the ARAC Flight Test Harmonization Working Group (FTHWG). The FTHWG has completed the technical content of proposed 14 CFR Part 25 regulations and advisory material for evaluating airplane performance and handling characteristics in the icing conditions of Appendix C. A notice of proposed rulemaking (NPRM) is scheduled for publication in May 2001. The FAA strives to improve the certification process as evidenced by the FAA Inflight Aircraft Icing Plan. In accordance with the Icing Plan, the FAA released Advisory Circular (AC) 25.1419?1, revised AC 23.1419?2A, and updated the FAA Electronic Aircraft Icing Handbook to include information on the calculation of median volumetric diameter and liquid water content. The FAA is also working on validation standards for analytical and empirical tools used in icing certifications. What is most relevant to this safety recommendation is the FAA's plan to produce certification guidance material on determining critical ice shapes used in certification. The guidance will provide a basis for determining the most adverse shapes for relevant aerodynamic characteristics and evaluating whether or not the certification ice shapes are appropriately chosen so that the aerodynamic impact will be the most severe. Progress on this activity is provided to the Board in response to Safety Recommendation A?98?92. The FAA believes that these interim actions, along with the work being accomplished by ARAC, fully address the issues raised by the Board and in this safety recommendation. I will continue to keep the Board informed of the FAA's progress on this safety recommendation.
3/26/2001	NTSB	Pending the FAA’s issuance of a requirement for installation of ice detectors, aerodynamic performance monitors, or other acceptable means to warn flight crews of ice accumulation on critical surfaces and a requirement for the crew to take action, issuance of 14 CFR Part 25 regulations and advisory material for evaluating airplane performance and handling characteristics in the icing conditions of Appendix C, and the expansion of the certification atmospheric icing conditions applicable to all airplanes, Safety Recommendation A-96-56 remains classified “Open--Acceptable Response.”
8/22/2001	Addressee	Letter Mail Controlled 08/29/2001 3:49:24 PM MC# 2010693: The ARAC is considering a proposed revision to 14 CFR Part 121 and advisory material. The proposed rule is applicable to airplanes operated under 14 CFR Part 121 with takeoff weights less than 60,000 pounds. The proposed rule addresses when to activate the ice protection system and when the flightcrew should exit icing conditions. The latter aspect is limited to airplanes with unpowered roll controls. The ARAC is also considering a similar certification standard for transport- category airplanes under 14 CFR Part 25. The original task to ARAC included airplanes certificated to 14 CFR Parts 23 and 25 standards. The task was revised in June 2000 to address 14 CFR Part 25 only. The FAA will promulgate similar 14 CFR Part 23 rules after completion of the 14 CFR Part 25 rulemaking. I will keep the Board informed of the FAA's progress on this safety recommendation.
1/27/2003	NTSB	Although the FAA, through its referral of this work to the ARAC, is responding to these recommendations, the Safety Board remains concerned that in the 6 years since these recommendations were issued, the work has not been completed. The Board would like the FAA to provide a schedule for completion of the recommended actions. Pending receipt and review of a schedule and completion of the recommended actions, Safety Recommendations A-96-56 and -58 remain classified "Open--Acceptable Response."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

5/19/2003	Addressee	Letter Mail Controlled 5/28/2003 2:42:21 PM MC# 2030262 The FAA has initiated several projects to address this safety recommendation. The following is a status update of these projects: 14 CFR Part 121 Operations in Icing: In September 2002, the ARAC voted to forward to the FAA a proposed revision to 14 CFR Part 121 and advisory material to the FAA. The proposed rule is applicable to airplanes with takeoff weights less than 60,000 pounds, and addresses when to activate the ice protection system and when the flightcrew should exit icing conditions. The latter aspect is limited to airplanes with unpowered roll controls. The proposed rule would require a visual or aural alert or substantiated visual cues that enable the flightcrew to determine that the airplane is in large droplet conditions conducive to ice accumulation aft of the airframe's protected areas. The proposed rule would also require the pilot in command to immediately exit the conditions in which ice accretion is occurring after determining the airplane is in the large droplet conditions. The FAA is processing a 14 CFR Part 25 proposed rule that addresses when to activate the ice protection system for all 14 CFR Part 25 airplanes. In both 14 CFR Parts 121 and 25 rule, it is proposed that the activation of the ice protection system be based on one of the following: · a primary ice detector; · visual cues and an advisory ice detector; or · visible moisture and a temperature conducive to airframe icing. 14: CFR Part 25 Perfiormance and Handling in Icing: The ARAC drafted recommended changes to 14 CFR Part 25 requirements and related advisory material to introduce new requirements to evaluate airplane performance and handling characteristics of transport-category airplanes for flight in icing conditions of 14 CFR Part 25, Appendix C. The FAA will publish a notice of proposed rulemaking based on these recommendations by June 2004. The recommendations include a proposed regulatory amendment containing a flight test maneuver to evaluate airplanes for susceptibility to ice-contaminated tailplane stall. The advisory material provides detailed flight test guidance, including consideration of critical ice accretions that may be accumulated during extensive exposure to icing conditions, and evaluated in the most critical landing configurations. Expansion of Certification Icing Conditions: As discussed in our response to Safety Recommendation A-96-54, the ARAC approved a concept developed by the Ice Protection Harmonization Working Group in May 2002 for a 14 CFR Part 25 rule that includes regulatory requirements to demonstrate an airplane can safely operate in certain supercooled large droplets for an unrestricted time or can detect the supercooled large droplets environment and safely exit icing conditions. The Ice Protection Harmonization Working Group is continuing to develop its recommendations for a rule and the associated advisory material. Upon receipt of the recommendations, the FAA will determine the priority that should be assigned to this rulemaking project, In June 2002, research to clarify the effects of mixed phase icing conditions was completed. The report is expected during the second quarter of 2003. Upon receipt of the report, an evaluation will be made to determine if there is evidence that the mixed phase icing condition is more hazardous than the liquid phase icing environment. I will keep the Board informed of the FAA's progress on this safety recommendation.
9/15/2003	NTSB	The Safety Board notes that the FAA intends to publish a notice of proposed rulemaking by June 2004 that will include a flight test maneuver to evaluate airplanes for susceptibility to ice-contaminated tailplane stall. Advisory material will provide detailed flight test guidance, including consideration of critical ice accretions that may be accumulated during extensive exposure to icing conditions and evaluated in the most critical landing configurations. Pending issuance of revisions to Part 121 and Part 25, Safety Recommendation A-96-56 remains classified "Open--Acceptable Response."
11/9/2004	NTSB	As part of its November 9, 2004 meeting addressing the Safety Board's Most Wanted List of safety improvements, the Board voted to reclassify this recommendation from "Open-Acceptable Response" to "Open-Unacceptable Response."
2/1/2005	Addressee	In its 2/1/2005 annual report to Congress, Regulatory Status of the National Transportation Safety Board's "Most Wanted" Recommendations to the Department of Transportation, the DOT wrote:In September 2002, the ARAC gave the FAA a proposed revision to 14 CFR Part 121, applicable to airplanes with takeoff weights less than 60,000 pounds, that addresses when to activate the ice protection system and when the flight crew should exit icing conditions. The proposed rule would require visual or aural alert or substantiated visual cues that enable the flight crew to determine that the airplane is in large-droplet conditions. The FAA is also working on a revision to 14 CFR Part 25 that addresses when to activate the ice protection system. The ARAC is continuing to develop a Part 25 rule that includes regulatory requirements to demonstrate an airplane can safely operate in certain super- cooled large drop (SLD) conditions for an unrestricted time or can detect SLD and enable the flight crew to exit icing conditions. The FAA will promulgate similar 14 CFR Part 23 rules after completion ofthe 14 CFR Part 25 rulemaking.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

10/26/2005	Addressee	Letter Mail Controlled 10/27/2005 2:12:40 PM MC# 2050501 Marion C. Blakey, Administrator, FAA, 10/26/05 The following is a status update on projects the FAA initiated to address this safety recommendation: Part 121 Operations in Icing and Part 25 Activation of Ice Protection: In January 2003, the ARAC forwarded to the FAA a proposed revision to 14 CFR Part 121 and advisory material. applicable to certain airplanes, for activation of the ice protection system and exiting icing conditions. The FAA is processing a proposed change to 14 CFR Part 25 that addresses when to activate the ice protection system for all Part 25 airplanes. The FAA's progress on these rulemaking projects is reported in our response to Safety Recommendation A-98-91. Part 25 Performance and Handling in Icing: The FAA had anticipated publishing the proposed rulemaking and advisory material for evaluating airplane performance and handling characteristics in icing conditions of Appendix C in June 2004. The FAA now anticipates publication by October 2005. The FAA's progress on this rulemaking project is reported in response to Safety Recommendation A-91-87. Expansion of Certification Icing Conditions: The ARAC's Ice Protection Harmonization Working Group is continuing to develop a revision to 14 CFR Part 25 that includes regulatory requirements to demonstrate that an airplane can safely operate in certain SLD conditions or can detect SLD and safely exit icing conditions. The FAA's progress on this rulemaking project is reported in response to Safety Recommendation A-96-54. I will keep the Board informed of the FAA's progress on this safety recommendation.
3/1/2006	Addressee	In its 3/1/2006 annual report to Congress, Regulatory Status of the National Transportation Safety Board's "Most Wanted" Recommendations to the Department of Transportation, the DOT wrote: There are five rulemaking activities that address this safety recommendation: A proposed revision to 14 CFR Part 121, applicable to airplanes with takeoff weights less than 60,000 pounds, that addresses when to activate the ice protection system and when the flight crew should exit icing conditions. A proposed revision to 14 CFR Part 25 that addresses when to activate the ice protection system. The next step for these two rules is for the FAA to prepare a regulatory evaluation. Due to the higher priority of other safety related rulemaking activities, the regulatory evaluations have been delayed. A proposed revision to 14 CFR Part 25 for evaluating airplane performance and handling characteristics in the icing conditions of Appendix C. The NPRM and AC were published in the Federal Register on November 4,2005. ARAC is developing Part 25 and Part 33 rules that include regulatory requirements to demonstrate an airplane can safely operate in certain super-cooled large drop (SLD) conditions for an unrestricted time or can detect SLD and enable the flight crew to exit icing conditions. For Part 33 there will also be recommendations for mixed-phase icing rulemaking. The FAA anticipates receiving the ARAC recommendations in 2006. The FAA will promulgate similar 14 CFR Part 23 rules after completion of the 14 CFR Part 25 rulemaking.
5/10/2006	NTSB	The FAA provided an update of several activities in progress in response to this recommendation: 1.Part 121 Operations in Icing and Part 25 Activation of Ice Protection: In January 2003, the ARAC proposed revisions to Part 121 for activation of the ice protection system and exiting icing conditions. The FAA is also processing a proposed change to Part 25 that addresses when to activate the ice protection system. 2.Part 25 Performance and Handling in Icing: This is addressed by the FAA's November 4, 2005, NPRM. 3.Expansion of Certification Icing Conditions: The IPHWG is continuing to develop Part 25 revisions that include a demonstration that an airplane can safely operate in SLD conditions or can detect SLD and safely exit icing conditions. These three projects are responsive to this recommendation, but the interminable delays are not acceptable. Issuance of the NPRM is progress, but the Board notes that it is only an NPRM, and full implementation of the regulatory change may be several years away. The FAA has made no progress on the other two items. The Board also notes that for the first item, the ARAC recommended regulatory revisions 3 years ago, but the FAA has not taken any further action since then. Pending the FAA's completing the recommended actions, Safety Recommendation A-96-56 remains classified "Open-Unacceptable Response."

Recommendation Report

Thursday, March 05, 2009

REC:A-96-057

Log Number 2529A

Issue Date 8/15/1996 **ROSELAWN IN** **10/31/1994**

ON OCTOBER 31, 1994, ABOUT 1600 CENTRAL STANDARD TIME A SIMMONS AIRLINES AVIONS DE TRANSPORT REGIONAL ATR-72-210, OPERATING AS AMERICAN EAGLE FLIGHT 4184, CRASHED INTO A SOYBEAN FIELD 3 MILES SOUTH OF ROSELAWN, INDIANA. THE FLIGHT WAS ON AN INSTRUMENT FLIGHT RULES FLIGHT PLAN FROM INDIANAPOLIS, INDIANA, TO O'HARE INTERNATIONAL AIRPORT, CHICAGO, ILLINOIS, AND HAD BEEN PLACED IN A HOLDING PATTERN OVER ROSELAWN BECAUSE OF WEATHER DELAYS BEING EXPERIENCED AT O'HARE. THE AIRPLANE'S PRIMARY AND SECONDARY RADAR RETURNS DISAPPEARED FROM THE AIR TRAFFIC CONTROL RADAR SHORTLY AFTER THE FLIGHT WAS CLEARED TO CONTINUE THE HOLDING PATTERN AND TO DESCEND FROM 10,000 TO 8,000 FEET. WITNESSES OBSERVED THE AIRPLANE DESCEND OUT OF A LOW OVERCAST AND STRIKE THE GROUND IN A STEEP NOSE-DOWN ATTITUDE. ALL 64 PASSENGERS AND 4 CREWMEMBERS WERE KILLED IN THE ACCIDENT. THE SAFETY BOARD INVESTIGATED ONE SUCH EVENT THAT OCCURRED ON DECEMBER 22, 1988, AT MOSINEE, WISCONSIN.

Recommendation # A-96-057

Overall Status
CUA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FAA: REQUIRE ALL AIRCRAFT MANUFACTURERS TO PROVIDE, AS PART OF THE CERTIFICATION CRITERIA, INFO TO THE FAA & OPERATORS ABOUT ANY KNOWN UNDESIRABLE CHARACTERISTICS OF FLIGHT BEYOND THE PROTECTED (STALL SYSTEM & RELATED SHAKER/PUSHER) FLIGHT REGIME.

FAA	Closed - Unacceptable Action	2/5/2003

10/30/1996	Addressee	THE FAA RESPONDS THAT IT IS CURRENTLY PROVIDED INFO FROM THE MANUFACTURER DURING THE CERTIFICATION PROCESS PERTAINING TO THE ADVERSE AIRPLANE CHARACTERISTICS BEYOND THE STALL IDENTIFICATION SYSTEM AT LEAST TO THE EXTENT NECESSARY TO UNDERSTAND THE ADVERSE CHARACTERISTICS. THE FAA STATED THAT THE ADDITION OF INFO SUCH AS THAT RECOMMENDED BY THE BOARD WOULD REPRESENT A NEW APPLICATION OF THE REGULATION & IT IS FAA POLICY TO COORDINATE THIS TYPE OF CHANGE WITH INDUSTRY. HOWEVER, THE FAA STATED THAT IT WOULD ADVISE THE ARAC FLIGHT TEST HARMONIZATION WORKING GROUP OF ITS INTENT TO ADVISE ALL FAA AIRCRAFT CERTIFICATION OFFICES (ACO) OF THE NEW GUIDANCE THROUGH A POLICY MEMORANDUM. THE ARAC GROUP WILL BE ADVISED OF THE NEW GUIDANCE BY 4/30/97.
8/20/1997	NTSB	A-96-57 ASKED THE FAA TO REQUIRE ALL AIRCRAFT MANUFACTURERS TO PROVIDE, AS PART OF THE CERTIFICATION CRITERIA, INFO TO THE FAA & OPERATORS ABOUT ANY KNOWN DESIRABLE CHARACTERISTIC OF FLIGHT BEYOND THE PROTECTED (STALL SYSTEM & RELATED SHAKER/PUSHER) FLIGHT REGIME. PENDING RECEIPT & REVIEW OF THE FINAL POLICY MEMORANDUM, THE BOARD CLASSIFIES A-96-57 "OPEN--ACCEPTABLE RESPONSE."
7/1/1998	Addressee	(Letter Mail Controlled 7/7/98 4:01:11 PM MC# 9808460) ALTHOUGH THIS RECOMMENDATION REFERS TO "STALL SYSTEM & RELATED SHAKER/PUSHER," A REVIEW OF THE BOARD'S 10/31/94, AMERICAN EAGLE ATR-72 ACCIDENT ATR-72 ACCIDENT REPORT REVEALED THAT THE BOARD'S SPECIFIC CONCERNS ARE THE FLIGHT CHARACTERISTICS BEYOND THE ANGLE-OF-ATTACK AT WHICH THE STALL PROTECTION SYSTEM (STICK PUSHER) ACTIVATES. 14 CFR 25.1581(A)(2) STATES THAT AN AIRPLANE FLIGHT MANUAL MUST BE FURNISHED WITH EACH AIRPLANE & THAT IT MUST CONTAIN OTHER INFO THAT IS NECESSARY FOR SAFE OPERATION BECAUSE OF DESIGN, OPERATING, OR HANDLING CHARACTERISTICS. THE FAA HAS DRAFTED A POLICY LETTER WHICH WOULD ALLOW THE AIRCRAFT CERTIFICATION OFFICES TO USE THIS REGULATION AS A BASIS FOR REQUIRING THAT OPERATORS BE PROVIDED WITH INFO ABOUT ANY KNOWN UNDESIRABLE CHARACTERISTICS OF FLIGHT BEYOND THE ANGLE-OF-ATTACK RANGE FOR WHICH THE STALL PROTECTION SYSTEM PROVIDES PROTECTION. IT IS ANTICIPATED THAT THE POLICY LETTER WILL BE PUBLISHED IN THE FEDERAL REGISTER FOR COMMENT BY JULY 1998.
11/9/1998	NTSB	THE BOARD NOTES THAT IS IMPORTANT POLICY LETTER, ORIGINALLY SCHEDULED FOR A JULY 1998 RELEASE, IS NOW DUE TO BE PUBLISHED IN THE FEDERAL REGISTER IN DECEMBER 1998. THE BOARD URGES THE FAA TO MOVE QUICKLY ON THIS ISSUE TO ENSURE THAT ALL FIGHTCREWS RECEIVE THIS CRITICAL INFO IN A TIMELY MANNER. PENDING THE PUBLICATION OF THE FAA POLICY LETTER IN THE FEDERAL REGISTER, A-96-57 IS CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."

Recommendation Report

Thursday, March 05, 2009

REC:A-96-057

4/15/1999	Addressee	Letter Mail Controlled 4/21/99 4:25:45 PM MC# 990438

Recommendation Report

Thursday, March 05, 2009

REC:A-96-057

8/11/2000	Addressee	Letter Mail Controlled 08/15/2000 1:31:29 PM MC# 2001066 ON 7/1/98, THE FAA TOLD THE BOARD THAT ALTHOUGH THIS RECOMMENDATION REFERS TO "STALL SYSTEM AND RELATED SHAKER/PUSHER," THE BOARD'S 10/31/94, AMERICAN EAGLE ATR-72 ACCIDENT REPORT REVEALED THAT THE BOARD'S SPECIFIC CONCERNS ARE THE FLIGHT CHARACTERISTICS BEYOND THE ANGLE-OF-ATTACK AT WHICH THE STALL PROTECTION SYSTEM (STICK PUSHER) ACTIVATES. 14 CFR 25.1581(A)(2) STATES THAT AN AIRPLANE FLIGHT MANUAL MUST BE FURNISHED WITH EACH AIRPLANE AND THAT IT MUST CONTAIN OTHER INFORMATION THAT IS NECESSARY FOR SAFE OPERATION BECAUSE OF DESIGN, OPERATING, OR HANDLING CHARACTERISTICS. THE FAA STATED THAT IT HAD DRAFTED A POLICY LETTER, WHICH WOULD ALLOW THE AIRCRAFT CERTIFICATION OFFICES TO USE THIS REGULATION AS A BASIS FOR REQUIRING THAT OPERATORS BE PROVIDED WITH INFORMATION ABOUT ANY KNOWN UNDESIRABLE CHARACTERISTICS OF FLIGHT BEYOND THE ANGLE-OF-ATTACK RANGE FOR WHICH THE STALL PROTECTION SYSTEM PROVIDES PROTECTION. THE FAA ANTICIPATED PUBLISHING THE POLICY LETTER IN THE FEDERAL REGISTER FOR COMMENT BY JULY 1998. SUBSEQUENT TO THE ABOVE RESPONSE TO THE BOARD, FAA SPECIALISTS INVOLVED IN THE ACCIDENT INVESTIGATION REVIEWED THE DRAFT POLICY LETTER AND DISCOVERED A NOTABLE INCONSISTENCY THAT RESULTED FROM OUR MISINTERPRETATION OF THE BOARD'S REPORT. ALTHOUGH THE BOARD'S REPORT DOES NOT SPECIFICALLY STATE THAT THE ACCIDENT EXCEEDED THE STALL ANGLE OF ATTACK (I.E., PUSHER ACTIVATION POINT), THE WORDING OF A-96-57 MAKES A SPECIFIC REFERENCE TO "CHARACTERISTICS OF FLIGHT BEYOND THE PROTECTED FLIGHT REGIME. THE WORDING OF THIS RECOMMENDATION CONVEYS THE SENSE THAT THE BOARD MAY SUSPECT THIS TO BE THE CASE. THIS RECOMMENDATION WOULD GENERALLY BE INTERPRETED AS FLIGHT CHARACTERISTICS AT ANGLES OF ATTACK GREATER THAN THAT AT WHICH THE STALL PREVENTION (STICK PUSHER) SYSTEM NORMALLY ACTIVATES. THE ACCIDENT INVESTIGATION, HOWEVER, REVEALED THAT THE AIRPLANE'S ANGLE OF ATTACK NEVER APPROACHED THAT NECESSARY FOR PUSHER ACTIVATION. THE FLIGHTCREW WAS UNABLE TO RECOVER FROM A LATERAL UPSET CAUSED BY AIRFLOW SEPARATION ON THE UPPER SURFACE OF ONE WING. IT HAS BEEN SHOWN THAT THE FLOW SEPARATION COULD HAVE BEEN CAUSED BY AN ICE RIDGE THAT FORMED AFT OF THE PROTECTED LEADING EDGE THAT, IN TURN, RESULTED IN A SIGNIFICANT CHANGE IN AIRLERON HINGE MOMENT THAT WAS TRANSPARENT TO THE FLIGHTCREW UNTIL THE AUTOPILOT DISCONNECTED, AT WHICH POINT THE AIRPLANE MADE A RAPID ROLL AND FLIGHT PATH DEPARTURE. THE AILERON AUTODEFLECTION AND RESULTING ROLL-OFF OF THE ACCIDENT AIRPLANE WERE THE RESULT OF OPERATING IN ICING CONDITIONS THAT THE ICE PROTECTION SYSTEM HAD NOT BEEN DESIGNED TO PROTECT AGAINST. THIS HAS SINCE BEEN ADDRESSED FOR AIRPLANES WITH DESIGN FEATURES (I.E., REVERSIBLE CONTROL SYSTEM AND PNEUMATIC DEICING SYSTEM) THAT MAKE THEM SUSCEPTIBLE TO THE FORMATION OF AN ICE RIDGE IN SUPERCOOLED LARGE DROPLET ICING CONDITIONS. FOR THESE AIRPLANES, THE FAA HAS MANDATED THAT THE MEANS FOR DETERMINING WHEN THE AIRPLANE IS OPERATING IN SUPERCOOLED LARGE DROPLETS BE PROVIDED TO THE FLIGHTCREW AND THAT THE AIRPLANE MUST BE CONTROLLABLE TO PERMIT CONTINUED SAFE FLIGHT WHILE EXITING THE SUPERCOOLED LARGE DROPLET CONDITIONS WITH SOME SUPERCOOLED LARGE DROPLET ICE ACCRETION IN FRONT OF ONE AILERON. ALL AFFECTED AIRPLANES HAVE BEEN SHOWN TO COMPLY WITH THESE CRITERIA. THE FAA IS APPLYING THE SAME SUPERCOOLED LARGE DROPLET TEST REQUIREMENTS TO ANY NEW AIRPLANE OF SIMILAR DESIGN. THE FAA DOES NOT CONSIDER THE FLIGHT PATH DEPARTURE OF AMERICAN EAGLE FLIGHT 4184 TO HAVE A DIRECT RELATIONSHIP WITH THE FLIGHT CHARACTERISTICS OF THAT AIRPLANE TYPE BEYOND THE REGIME PROTECTED BY THE STICK PUSHER. THE ACTIVATION POINT OF MOST STICK PUSHER SYSTEMS IS PREDICATED ON LIMITING THE ANGLE OF ATTACK TO A VALUE BELOW THAT AT WHICH POOR STALL CHARACTERISTICS OCCUR; THOSE CHARACTERISTICS COULD BE LONGITUDINAL AND/OR LATERAL CONTROL FORCE ANOMALIES, UNCOMMANDED PITCH-UP, UNCONTROLLABLE ROLL-OFF, ETC. THE MANUFACTURERS AND THE FAA CONDUCT RIGOROUS FLIGHT TESTING TO ENSURE THAT A STALL PREVENTION SYSTEM WILL PERFORM ITS INTENDED FUNCTION UNDER ALL FLIGHT CONDITIONS, THUS PROVIDING A SAFE NORMAL OPERATING ENVELOPE. ADDITIONALLY, THE FAA HAS PUBLISHED SAFETY AND RELIABILITY GUIDELINES FOR STALL WARNING AND STALL PREVENTION SYSTEMS IN ADVISORY CIRCULAR 25-7A, FLIGHT TEST GUIDE FOR CERTIFICATION OF TRANSPORT CATEGORY AIRPLANES, TO ADVISE MANUFACTURERS ON HOW TO COMPLY WITH THE REGULATIONS REGARDING THESE SYSTEMS. IN THE CERTIFICATION OF SMALL PREVENTION SYSTEMS, THE STICK PUSHER ANGLE OF ATTACK IS DETERMINED FOR AN AIRPLANE WITH NO ICE CONTAMINATION. IN SOME CASES, IT IS RESET TO A LOWER ANGLE OF ATTACK BASED ON SYMMETRIC APPLICATION OF 14 CFR PART 25, APPENDIX C, ICE ACCRETIONS ON THE UNPROTECTED SURFACES AND INTERCYCLE ICE ON THE LEADING EDGE BOOTS. RECOGNIZING THAT THE STALL ANGLE OF ATTACK WILL BE REDUCED FOR AN ICE-CONTAMINATED WING, STALL PREVENTION SYSTEM DESIGNS INCORPORATING SUCH RESETS WILL ENSURE

		THAT ADEQUATE STALL WARNING AND STALL PROTECTION EXISTS (APPENDIX C) IN ICING CONDITIONS TO PREVENT INADVERTENT STALL. THE FLIGHT TEST HARMONIZATION WORKING GROUP IS CURRENTLY DEVELOPING REGULATORY REQUIREMENTS FOR TRANSPORT-CATEGORY AIRPLANES THAT WILL REQUIRE, AMONG OTHER THINGS, EVALUATION OF STALL SPEEDS, STALL CHARACTERISTICS, AND STALL WARNING IN THE ICING CONDITIONS OF APPENDIX C. THE COMBINATION OF THE FAA'S REQUIREMENTS FOR IDENTIFICATION OF, AND SAFE EXIT FROM, SUPERCOOLED LARGE DROPLET CONDITIONS ALONG WITH THE ICING CERTIFICATION REQUIREMENTS BEING PROPOSED BY THE FLIGHT TEST HARMONIZATION WORKING GROUP SHOULD ESSENTIALLY ELIMINATE AIRPLANE OPERATIONS THAT COULD RESULT IN UPSETS AND FLIGHT PATH DEPARTURES IN ICING CONDITIONS. IN SUMMARY, ALTHOUGH THE ACCIDENT AIRPLANE SUFFERED A FLIGHT PATH DEPARTURE ABOUT THE ROLL AXIS THAT IS SIMILAR IN NATURE TO THE FLIGHT CHARACTERISTICS THAT RESULTED IN A STICK PUSHER BEING INSTALLED TO LIMIT THE NOSE-UP ANGLE OF ATTACK, THE CAUSE OF THE ACCIDENT AIRPLANE'S ROLL-OFF WAS ENTIRELY DIFFERENT. THE MANUFACTURERS AND THE FAA CONDUCT RIGOROUS FLIGHT TESTING TO ENSURE THAT A STALL PREVENTION SYSTEM WILL PERFORM ITS INTENDED FUNCTION UNDER ALL FLIGHT CONDITIONS, THUS PROVIDING A SAFE NORMAL OPERATING ENVELOPE. THE SAFETY AND RELIABILITY CRITERIA THAT THE FAA APPLIES IN THE CERTIFICATION OF STALL PREVENTION SYSTEMS RESULT IN THE COMBINED PROBABILITY OF REACHING THE STALL ANGLE OF ATTACK AND HAVING THE STICK PUSHER FAIL TO OPERATE BEING LESS THAN 10 PER FLIGHT HOUR. CONSEQUENTLY, THE FAA DOES NOT BELIEVE THERE WOULD BE ANY POSITIVE BENEFIT FROM ISSUING A POLICY LETTER TO BE USED AS A BASIS FOR REQUIRING THAT AIRPLANE FLIGHT CHARACTERISTICS BEYOND THE PROTECTED FLIGHT REGIME BE PUBLISHED IN THE FLIGHT AND OPERATING MANUALS. I BELIEVE THAT THE FAA HAS ADDRESSED THIS ISSUE COMPLETELY, AND I CONSIDER THE FAA'S ACTION TO BE COMPLETED IN RESPONSE TO THIS RECOMMENDATION.
1/5/2001	NTSB	THE SAFETY BOARD DISAGREES WITH THE FAA'S ASSESSMENT AND BELIEVES THAT THE RECOMMENDED ACTION IS STILL NEEDED. KNOWING ABOUT UNDESIRABLE STABILITY AND CONTROL CHARACTERISTICS AT THE EDGES OF THE FLIGHT ENVELOPE GREATLY INCREASES THE LIKELIHOOD OF RECOVERY IF SUCH CHARACTERISTICS ARE ENCOUNTERED. THE BOARD BELIEVES THAT THE FAA'S FAILURE TO TAKE ACTION ON THIS ISSUE COULD LEAD TO THE OCCURRENCE OF ADDITIONAL ACCIDENTS. AS THE BOARD PREVIOUSLY COMMUNICATED TO THE FAA, THE INTENT OF THIS RECOMMENDATION WOULD HAVE BEEN MET IF THE FAA ISSUED A POLICY LETTER THAT WOULD ALLOW THE ACO'S TO USE 14 CFR 25.1581(A)(2) AS A BASIS FOR REQUIRING THAT OPERATORS BE PROVIDED WITH INFORMATION ABOUT ANY KNOWN UNDESIRABLE CHARACTERISTICS OF FLIGHT BEYOND THE AOA RANGE FOR WHICH THE STALL PROTECTION SYSTEM PROVIDES PROTECTION. PENDING ISSUANCE OF SUCH A LETTER, OR OTHER EQUIVALENT ACTION, A-96-57 IS CLASSIFIED "OPEN--UNACCEPTABLE RESPONSE."
6/26/2001	Addressee	Letter Mail Controlled 07/02/2001 5:00:09 PM MC# 2010542: The Federal Aviation Administration's (FAA) letter to the Board dated August 11, 2000, established the technical position on this issue. Stall protection systems are installed by manufacturers to prevent airplanes from reaching a critical angle of attack when they do not meet the stall characteristic requirements of 14 CFR 25.203. In order to obtain FAA certification, manufacturers supply the results of tests and analyses to show compliance with 14 CFR Part 25. In the case of stall characteristics, any data the manufacturer may possess related to flight characteristics beyond the protected angle of attack range would not be required to show compliance with the regulations. Consequently, the FAA cannot use a policy letter to require the inclusion of such information in the Airplane Flight Manual (AFM). The only means for the FAA to require manufacturers to produce AFM information about flight characteristics beyond the protected angle of attack range would be via regulatory requirement that would: (I.) require testing to be conducted beyond the protected angle of attack range, and (2) require the results of the tests to be described in the AFM. There are no facts or data to support the need for such a regulatory requirement. I believe that the FAA has fully addressed this safety recommendation, and I consider the FAA's action to be completed.

Recommendation Report

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2/5/2003 NTSB

The Safety Board believes that taking the recommended action will result in significant safety benefits when airplanes encounter unusual icing conditions not accounted for during certification or in the event of SPS failure. The ATR aileron instability in the presence of flow separation found in the Roselawn accident is an example of how the recommended requirement would help pilots become aware of what can happen beyond the SPS thresholds.

Because flight testing has already established the basis for SPS thresholds, the Safety Board believes that the FAA does not need to require additional flight testing. The Board believes that manufacturers are already required to advise the FAA in their certification submission as to why they need an SPS, and that the FAA is responsible for evaluating whether items such as shaker and pusher thresholds are set to safe levels. To fulfill its responsibilities, the FAA needs to know the characteristics from which the pilot is being protected and the situations in which these characteristics occur. The Board notes that the recommendation does not ask for flight testing to extreme situations; rather, the recommendation asks that the FAA be made aware of what characteristics the manufacturer finds during flight testing. The Board continues to believe that the airplane cannot be adequately certified without this information.

The FAA has indicated that it considers its action final and plans no further action. Consequently, Safety Recommendation A-96-57 is classified "Closed--Unacceptable Action."

Total Number of Recommendations for Recommendation Report: 1

Selection for Report:

REC:A-96-057

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Recommendation # A-96-058

Overall Status
OAA

Priority
CLASS II

NTSB RECOMMENDS THAT THE FAA: DEVELOP AN ICING CERTIFICATION TEST PROCEDURE SIMILAR TO THE TAILPLANE ICING PUSHOVER TEST TO DETERMINE THE SUSCEPTIBILITY OF AIRPLANES TO AILERON HINGE MOMENT REVERSALS IN THE CLEAN & ICED-WING CONDITIONS. REVISE 14 CFR PART 23 & 25 ICING CERTIFICATION REQUIREMENTS TO INCLUDE SUCH A TEST.

FAA	Open - Acceptable Response

10/30/1996	Addressee	THE FAA WILL TASK ARAC TO DEVELOP CERTIFICATION CRITERIA FOR THE SAFE OPERATION OF AIRPLANES IN SUPERCOOLED LIQUID DROPLETS ALOFT, NEAR THE SURFACE & IN MIXED-PHASE CONDITIONS IF THOSE CONDITIONS ARE DETERMINED TO BE MORE HAZARDOUS THEN THE LIQUID PHASE ENVIRONMENT. THE ARAC WILL ALSO DEVELOP THE REQUIREMENTS THAT WILL ALLOW AN AIRPLANE SAFETY EXIT THOSE CONDITIONS & WILL DETERMINE THE TYPE(S) OF TESTS NECESSARY TO DETERMINE THE SUSCEPTIBILITY OF AIRPLANES TO AILERON HINGE MOMENT REVERSALS IN ICING CONDITIONS.
8/20/1997	NTSB	A-96-58 ASKED THE FAA TO DEVELOP AN ICING CERTIFICATION TEST PROCEDURE SIMILAR TO THE TAILPANE ICING PUSHOVER TEST TO DETERMINE THE SUSCEPTIBILITY OF AIRPLANE TO AILERON HINGE MOMENT REVERSAL IN THE CLEAN & ICE-WIND CONDITIONS & TO REVISE 14 CFR PARTS 23 & 25 ICING CERTIFICATION REQUIREMENTS TO INCLUDE SUCH A TEST. PENDING COMPLETION OF THE ARAC WORK & FINAL ACTION BY THE FAA, THE BOARD CLASSIFIES A-96-58 "OPEN--ACCEPTABLE RESPONSE."
7/1/1998	Addressee	(Letter Mail Controlled 7/7/98 4:01:11 PM MC# 980846) THE FAA'S POSITION AS STATED IN ITS LETTER DATED 10/30/96, IS THAT A WING TEST REQUIREMENT FOR A "CLEAN," UNCONTAMINATED WING IS NOT NECESSARY. FOR THE ICED-WING CONDITION, THE FAA HAS TASKED THE ARAC TO DEFINE AN ICING ENVIRONMENT THAT INCLUDES SLD, & TO DEVISE REQUIREMENTS TO ASSESS THE ABILITY OF AIRCRAFT TO OPERATE SAFELY EITHER FOR THE PERIOD OF TIME TO EXIT OR TO OPERATE WITHOUT RESTRICTION IN SLD ALOF, IN SLD AT OR NEAR THE SURFACE, & IN MIXED PHASE CONDITIONS IF SUCH CONDITIONS ARE DETERMINED TO BE MORE HAZARDOUS THAN THE LIQUID PHASE ICING ENVIRONMENT CONTAINING SUPERCOOLED WATER DROPLETS. THE TOR DOCUMENT WAS APPROVED BY THE ARAC IN OCTOBER 1997 & PUBLISHED IN THE FEDERAL REGISTER ON 12/8/97. THE ARAC WILL ASSESS THE NEED FOR A SPECIFIC TEST (SIMILAR TO THE TAILPLANE ICING PUSHOVER TEST) TO DETERMINE THE SUSCEPTIBILITY OF AIRPLANES TO AILERON HINGE MOMENT REVERSALS WHEN THE SAFE EXIT REQUIREMENTS ARE DEVELOPED.
11/9/1998	NTSB	A-96-58 ASKED THE FAA TO DEVELOP AN ICING CERTIFICATION TEST PROCEDURE SIMILAR TO THE TAILPLANE ICING PUSHOVER TEST TO DETERMINE THE SUSCEPTIBILITY OF AIRPLANES TO AILERON HINGE MOMENT REVERSALS IN THE CLEAN & ICED-WING CONDITIONS & TO REVISE 14 CFR PARTS 23 & 25 ICING CERTIFICATION REQUIREMENTS TO INCLUDE SUCH A TEST. PENDING THE ARAC'S ASSESSMENT & CHANGES TO THE APPROPRIATE REGULATIONS, A-96-58 IS CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."
4/15/1999	Addressee	Letter Mail Controlled 4/21/99 4:25:45 PM MC# 990438 ON 10/30/96, THE FAA TOLD THE BOARD THAT A WING TEST REQUIREMENT FOR A "CLEAN", UNCONTAMINATED WING WAS NOT NECESSARY. THE FAA STATED THAT THE ARAC WILL ASSESS THE NEED FOR A SPECIFIC TEST (SIMILAR TO THE TAILPLANE ICING PUSHOVER TEST) TO DETERMINE THE SUSCEPTIBILITY OF AIRPLANES TO AILERON HINGE MOMENT REVERSALS WHEN THE SAFE EXIT REQUIREMENTS ARE DEVELOPED BY THE ICE PROTECTION HARMONIZATION WORKING GROUP. THE WORKING GROUP MET FOR THE FIRST TIME IN FEBRUARY 1998 AND HAS DEVELOPED A WORK PLAN AND SCHEDULE TO ADDRESS THE TASKS ASSIGNED TO THE GROUP. THE WORK PLAN IDENTIFIES THE TASK OF DEFINING AN ATMOSPHERIC CHARACTERIZATION THAT INCLUDES SLD. THIS TASK BEGAN IN FEBRUARY 1999. FOLLOWING DEFINITION OF THE ENVIRONMENT THE WORKING GROUP WILL DEVELOP A MEANS TO ASSESS THE ABILITY OF AIRCRAFT TO SAFELY OPERATE IN OR SAFELY EXIT THE NEWLY DEFINED CONDITIONS.

Recommendation Report

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MODE:AVIATION KEYWORD 1:icing

2/16/2000	NTSB	ON 10/30/96, THE FAA STATED THAT IT HAD DETERMINED THAT A WING TEST REQUIREMENT FOR A "CLEAN," UNCONTAMINATED WING WAS NOT NECESSARY. THE BOARD CONCURRED WITH THAT POSITION IN ITS 11/9/98, LETTER. THE FAA NOW REPORTS THAT THE ARAC WILL ASSESS THE NEED FOR A SPECIFIC TEST (SIMILAR TO THE TAILPLANE ICING PUSHOVER TEST) TO DETERMINE THE SUSCEPTIBILITY OF AIRPLANES TO AILERON HINGE MOMENT REVERSALS WHEN THE SAFE EXIT REQUIREMENTS ARE DEVELOPED BY THE ICE PROTECTION HARMONIZATION WORKING GROUP. THE SAFETY BOARD ENCOURAGES THE FAA TO AGGRESSIVELY PURSUE THESE ISSUES. PENDING DEVELOPMENT OF THE PROPOSED FLIGHT TEST IN THE ICED WING CONDITION AND APPROPRIATE REGULATORY ACTION, A-96-58 IS CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."
10/16/2000	Addressee	Letter Mail Controlled 10/19/2000 3:19:55 PM MC# 2001561 As stated in response to Safety Recommendation A?96?54, the IPHWG is continuing to define atmospheric characterization that includes SLD. An acceptable means of compliance to assess the ability of the aircraft to operate safely in or exit safely from the newly defined conditions will be developed. The IPHWG anticipates having an adequate data set available to define an atmosphere that includes SLD by February 2001. I will keep the Board informed of the FAA's progress on this safety recommendation.
3/26/2001	NTSB	The Safety Board urges the FAA to move expeditiously to implement the action recommended. Pending the development and requirement of an icing certification test procedure similar to the tailplane icing pushover test to determine the susceptibility of airplanes to aileron hinge moment reversals in the clean and iced-wing conditions, Safety Recommendation A-96-58 remains classified "Open--Acceptable Response."
8/22/2001	Addressee	Letter Mail Controlled 08/29/2001 3:49:24 PM MC# 2010693: The ARAC will address its task to recommend to the FAA an acceptable means of compliance to assess the ability of the aircraft to operate safely in or exit safely from the atmospheric conditions developed. The recommendation will assist the FAA in responding to Safety Recommendation A-96-54. The original task to ARAC included airplanes certificated to 14 CFR Parts 23 and 25 standards. The task was revised in June 2000 to address 14 CFR Part 25 only. The FAA will promulgate similar 14 CFR Part 23 rules after completion of the 14 CFR Part 25 rulemaking. I will keep the Board informed of the FAA's progress on this safety recommendation.
1/27/2003	NTSB	Although the FAA, through its referral of this work to the ARAC, is responding to these recommendations, the Safety Board remains concerned that in the 6 years since these recommendations were issued, the work has not been completed. The Board would like the FAA to provide a schedule for completion of the recommended actions. Pending receipt and review of a schedule and completion of the recommended actions, Safety Recommendations A-96-56 and -58 remain classified "Open--Acceptable Response."
5/19/2003	Addressee	Letter Mail Controlled 5/28/2003 2:42:21 PM MC# 2030262 The development of a means of compliance will occur simultaneously with the development of the rule that addresses safe operations in supercooled large droplets. A status of the proposed rule is outlined in response to Safety Recommendation A-96-54. I will keep the Board informed of the FAA's progress on this safety recommendation.
9/15/2003	NTSB	Although the IPHWG appears to be making progress in responding to these recommendations, the Safety Board remains concerned about the slow pace of this work. The Board notes that the IPHWG's report is not scheduled for completion until more than 7 years after these recommendations were issued, after which the FAA will need more time to develop and issue any related regulatory amendments. The Board urges the FAA to give this rulemaking project a high priority. The Board would also appreciate the opportunity to review a draft copy of the report on mixed phase icing conditions. Pending the revisions of 14 CFR Parts 23 and 25 and the expansion of the Appendix C design certification envelope, Safety Recommendation A-96-54 remains classified "Open--Acceptable Response." In response to Safety Recommendation A-96-58, the FAA stated that development of a means of compliance will occur simultaneously with the development of the rule that addresses safe operations in supercooled large droplets. Pending revision of 14 CFR Parts 23 and 25 to include a test to determine the susceptibility of airplanes to aileron hinge moment reversals in the clean and iced-wing conditions, Safety Recommendation A-96-58 remains classified "Open--Acceptable Response."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

10/26/2005	Addressee	Letter Mail Controlled 10/27/2005 2:12:40 PM MC# 2050501 Marion C. Blakey, Administrator, FAA, 10/26/05 An ARAC working group is developing 14 CFR Part 25 advisory material to establish a means of compliance to substantiate that an airplane can be safely operated in certain SLD for an unrestricted time or can detect SLD and safely exit icing conditions. The working group is considering whether the substantiation should include a specific test procedure to evaluate uncommanded motion of the aileron. The need to include such a test for 14 CFR Part 23 will be assessed when a 14 CFR Part 23 SLD rule is developed in response to Safety Recommendation A-96-54. In the interim, a proposed method that has been used on new airplanes and used to screen existing airplanes with reversible lateral controls and pneumatic deicing boots is in AC 23.1419-2C dated July 21, 2004.
5/10/2006	NTSB	The FAA indicated that an ARAC working group is developing advisory material for Part 25 to establish a means of compliance whereby an airplane can be safely operated in SLD conditions for an unrestricted time, or can detect SLD and safely exit icing conditions. The working group is considering whether to include a specific test procedure to evaluate uncommanded motion of the aileron. The FAA further indicated that the need to include such a test in Part 23 will be assessed when a Part 23 SLD rule is developed. However, in the interim, the FAA noted that AC 23.1419-2C contains a method that has been used for new airplanes and for existing airplanes with reversible lateral controls and pneumatic deicing boots. The Safety Board remains concerned with the very slow progress on this recommendation. This recommendation is 9 1/2 years old, and it has been over 11 years since the accident (Roselawn, Indiana) that prompted its issuance. In that accident, the Safety Board determined that the probable cause was the loss of control, attributed to a sudden and unexpected aileron hinge moment reversal that occurred after a ridge of ice accreted beyond the deice boots. This recommendation was issued to ensure that the FAA would evaluate the risk of airplanes being subject to this problem. However, the ARAC is still considering whether to include a specific test procedure to evaluate uncommanded motion of the aileron. The Board believes that regardless of the complex issues associated with an SLD rule, the FAA should not have delayed evaluation of aileron hinge moment reversals. The Board notes that an evaluation method was developed and published in 2004, in AC 23.1419-2C, and that the FAA has used this method on new airplanes and to screen existing airplanes. Although the final action on this recommendation has been delayed as long as action on the other icing recommendations, the FAA's interim actions in (1) publishing an evaluation method in the AC, and (2) using it for new and existing aircraft are positive steps towards implementing the recommendation. Pending the FAA's completing the recommended action, Safety Recommendation A-96-58 remains classified "Open-Acceptable Response." Safety Recommendations A-98-91, -92, -96, -100, and -101 were issued to the FAA as a result of the Safety Board's investigation of the January 9, 1997, accident involving Comair flight 3272, an Embraer EMB-120. The airplane crashed during a rapid descent after an uncommanded roll excursion in icing conditions near Monroe, Michigan.

Recommendation Report

Thursday, March 05, 2009

REC:A-96-059

Log Number 2529A

Issue Date 8/15/1996 **ROSELAWN IN** **10/31/1994**

ON OCTOBER 31, 1994, ABOUT 1600 CENTRAL STANDARD TIME A SIMMONS AIRLINES AVIONS DE TRANSPORT REGIONAL ATR-72-210, OPERATING AS AMERICAN EAGLE FLIGHT 4184, CRASHED INTO A SOYBEAN FIELD 3 MILES SOUTH OF ROSELAWN, INDIANA. THE FLIGHT WAS ON AN INSTRUMENT FLIGHT RULES FLIGHT PLAN FROM INDIANAPOLIS, INDIANA, TO O'HARE INTERNATIONAL AIRPORT, CHICAGO, ILLINOIS, AND HAD BEEN PLACED IN A HOLDING PATTERN OVER ROSELAWN BECAUSE OF WEATHER DELAYS BEING EXPERIENCED AT O'HARE. THE AIRPLANE'S PRIMARY AND SECONDARY RADAR RETURNS DISAPPEARED FROM THE AIR TRAFFIC CONTROL RADAR SHORTLY AFTER THE FLIGHT WAS CLEARED TO CONTINUE THE HOLDING PATTERN AND TO DESCEND FROM 10,000 TO 8,000 FEET. WITNESSES OBSERVED THE AIRPLANE DESCEND OUT OF A LOW OVERCAST AND STRIKE THE GROUND IN A STEEP NOSE-DOWN ATTITUDE. ALL 64 PASSENGERS AND 4 CREWMEMBERS WERE KILLED IN THE ACCIDENT. THE SAFETY BOARD INVESTIGATED ONE SUCH EVENT THAT OCCURRED ON DECEMBER 22, 1988, AT MOSINEE, WISCONSIN.

Recommendation # A-96-059

Overall Status
CUA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FAA: ENCOURAGE ATR TO TEST THE NEWLY DEVELOPED LATERAL CONTROL SYSTEM DESIGN CHANGES & UPON VERIFICATION OF THE IMPROVED OR CORRECTED HINGE MOMENT REVERSAL/UNCOMMANDED AILERON DEFLECTION PROBLEM, REQUIRE THESE DESIGN CHANGES ON ALL NEW & EXISTING ATR AIRPLANES.

FAA	Closed - Unacceptable Action	2/5/2003

10/30/1996	Addressee	THE FAA IS EVALUATING A PROPOSED MODIFICATION OF THE ATR-42 & -72 LATERAL CONTROL SYSTEM THAT WOULD REDUCE PILOT FORCES REQUIRED IN THE EVENT OF AN AILERON HINGE MOMENT REVERSAL. THE PROPOSED MODIFICATION IS TO BE INSTALLED ON NEWLY MANUFACTURED AIRPLANES BUT NOT ON EXISTING AIRPLANES BECAUSE THE FAA BELIEVES SUCH A MODEST REDUCTION IN CONTROL WHEEL FORCE IS INSUFFICIENT JUSTIFICATION & THAT SUCH A REDUCED CONTROL WHEEL FORCES WOULD NOT HAVE HAD AN EFFECT ON THE OUTCOME OF THE ROSELAWN ATR-72 ACCIDENT.
8/20/1997	NTSB	THE BOARD CONCLUDES THAT THE REDUCTION OF AILERON HINGE MOMENT FORCE FROM SUCH A MODIFICATION COULD HAVE LIKELY PREVENTED THE AUTOPILOT DISCONNECT THAT INITIATED THE ROLL EXCURSION & SUBSEQUENTLY LED TO THE LOSS OF CONTROL & CRASH OF THE ATR-72 IN ROSELAWN. HOWEVER, BECAUSE THE FAA IS EVALUATION A NEW ATR ICE DETECTOR THAT CAN SENSE ICE ACCRETION BEHIND THE EXTENDED ATR DEICE BOOTS. THE RETROFIT OF THE ATR FLEET WITH SUCH AN ICE DETECTION SYSTEM MAY BE AN ACCEPTABLE ALTERNATE ACTION. PENDING FURTHER FAA ACTION ON THIS ISSUE, THE BOARD CLASSIFIES A-96-59 ":OPEN--ACCEPTABLE ALERNATE RESPONSE."

Recommendation Report

Thursday, March 05, 2009

REC:A-96-059

12/14/1998	Addressee	Letter Mail Controlled 12/21/98 9:51:10 AM MC# 981482 DURING THE 1997-1998 WINTER SEASON, AEROSPATIALE, IN CONJUNCTION WITH THE FRENCH DIRECTOR GENERAL OF CIVIL AVIATION (DGCA), CONDUCTED A THOROUGH EVALUATION OF A STANDARD, VIBROMETER-TYPE ICE DETECTOR LOCATED AFT OF THE LEADING EDGE OF THE WING IN A LOCATION DESIGNED TO SENSE ICE ACCRETION AFT OF THE DEICING BOOTS. THESE DETECTORS WERE INSTALLED ON TWO ATR FLIGHT TEST AIRPLANES AND ON SEVEN IN-SERVICE AIRPLANES FLYING IN NORMAL REVENUE SERVICE. DURING THE EVALUATION, ONLY TWO UNUSUAL ICING ENCOUNTERS (SEVERE LARGE DROPLET ICING ENCOUNTERS) WERE EXPERIENCED ON THE TWO FLIGHT TEST AIRPLANES, BUT NO UNUSUAL, SEVERE ICING ENCOUNTERS WERE OBSERVED ON ANY OF THE IN-SERVICE AIRPLANES. THE TWO SEVERE ICING ENCOUNTERS DID NOT PROVIDE MEANINGFUL DATA. CONSEQUENTLY, BASED ON THE ANALYSIS OF THE AVAILABLE DATA, AEROSPATIALE WAS UNABLE TO CONCLUDE IF THE ICING DETECTOR WAS FUNCTIONING CORRECTLY. HOWEVER, AEROSPATIALE AND THE DGCA BELIEVE THAT THE DATA SUGGEST THAT THE CURRENT ICE DETECTOR CONFIGURATION UNDERESTIMATES THE AMOUNT OF ICE ACCRETED ON THE WING LEADING EDGE. AEROSPATIALE WILL EXPLORE ANOTHER SOLUTION BASED ON MONITORING THE TURBULENCE LEVEL IN THE BOUNDARY LAYER OF THE UPPER WING SURFACE. DETAILS OF THIS ADDITIONAL EFFORT ARE PROPRIETARY; HOWEVER, AEROSPATIALE REPORTS SOME INITIAL SUCCESS DURING FLIGHT TESTING ON AN ATR-42-500. AEROSPATIALE PLANS TO REPEAT THE IN-SERVICE EVALUATION DURING THE 1998-1999 WINTER ICING SEASON. THE FAA BELIEVES THAT THE AEROSPATIALE EFFORT IS A GOOD-FAITH INVESTIGATION INTO THE POSSIBLE MERITS OF AN UNUSUAL, SEVERE ICING DETECTOR ON ITS AIRPLANE FLEET. THE FAA IS AWARE OF OTHER SIMILAR EFFORTS BY DIFFERENT AIRPLANE AND EQUIPMENT MANUFACTURERS, AND THE FAA BELIEVES THAT THIS TURBULENCE DETECTION TECHNOLOGY MAY PROVE TO HAVE MERIT.
4/29/1999	NTSB	THE SAFETY BOARD REMAINS CONCERNED ABOUT THE EFFECT OF CERTAIN ICING CONDITIONS ON ATR-72 AND -42 AIRCRAFT AND ENCOURAGES THE FAA TO CONTINUE MONITORING THE ATR ICE DETECTOR RESEARCH PROGRAM. THEREFORE, PENDING THE FAA APPROVAL AND REQUIREMENT OF AN ICE DETECTION SYSTEM THAT WILL DETECT ICE AFT OF THE ACTIVE PORTION OF THE BOOT OR MANDATORY RETROFIT OF THE LATERAL CONTROL SYSTEM DESIGN CHANGE ON ALL ATR-72 AND -42 AIRCRAFT CURRENTLY IN USE, A-96-59 IS CLASSIFIED "OPEN--ACCEPTABLE ALTERNATE RESPONSE."

Recommendation Report

Thursday, March 05, 2009

REC:A-96-059

3/28/2000	Addressee	Letter Mail Controlled 04/04/2000 11:24:17 AM MC# 2000477 THE FAA, THE FRENCH DIRECTOR GENERAL OF CIVIL AVIATION (DGCA), AND AEROSPATIALE CONDUCTED EXTENSIVE RESEARCH AFTER THE ROSELAWN ACCIDENT IN ORDER TO UNDERSTAND THE ROLL UPSET PHENOMENON THAT LED TO THIS ACCIDENT. THE RESEARCH REVEALED THAT THE SPECIFIC CHAIN OF EVENTS THAT CAUSED THE AIRLERON HINGE MOMENT SHIFT RESULTED FROM THE PROLONGED OPERATION OF THE ACCIDENT AIRCRAFT IN SUPERCOOLED LARGE DROPLET (SLD) CONDITIONS (SEVERE ICING CONDITIONS THAT FAR EXCEED THE ICING CERTIFICATION ENVELOPE FOR ALL AIRCRAFT) AT AN AIRSPEED CLOSE TO VFI (MAXIMUM FLAP EXTENSION SPEED) WHILE USING A 15-DEGREE FLAP HOLDING CONFIGURATION THAT WAS NOT PROVIDED FOR IN THE FAA AND DGCA APPROVED AIRPLANE FLIGHT MANUAL (AFM). THESE CONDITIONS RESULTED IN A NEGATIVE WING ANGLE-OF-ATTACK THAT, IN TURN, CAUSED THE ACCRETION OF A RIDGE OF ICE AFT OF THE OUTER WING DEICING BOOTS IN FRONT OF THE AILERON. THE AILERON HINGE MOMENT SHIFT THAT CAUSED THE ROLL UPSET OCCURRED WHEN THE FLIGHTCREW RETRACTED THE FLAPS TO 0-DEGREE FLAP POSITION AND THE AIRCRAFT'S ANGLE-OF-ATTACK REACHED OPPROXIMATELY 6 DEGREES--FAR BELOW THE 11.2-DEGREE STALL WARNING THRESHOLD. AFTER THE ROSELAWN ACCIDENT, THE FAA, THE DGCA, AND AEROSPATIALE TOOK THE FOLLOWING SPECIFIC ACTIONS TO ADDRESS THE ROLL UPSET PHENOMENON: (1) IDENTIFICATION OF SPECIFIC VISUAL CUES FOR SEVERE SLD ICING CONDITIONS AND DEVELOPMENT OF ASSOCIATED MANDATORY AFM PROCEDURES TO EXIT SUCH CONDITIONS. THESE UNIQUE AND OBVIOUS VISUAL CUES, WHEN COMBINED WITH AFM PROCEDURES THAT MANDATE EXITING SEVERE ICING CONDITIONS AS SOON AS POSSIBLE, ELIMINATE THE POSSIBILITY OF PROLONGED EXPOSURE TO SUCH CONDITIONS (AS WAS THE CASE IN THE ROSELAWN ACCIDENT). (2) IMPLEMENTATION OF MANDATORY AFM RESTRICTIONS THAT PROHIBIT HOLDING IN ICING CONDITIONS WITH FLAPS EXTENDED. THE FLIGHT TESTS AT EDWARDS AIR FORCE BASE (AFB) DEMONSTRATED THAT A CRITICAL ICE RIDGE DOES NOT DEVELOP IF THE AIRCRAFT IS FLOWN IN THE CLEAN CONFIGURATION. THIS PROHIBITION ELIMINATES THE POSSIBLITY THAT AN ICE RIDGE SIMILAR TO THAT IDENTIFIED DURING THE EDWARDS AFB TANKER FLIGHT TESTS CAN ACCRETE. IN THE UNLIKELY EVENT THAT A FLIGHTCREW FAILS TO IDENTIFY OR DETECT THE VISUAL CUES ASSOCIATED WITH SEVERE ICING CONDITIONS AND FAILS TO EXIT SUCH CONDITIONS, THIS REVISED PROCEDURE WILL PREVENT THE FORMATION OF A CRITICAL ICE RIDGE AND (3) IMPLEMENTATION OF THE MANDATORY CHORDWISE EXTENSION OF THE OUTER WIND DEICING BOOTS. THE EDWARDS AFB FLIGHT TESTS DEMONSTRATED THAT THE EXTENDED OUTER WING DEICING BOOTS PREVENT THE DEVELOPMENT OF AN ICE RIDGE EVEN IF THE AIRCRAFT IS IMPROPERLY FLOWN FOR A PROLONGED PERIOD OF TIME IN SEVERE ICING CONDITIONS WITH THE FLAPS EXTENDED. THE FAA AND OTHER AIRWORTHINESS AUTHORITIES HAVE RECOGNIZED THESE PROCEDURES AS EFFECTIVE COUNTERMEASURES TO THE SEVERE SLD ICING ENVIRONMENT ON THESE AIRPLANES. THE FAA HAS ALSO DEEMED THESE PROCEDURES AS AN ACCEPTABLE MEANS OF COMPLIANCE AND TERMINATING ACTION TO THE SLD AIRWORTHINESS DIRECTIVE T95-02-51. ADDITIONALLY, THESE PROCEDURES PROVIDE THE ATR FLEET WITH A TRIPLE LEVEL OF REDUNDANCY SPECIFICALLY DESIGNED TO BREAK THE CHAIN OF EVENTS THAT CAN CAUSE A ROLL UPSET, AND THE ADEQUACY OF THESE PROCEDURES HAS BEEN AMPLY DEMONSTRATED. SINCE THE IMPLEMENTATION OF THESE PROCEDURES, THE ATR-41/72 FLEET HAS EXPERIENCED FOUR SUCCESSIVE WINTERS WITHOUT A SINGLE REPORT OF A ROLL CONTROL SYSTEM ANOMALY OR CRITICAL ICE ACCRETION BEHIND THE EXTENDED OUTER WING DEICING BOOTS. IN THIS REGARD, AEROSPATIALE BELIEVES THAT IT IS SIGNIFICANT TO NOTE THAT THE ATR FLEET HAS NOW ACCUMULATED MORE FLIGHTS SINCE THE ROSELAWN ACCIDENT (5 MILLION FLIGHTS) THAN HAD BEEN ACCUMULATED PRIOR TO THE ROSELAWN ACCIDENT (3.9 MILLION FLIGHTS). IN ADDITION TO THE MANDATORY ACTIONS NOTED ABOVE TO ADDRESS THE UNCOMMANDED ROLL IN SLD CONDITIONS, AEROSPATIALE HAS VOLUNTARILY TAKEN ADDITIONAL ACTIONS TO DEVELOP FURTHER ENHANCEMENTS TO THE ATR ICE PROTECTION SYSTEM. THESE ADDITIONAL ACTIONS WERE DESIGNED TO MINIMIZE THE LIFT AND DRAG PENALTIES ASSOCIATED WITH INADVERTENT, PROLONGED OPERATION IN SEVERE ICING CONDITIONS. A FEW CASES OF MINIMAL ICE ACCRETION BEHIND THE MEDIAN OR MID-WING DEICING BOOTS (LOCATED OUTBOARD OF THE ENGINES BUT INBOARD OF THE OUTER WING DEICING BOOTS) WERE REPORTED DURING THE REGIONAL AIRLINE ASSOCIATION/FAA UNUSUAL ICING REPORTING PROGRAM SURVEY. THESE EVENTS WERE CONFIRMED TO HAVE OCCURRED WITHIN SEVERE SLD ICING CONDITIONS; HOWEVER, THERE WERE NO REPORTS OF ROLL ANOMALIES OR ADVERSE AIRCRAFT PERFORMANCE OR HANDLING CHARACTERISTICS. IN RESPONSE TO THESE RARE AND ISOLATED EVENTS, AND DESPITE THE FACT THAT ICE ACCRETION AFT OF THE MEDIAN BOOTS HAS NO CONNECTION TO THE ROSELAWN ROLL CONTROL PHENOMENON, AEROSPATIALE VOLUNTARILY DEVELOPED A MODIFICATION TO THE MEDIAN WING DEICING BOOTS. THE MODIFICATION EXTENDED THE CHORDWISE COVERAGE OF THE MEDIAN WING BOOT TO MINIMIZE THE POTENTIAL FOR ICE TO

ACCRETE ON THE UPPER SURFACE OF THE MEDIAN WING AREA IN SEVERE ICING CONDITIONS, THUS MINIMIZING ANY POTENTIAL LIFT OR DRAG PENALTIES THAT MAY AFFECT AIRCRAFT PERFORMANCE UNDER SUCH CONDITIONS. THIS MODIFICATION WAS APPROVED BY THE FAA FIRST FOR THE PRODUCTION AIRCRAFT (ATR 42-500 AND ATR 72-212A MODELS), AND THESE AIRCRAFT ARE NOW EQUIPPED WITH THIS MODIFICATION. THE RETROFIT OF ALL IN-SERVICE AIRCRAFT (ALL ATR 42/72 MODELS) HAS STARTED, AND COMPLETION OF THE RETROFIT IS EXPECTED BY 9/30/01. THE FAA BELIEVES THAT SINCE THE PROCEDURES AND AIRCRAFT MODIFICATIONS DISCUSSED ABOVE EFFECTIVELY ELIMINATE THE ROOT CAUSE OF THE ROLL UPSET PHENOMENON, A FLEETWIDE RETROFIT OF THE SPRING TAB MODIFICATION IS NOT NECESSARY FOR THE FOLLOWING REASONS: (1) IN THE ROSELAWN ACCIDENT SCENARIO WHERE NONE OF THESE PROCEDURAL CHANGES OR MODIFICATIONS HAD BEEN IMPLEMENTED AND THE AIRCRAT FLEW IN SEVERE SLD ICING CONDITIONS FOR A PROLONGED PERIOD OF TIME, THERE ARE TOO MANY VARIABLES INVOLVED TO STATE THAT THE SPRING TAB MODIFICATION ALONE WOULD HAVE PREVENTED AN ICE-INDUCED ROLL UPSET FROM OCCURRING. (2) WITH RESPECT TO THE CURRENT FLEET OF ATR AIRCRAFT, EVEN IF THE REVISED PROCEDURES ARE NOT FOLLOWED BY THE FLIGHTCREW, THE AIRCRAFT MODIFICATIONS AND PROCEDURAL CHANGES DISCUSSED ABOVE MAKE IT HIGHLY UNLIKELY THAT AN ICE-INDUCED ROLL UPSET COULD OCCUR AGAIN IN SEVERE SLD ICING CONDITIONS. AS PREVIOUSLY MENTIONED, THE EXTENDED OUTER WING DEICING BOOTS THAT HAVE NOW BEEN INCORPORATED ON THE ENTIRE ATR FLEET PREVENT THE DEVELOPMENT OF A CRITICAL RIDGE ON THE OUTER WING UPSTREAM OF THE AILERONS AND (3) IT IS VERY UNLIKELY THAT THE OUTER WING DEICING BOOTS WOULD NOT BE AVAILABLE TO THE FLIGHTCREW IN THE EVENT OF AN INADVERTENT ENCOUNTER WITH SLD ICING CONDITIONS. IN THIS REGARD, THE ONLY WAY THE DEICING BOOTS WOULD NOT BE AVAILABLE TO THE FLIGHTCREW WOULD BE IF THE FLIGHTCREW FAILED TO TURN ON THE BOOTS OR THE DEICING BOOTS MALFUNCTIONED. THESE FAILURE SCENARIOS ARE EXTREMELY UNLIKELY. SPECIFICALLY, A FAILURE BY THE FLIGHTCREW TO ACTIVATE THE DEICING BOOTS IS NOW VERY UNLIKELY BECAUSE THE ATR ICE DETECTION SYSTEM LOGIC HAS BEEN MODIFIED SO THAT THE ICE DETECTOR LIGHT WILL FLASH CONTINUOUSLY IN THE COCKPIT UNTIL THE "LEVEL 311" DEICING SWITCH (DEICING BOOTS TURNED ON) IS SELECTED. FURTHER, AEROSPATIALE'S ANALYSIS CONFIRMS THAT THE PROBABILITY OF AN UNDETECTED FAILURE OF THE DEICING BOOTS ASSOCIATED WITH PROLONGED FLIGHT OPERATIONS IN SEVERE SLD ICING CONDITIONS IS EXTREMELY REMOTE. REGARDING THE DEVELOPMENT OF AN SLD ICING DETECTOR, AEROSPATIALE REPORTS THAT DURING THREE SUCCESSIVE WINTERS (1996-1998), IT CONDUCTED FLIGHT TEST CAMPAIGNS ON A COMPANY-OWNED AIRCRAFT, AS WELL AS IN-SERVICE EVALUATIONS ON SEVERAL ATR-72 AIRCRAFT IN THE UNITED STATES AND EUROPE. THESE FLIGHT TEST PROGRAMS WERE DESIGNED TO TEST AN ICE DETECTOR DURING FLIGHT IN UNUSUAL ICING CONDITIONS (SLD) AND WERE CONDUCTED IN THE U.S. IN CONNECTION WITH THE UNUSUAL ICING REPORTING PROGRAM. THE FLIGHT TESTS AND IN-SERVICE EVALUATIONS WERE UNSUCCESSFUL FOR SEVERAL REASONS, INCLUDING THE FOLLOWING: (1) TECHNICAL DIFFULTIES WITH RESPECT TO DETERMINING THE PROPER LOCATION ON THE AIRCRAFT FOR AN UNUSUAL ICE (SLD) DETECTOR. (2) TECHNICAL DIFFICULTIES WITH RESPECT TO FINE-TUNING THE ICE DETECTOR. (3) THE RARITY OF SEVERE SLD ICING ENCOUNTERS. (4) THE LACK OF ANY ESTABLISHED CERTIFICATION CRITERIA AND THE LACK OF ANY APPROVED REGULATORY COMPLIANCE MECHANISMS FOR DEALING WITH THE SEVERE SLD ICING ENVIRONMENT. THESE ISSUES, AMONG OTHERS, ARE FUNDAMENTAL ISSUES THAT ARE INVOLVED IN THE DEVELOPMENT OF A RELIABLE ICE DETECTOR FOR DETECTING UNUSUAL ICING CONDITIONS. THE NEED FOR REGULATIONS REGARDING THE INSTALLATION OF AN UNUSUAL ICING DETECTOR ON TRANSPORT-CATEGORY AIRCRAFT IS CURRENTLY BEING ANALYZED WITHIN THE AVIATION RULEMAKING ADVISORY COMMITTEE'S ICE PROTECTION HARMONIZATION WORKING GROUP. THIS WORKING GROUP IS COMPOSED OF REPRESENTATIVES FROM AIRWORTHINESS AUTHORITIES, AIRCRAFT MANUFACTURERS, AND INDUSTRY GROUPS. APPROPRIATE REGULATIONS, APPLICABLE STANDARDS, AND ADVISORY MATERIALS WILL BE DEVELOPED IF THIS WORKING GROUP FINDS THEM TO BE NECESSARY. THE FAA BELIEVES THAT THE MANDATORY AND VOLUNTARY ACTIONS TAKEN BY AEROSPATIALE IN RESPONSE TO THE ROSELAWN ACCIDENT ADDRESS THIS RECOMMENDATION COMPLETELY, AND I PLAN NO FURTHER ACTION.

Recommendation Report

Thursday, March 05, 2009

REC:A-96-059

11/14/2000	NTSB	THE SAFETY BOARD NOTES THAT ALTHOUGH NO ATR ICING ACCIDENTS SIMILAR TO THAT AT ROSELAWN HAVE OCCURRED SINCE THE ACTIONS LISTED ABOVE WERE TAKEN, THE BOARD HAS SEVERAL CONCERNS REGARDING THE LONG-TERM ADEQUACY OF THOSE ACTIONS. SPECIFICALLY, THE BOARD IS CONCERNED THAT THE EXTENDED OUTER-WING DEICING BOOTS MAY NOT PREVENT THE DEVELOPMENT OF AN ICE RIDGE IN SEVERE ICING CONDITIONS EVEN WITH FLAPS RETRACTED AND THAT THE VISUAL ICING CUES MAY NOT GUARANTEE THAT PILOTS WILL IDENTIFY SEVERE ICING CONDITIONS. FURTHER, THE BOARD NOTES THAT THE EXISTING ATR ICING DETECTOR IS NOT ALWAYS ABLE TO DETECT SEVERE ICING CONDITIONS. THE BOARD IS AWARE OF ARAC AND INDUSTRY DISCUSSIONS REGARDING A NEW TYPE OF SEVERE ICING DETECTOR; THE FAA SHOULD PURSUE THAT RESEARCH AND DEVELOPMENT OPPORTUNITY AS A MEANS OF IMPROVING THE HUMAN FACTORS ASPECT OF SEVERE ICING DETECTION AND SUBSEQUENT PROCEDURAL ACTION. ADDITIONAL SAFEGUARDS, SUCH AS THE SPRING TAB MODIFICAITON INCORPORATED ON NEW ATR AIRCRAFT, SHOULD BE REQUIRED ON ALL EXISTING ATR AIRCRAFT TO FURTHER MINIMIZE THE POTENTIALLY CATASTROPHIC CONSEQUENCES RESULTING FROM A SEVERE ICING ENCOUNTER. PENDING FURTHER FAA ACTION, A-96-59 IS CLASSIFIED "OPEN--UNACCEPTABLE RESPONSE."

3/20/2001 Addressee

Letter Mail Controlled 03/27/2001 12:04:42 PM MC# 2010265: The Federal Aviation Administration (FAA) provided a complete assessment of its actions to address this safety recommendation in previous letters to the Board. The FAA informed the Board of the research that was conducted by the FAA and others after the Roselawn accident and listed various mandatory modifications and Airplane Flight Manual (AFM) procedural changes that resulted from the research. The FAA also described additional modifications and other actions developed and implemented voluntarily by Aerospatiale, and explained that the entire ATR fleet would soon be equipped with these additional design improvements. The FAA considered its action to be completed on this safety recommendation.

On November 14, 2000, the Board classified this safety recommendation as "open unacceptable," stating that it had several concerns regarding the long-term adequacy of those actions. The following is the FAA's response to each of the Board's concerns

The Board is concerned that the extended outer-wing deicing boots may not prevent the development of an ice ridge in severe icing conditions even with flaps retracted.

As part of the research following the accident, the FAA, the French Director General of Civil Aviation (DGCA), the National Aeronautics and Space Administration, and the Safety Board participated in two series of icing tanker tests at Edwards Air Force Base. Details of these icing tanker tests can be found in the final report of the FAA/DGCA Special Certification Review (SCR) of ATR-42 and -72 series airplanes dated September 29, 1995.

During the first of the two test series, it was confirmed that a ridge of ice would form aft of the original deicing boots in simulated very severe icing conditions, which are believed by the SCR team to approximate the meteorological conditions of freezing drizzle that contributed to the accident. The original boots extended to approximately 5 percent of chord on the ATR-42 and 7 percent of chord on the ATR-72, and the ice ridge with flaps set at the critical case of 15 degrees appeared at approximately 8.5 percent of chord. With flaps up, the ice ridge appeared during the tanker tests at approximately 7.5 percent of chord.

It was confirmed during the second tanker test series that the modified outer deicing boots, which extend the trailing edge of the boots to 12.5 percent of chord on both airplane models, prevented the formation of the ice ridge in severe icing conditions at the 7.5 percent and 8.5 percent of chord locations with the flaps set at zero and at 15 degrees, respectively. Thus, it has been shown conclusively during inflight icing tanker tests that the expanded outer-wing boots will prevent the formation of a ridge of ice in severe icing conditions similar to the Roselawn accident conditions. These extended outer deicing boots are now installed on the entire ATR fleet.

The Board is concerned that the visual icing cues may not guarantee that pilots will identify severe icing conditions.

During the Edwards icing tanker tests in severe supercooled large droplets (SLD) conditions, a unique ice accretion formed on the cockpit side windows having a dispersed granular pattern consisting of a ridge of ice running parallel to the forward side window post and approximately one-third of the way back from the side window forward edge. This formation extended the entire height of the side window. Flight tests showed that this formation occurred very rapidly on the side windows of the cockpit during the first minute of immersion in the tanker ice plume. It is important to note that no ice formed on the side windows during flight in simulated icing conditions consistent with Appendix C of 14 CFR Part 25. From these data, the FAA concluded that this side window ice accretion constitutes an unmistakable visual cue that the airplane has flown into an area of severe icing conditions outside Appendix C conditions. FM-approved AFM's for the ATR-42/-72 now contain an explanation of this visual cue and mandatory instructions for the flightcrew to exit those severe icing conditions immediately. Additionally, careful study of in-service events and flight testing by the FAA have shown that there are several alternative visual cues available to provide adequate warning to the flightcrew when the airplane is in a potentially hazardous condition. These other cues are:

· ice accretion beyond the area of the upper leading edge of the wing that can be seen from the flightcrew seats (ice accretion greater than residual ice--about l/4 inch—has been reported without any adverse handling effects);
· droplets "splashing" on the windshield at temperatures conducive to ice formation; water streaming on the windshield which can result from SLD or smaller droplets at high liquid water content; and
· observations of precipitation on the weather radar at temperatures conducive to freezing.

These are all secondary indications to alert the flightcrew that the airplane is in potentially hazardous icing conditions and are described in the ATR-42/-72 AFM.

The Board notes that the existing ATR icing detector is not always able to detect severe icing

conditions.

On the ATR fleet, the primary ice detection method is the visual detection of ice accretion on the windshield wipers, the windshield posts, the propeller spinners, and other structure by the flightcrew. The electronic ice detector has been certified by the FAA as a supplementary ice detection method only. In addition, the entire ATR fleet is equipped with an "Ice Evidence Probe" (a passive protuberance located outside the captain's window) that is designed to be the first area of the airplane to collect ice and the last to be cleared of ice. The visual ice detection method (primary), supplemented by the electronic detection system (secondary), and combined with the numerous visual cues of inadvertent entry into severe icing conditions outside those specified in Appendix C of 14 CFR Part 25 ensure that the flightcrew will maintain adequate awareness of the icing conditions in which their airplane is flying.

The Board states that it is aware of ARAC and industry discussions regarding a new type of severe icing detector—the FAA should pursue that research and development opportunity as a means of improving the human factors aspect of severe icing detection and subsequent procedural action.

The FAA agrees with the Board. The need for regulations regarding the installation of an unusual icing detector on transport-category aircraft is currently being analyzed within the Aviation Rulemaking Advisory Committee's Ice Protection Harmonization Working Group. This working group is composed of representatives from airworthiness authorities, aircraft manufacturers, and industry groups. Appropriate research and development activities will be pursued and regulations, applicable standards, and advisory materials developed if this working group finds them to be necessary.

Additional safeguards, such as the spring tab modification incorporated on new ATR aircraft should be required on all existing ATR aircraft to further minimize the potentially catastrophic consequences resulting from a severe icing encounter.

The modification to the lateral control system referenced in this safety recommendation replaces the direct, mechanical connection between the pilot's control wheel and the ailerons with a spring tab system. In the old system, the pilot moves the ailerons up and down directly with the control wheel through a series of cables and pushrods. The ailerons contain small servo tabs driven in the opposite direction of aileron movement by a mechanical linkage (aileron trailing edge up, tab trailing edge down), which provides a balancing aerodynamic moment to reduce pilot effort required to deflect the ailerons.

In the modified spring tab system, the pilot controls free-floating ailerons by moving the aileron tabs directly. The pilot's control wheel is not connected to the ailerons directly except through a stiff spring. At low airspeeds, the aerodynamic forces on the ailerons are low and the stiff spring does not stretch. As a result, the ailerons and their tabs will move directly through pilot action. As airspeed increases, however, pilot effort needed to deflect the ailerons increases due to aerodynamic pressure. At higher speeds, the springs will stretch under the higher load, effectively disconnecting the ailerons from the control wheel and allowing the aileron tab only to move the aileron, thus reducing the perceived control wheel force felt by the pilot. This type of lateral control system has been in use for many years, especially on larger airplanes in which the normal control wheel forces may be large, and spring tab ailerons can result in a significant reduction in the perceived control wheel forces felt by the pilots.

In the case of the ATR-42 and -72, the reduction in perceived control wheel forces due to the modification was quite small because the original directly linked ailerons had been optimized for minimum control wheel forces by Aerospatiale during the initial design of the two airplanes. The original (premodification) control wheel forces were kept low by the use of two types of aerodynamic balancing: a relatively large aileron surface area ahead of the aileron hinge line that provided a balancing aerodynamic force to the force applied by the pilot to deflect the ailerons; and aerodynamically balancing aileron horns that provided additional forces to balance the force required to
be applied by the pilot.

In its letter to the FAA dated August 20, 1997, the Board concluded that the reduction of aileron hinge moment forces from such a modification could have likely prevented the autopilot disconnect that initiated the roll excursion and subsequently led to the loss of control and crash of the ATR-72 in Roselawn. The FAA disagrees with the Board's conclusion. The FAA and the DGCA reviewed data from the digital flight data recorder on the accident airplane and concluded that the data clearly show that the disconnect of the autopilot was a result of the uncommanded deflection of the ailerons due to the ice ridge and was not the cause of the roll upset. Further, the SCR team concluded from analysis of icing tanker flight testing and wind tunnel testing that the control wheel forces that were likely present during the roll upset did not exceed 14 CFR Part 25 limits. Therefore, the FM believes that the slight reduction of aileron hinge moment forces from such a modification could be considered to be a product improvement, but would in no way impact the "hinge moment reversal/uncommanded

aileron deflection problem" as asserted by the Board. The FAA does not plan to mandate the installation of this modification on the existing ATR fleet.

The mandatory and voluntary actions taken by the FAA and Aerospatiale fully address this safety recommendation, and I consider the FAA's action to be completed.

2/5/2003 NTSB

The Safety Board and the FAA have had extensive correspondence and discussion on this issue. The FAA states that it considers the spring tab aileron system installed on all newly manufactured ATR airplanes to be a product improvement, does not find sufficient justification for a fleetwide retrofit, and lists the mandatory and voluntary actions already taken by the FAA and Aerospatiale that address this safety recommendation.

The FAA states that the ATR inflight icing tanker tests showed that the expanded outer-wing boots now installed on the entire ATR fleet will prevent the formation of a ridge of ice in severe icing conditions. The Safety Board is not convinced that this testing was sufficiently broad to conclude there is no combination of permissible airplane configuration, AOA, and naturally occurring icing conditions that could produce a ridge of ice aft of the boots. The FAA further states that there are unmistakable visual cues, such as side window ice accretion, that the airplane has flown into an area of severe icing conditions outside Appendix C, and that the AFMs for the ATR-42/72 now contain an explanation of this visual cue and mandatory instructions for the flight crew to exit such conditions immediately. The Board believes that although the visual cues for severe icing conditions involving ATR aircraft to date have been distinctive, it should not be assumed that side window ice will be present for all dangerous icing conditions. Human factors issues remain, and flight crew awareness is not always guaranteed. It is possible that visual cues may not be as distinct in certain icing encounters or that flight crews may not notice the cues, associate them with conditions requiring their exit from the area, and exit the area fast enough to prevent the formation of an ice ridge aft of the boots.

The FAA disagrees with the Safety Board's conclusion that the reduction of aileron hinge moment forces from the aileron spring tab modification could likely have prevented the autopilot disconnect that initiated the roll excursion and subsequently led to the loss of control and crash of the ATR-72 in Roselawn. The Board believes that the autopilot disconnect was a result of the uncommanded aileron deflections due to the ice ridge, and the autopilot disconnect did not cause the roll upset. However, the autopilot disconnect was sudden and exacerbated the magnitude of the roll upset. As concluded by Honeywell, the Roselawn autopilot's aileron motion monitor logic commanded a disconnect because the aileron servo was backdriven by the ailerons with a significant force. The Board believes that the spring tab system may reduce this force feedback and prevent autopilot disconnect or delay the disconnect and give the flight crew more time to recognize the uncommanded roll and take action before dangerous attitudes are reached.

The Safety Board has not reviewed any quantitative data on control wheel forces with the spring tab system; however, the Board's position that the spring tab system might have prevented or delayed the autopilot disconnect is also supported by AMR pilot observations during flight tests with Roselawn-type ice shapes on a spring tab-equipped ATR-72. The airplane in these tests was equipped with an AOA gauge and tail-mounted video cameras trained on the ailerons to help demonstrate the performance of the spring tab in the presence of flow separation similar to the Roselawn accident. The AMR pilots report that the autopilot remained connected and controlled the roll attitude of the airplane throughout the AOA range in which flow separation occurred over the ailerons. As the FAA is aware, the ATR-72 autopilot is not able to remain connected and control the roll attitude of the airplane in this condition with the original aileron tab configuration. Further, the AMR pilots were able to hand fly the spring tab-equipped airplane in this flow separation region with only one hand on the control wheel and with wheel forces much lower than those found on ATR-72s with the original aileron tab configuration.

The FAA states that the Special Certification Review (SCR) team concluded from its analysis of icing tanker flight testing and wind tunnel testing that the control wheel forces that are likely present during the Roselawn roll upset were within 14 CFR Part 25 limits (up to 60 pounds). The Safety Board has not reviewed any quantitative data to support this conclusion. Airspeeds in the icing tanker tests did not approach those of the accident flight upset (which started at about 186 knots and ended at over 375 knots), and the SCR report provided to the Board did not include any of the wind tunnel test data. Nevertheless, even if control wheel forces were initially within prescribed limits, force limitations alone do not address time lags in pilot response to sudden and oscillatory phenomena. The potential for large, abrupt, and oscillatory control wheel forces, such as those that occurred in the Roselawn accident, clearly represent an unsafe and potentially catastrophic condition. The Board believes that steps should be taken to minimize these effects to the greatest extent possible, including the retrofit of the spring tab system on all ATR aircraft equipped with the original aileron tab configuration.

The Safety Board appreciates the FAA's past and continuing efforts, such as its commitment to continue research on new ice detector technology, and to address the ATR-specific and general aircraft icing issues raised during and after the Roselawn investigation. However, because the FAA has not required the spring tab aileron control system retrofit on all ATR aircraft, Safety Recommendation A-96-59 is classified "Closed--Unacceptable Action."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Recommendation # A-96-060

Overall Status
OAAR

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FAA: REVISE 14 CFR PARTS 91.527 AND 135.227 TO ENSURE THAT THE REGULATIONS ARE COMPATIBLE WITH THE PUBLISHED DEFINITION OF SEVERE ICING, AND TO ELIMINATE THE IMPLIED AUTHORIZATION OF FLIGHT INTO SEVERE ICING CONDITIONS FOR AIRCRAFT CERTIFIED FOR FLIGHT IN SUCH CONDITIONS.

FAA	Open Acceptable Alternate Response

10/30/1996	Addressee	The FAA is developing an FAA In-flight Icing Plan which will address the recommendations and issues raised at the May 1996 International Conference on Aircraft In-flight Icing. One major issue identified at the conference was the need to harmonize icing terminology and criteria. This initiative will be addressed by a working group that will review, revise, develop the necessary advisory and guidance materials and handbook changes, and revise the appropriate regulations. This project will address the intent of this safety recommendation. The working group will be chaired by the FAA and will include representatives from appropriate FAA offices, the National Weather Service (NWS), the Aviation Weather Center in Kansas City, Missouri, and the William J. Hughes Technical Center in Atlantic City, New Jersey. I will keep the Board apprised of the FAA's progress on these safety recommendations.
6/27/1997	Addressee	THE FAA PUBLISHED ITS INFLIGHT AIRCRAFT ICING PLAN IN APRIL 1997. THE PLAN ADDDRESSES RECOMMENDATIONS & ISSUES RAISED AT THE MAY 1996 INTERNATIONAL CONFERENCE ON AIRCRAFT INFLIGHT ICING. THE PLAN DESCRIBES VARIOUS ACTIVITIES INCLUDING RULEMAKING, DEVELOPMENT OF & REVISIONS TO ADVISORY MATERIALS, RESEARCH PROGRAMS, & OTHER INITIATIVES TO ACHIEVE SAFETY WHEN OPERATING IN ICING CONDITIONS. THE MOST CURRENT INFO WAS USED IN THE DEVELOPMENT OF THE TASKS & SCHEDULES CONTAINED IN THE PLAN. HOWEVER, BECAUSE OF THE COMPLEX NATURE OF THE TASKS & THE INTERRELATIONSHIPS BETWEEN TASKS, THE PLAN MAY NEED TO BE REVISED PERIODICALLY TO REFLECT CHANGES IN SCOPE OR SCHEDULE. THE INTENT OF THIS RECOMENDATION IS ADDRESSED IN THE PLAN. THE FAA WILL KEEP THE BOARD APPRISED OF THE FAA'S PROGRESS ON THIS RECOMMENDATION.
8/20/1997	NTSB	A-96-60 ASKED THE FAA TO REVISE 14 CFR 91.527 & 135.227 TO ENSURE THAT THE REGULATIONS ARE COMPATIBLE WITH THE PUBLISHED DEFINITION OF SEVERE ICING, & TO ELIMINATE THE IMPLIED AUTHORIZATION OF FLIGHT INTO SEVERE ICING CONDITIONS FOR AIRCRAFT CERTIFIED FOR FLIGHT IN SUCH ICING CONDITION. PENDING COMPLETION & EVALUATION OF THE ACTIONS PLANNED THEREIN, THE BOARD CLASSIFIES A-96-51,-52, & -60 "OPEN--ACCEPTABLE RESPONSE."
3/16/2000	NTSB	ON 3/16/00 THE SAFETY BOARD REQUESTED AN UPDATE ON THE STATUS OF THIS RECOMMENDATION.

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MODE:AVIATION KEYWORD 1:icing

5/18/2000	Addressee	ON 6/27/97, THE FAA ADVISED THE BOARD THAT THE AIRCRAFT ICING PLAN ISSUED IN APRIL 1997 ADDRESSED RECOMMENDATIONS AND ISSUES RAISED AT THE MAY 1996 INTERNATIONAL CONFERENCE ON AIRCRAFT IN-FLIGHT ICING. THE ICING PLAN DESCRIBED VARIOUS ACTIVITIES INCLUDING RULEMAKING, DEVELOPMENT OF AND REVISIONS TO ADVISORY MATERIALS, RESEARCH PROGRAMS, AND OTHER INITIATIVES TO ACHIEVE SAFETY WHEN OPERATING IN ICING CONDITIONS. THE FAA FURTHER STATED THAT A WORKING GROUP WAS BEING FORMED TO REVIEW, REVISE, AND DEVELOP NECESSARY REGULATIONS AND GUIDANCE MATERIALS RELATED TO ICING. THE FAA'S IN-FLIGHT ICING PLAN, FORMERLY KNOWN AS THE AIRCRAFT ICING PLAN, CONSISTS OF 14 TASKS. EACH TASK HAS A WORKING TEAM TO ADDRESS VARIOUS ISSUES RELATED TO ICING. TASK 1B TEAM HAS DEVELOPED A LIST OF NEW ICING TERMINOLOGY, WHICH WILL INCLUDE "ICING IN PRECIPITATION," AND A TABLE OF ICING EFFECTS ON AIRCRAFT. THE ICING TERMINOLOGY WILL BE INCORPORATED INTO ALL EXISTING AND FUTURE GUIDANCE AND RELEVANT DOCUMENTS. THE TABLE PROVIDES INFORMATION TO PILOTS IN THE FORM OF FOUR LEVELS OF EFFECTS WITH LEVEL FOUR HAVING THE MOST SEVERE EFFECT ON POWER, CLIMB, SPEED, CONTROL, AND STALL CHARACTERISTICS. THE FAA HAS INCLUDED IN ITS PROPOSAL OF NEW ICING TERMINOLOGY A REQUIREMENT THAT THE LEVEL OF EFFECTS BE INCLUDED IN THE PILOT'S ICING REPORT FORMAT SO THAT OTHER PILOTS CAN MAKE A REASONABLE JUDGEMENT REGARDING THE EFFECTS THAT THE REPORTED ICING MAY HAVE ON THEIR AIRCRAFT. THE FAA IS EVALUATING THE FEASIBILITY OF AMENDING 14 CFR 91.527 AND 135.227 TO FORBID FLIGHT INTO SEVERE ICING CONDITIONS. I WILL INFORM THE BOARD OF THE FAA'S DECISION ON THIS RECOMMENDATION AS SOON AS ITS EVALUATION IS COMPLETED.
11/14/2000	NTSB	THE SAFETY BOARD IS CONCERNED THAT, AFTER MORE THAN 3 YEARS SINCE THE ISSUANCE OF THIS RECOMMENDATION, THE FAA HAS NOT YET MADE THE NECESSARY REVISIONS. THE BOARD NOTES THAT THE CITED REGULATIONS AND THE PUBLISHED ICING TERMINOLOGY ARE INCOMPATIBLE. NEVERTHELESS, THE BOARD RECOGNIZES THAT COMPLETION OF THE NEW ICING TERMINOLOGY, AS DISCUSSED IN RESPONSE TO A-96-51 AND -52, WILL ENABLE THE FAA TO DETERMINE AN APPROPRIATE COURSE OF ACTION FOR THIS RECOMMENDATION. PENDING REVISION OF 14 CFR PARTS 91.527 AND 135.227, A-96-60 IS CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."
3/21/2001	Addressee	Letter Mail Controlled 03/26/2001 8:26:49 PM MC# 2010261 In May 2000, the FAA informed the Board that it was evaluating the feasibility of amending 14 CFR 91.527 and 135.227 to forbid flight into severe icing conditions. The FAA is now concerned that the apparent incompatibility of 14 CFR 91.527 and 135.227 may be because of the difference in the way the term "severe icing" is understood. The FAA considers severe icing to be airplane-specific; however, weather forecasters do not have the technical capability at this time to forecast severe icing conditions for specific aircraft. Consequently, the FAA will ask the In-Flight Icing Steering Committee to address this issue. It is anticipated that the FAA will have a course of action established to address this safety recommendation by spring 2001.
6/5/2001	NTSB	The Safety Board is concerned that this problem was not discovered until 4 1/2 years after the recommendation was issued. Nevertheless, pending completion of the recommended action, Safety Recommendation A-96-60 remains classified "Open--Acceptable Response."
8/29/2003	Addressee	Letter Mail Controlled 9/2/2003 2:47:32 PM MC# 2030440 In May 2000, the FAA informed the Board that it was evaluating the feasibility of amending 14 CFR 91.527 and 135.227 to forbid flight into severe icing conditions. The FAA was concerned that the apparent incompatibility of 14 CFR 91.527 and 135.227 may be because of the difference in the way the term "severe icing" is understood. The FAA considers severe icing to be airplane-specific; however, weather forecasters do not have the technical capability at this time to forecast severe icing conditions for specific aircraft. For example, airplanes with thinner airfoil shapes are more efficient collectors of ice than airplanes with thicker airfoil shapes. To broaden and reinforce this knowledge, the FAA published Advisory Circular (AC) 91-74, Pilot Guide - Flight In Icing Conditions. The AC provides pilots with a convenient reference on the principal factors related to flight in icing conditions and informs them of the location of additional information in related publications. I have enclosed a copy of the AC for the Boards information. The FAA had planned to ask the In-Flight Icing Steering Committee to address the difference in the way the term "severe icing" was understood, but subsequently determined that this request was not within the scope of the committee. As an alternate solution, the FAA issued Notice N8400.33, Air Carrier Transportation - Flight Into Known or Forecast Severe Icing Condition. The notice clarifies the definition of severe icing and clearly states that when encountering severe icing, immediate flight diversion is necessary. I have enclosed a copy of the notice for the Board's information. I believe that the FAA has satisfactorily responded to this safety recommendation, and I look forward to your response. SWAT Meeting, 2/24/04 Minutes attached.

Recommendation Report

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MODE:AVIATION KEYWORD 1:icing

4/9/2004	NTSB	Previously, the FAA informed the Safety Board that it was concerned that the apparent incompatibility of 14 Code of Federal Regulations 91.527 and 135.227 may result from the difference in the way "severe icing" is understood. The FAA considers severe icing to be airplane-specific; however, weather forecasters do not have the technical capability to forecast severe icing conditions for specific aircraft. To address this gap, the FAA published Advisory Circular (AC) 91-74, "Pilot Guide-Flight In Icing Conditions," which provides pilots with a reference on factors related to flight in icing conditions. The FAA had planned to ask its In-Flight Icing Steering Committee to address the difference in the way the term "severe icing" was understood, but it subsequently determined that this request was not within the scope of the committee. Instead, on October 30, 2002, the FAA issued Notice N8400.33, "Air Carrier Transportation-Flight Into Known or Forecast Severe Icing Condition," which clarifies the definition of severe icing and states that when a pilot encounters severe icing, immediate flight diversion is necessary. Although Notice N8400.33 met the intent of this recommendation in an acceptable alternate manner, the Safety Board notes that it did so only for air carrier operations (i.e., those operated under Parts 135 and 121); it did not address aircraft operated under Part 91, although the recommendation specifically asked for changes to Part 91. The Board further notes that the notice was cancelled on October 30, 2003. In addition, the Board notes that AC 91-74, Appendix B, "Regulatory Issues Related to Icing," Paragraph 1, "Part 91 Icing Regulations," Section (c), "Severe Icing" contains an implied authorization of flight into severe icing conditions for aircraft certified for flight in such conditions. That section states the following: c. Severe Icing. No pilot may fly an airplane into known or forecast severe icing conditions unless: (1) The airplane has ice protection provisions that meet the requirements in section 34 of SFAR 23. (2) The airplane has ice protection provisions that meet the requirements for transport category airplane type certification. On February 24, 2004, staff from the FAA and the Safety Board met to discuss issues related to currently open recommendations, including Safety Recommendation A-96-60. At that meeting, the Board discussed its concern with the continued implied authorization in AC 91-74 for flight into severe icing conditions. Potential revisions to the AC's language that would address the Board's concerns in this recommendation in an acceptable alternate manner were also discussed. The Board believes that appropriate changes to the AC will address our concern that Notice N8400.33 has expired and applies only to Part 135 operations. Accordingly, pending revisions to the AC that address the implied authorization in Parts 91and 135 for flight into severe icing conditions, Safety Recommendation A-96-60 is classified "Open--Acceptable Alternate Response."

Recommendation # A-96-061

Overall Status
CAA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FAA: REQUIRE ALL PRINCIPAL OPERATIONS INSPECTORS (POIS) OF 14 CFR PART 121 & 135 OPERATORS TO ENSURE THAT TRAINING PROGRAMS INCLUDE INFO ABOUT ALL ICING CONDITIONS, INCLUDING FLIGHT INTO FREEZING DRIZZLE/FREEZING RAIN CONDITIONS.

FAA	Closed - Acceptable Action	8/20/1997

10/30/1996	Addressee	The FAA agrees with this safety recommendation and will issue a flight standards information bulletin requiring POI's to ensure that training programs include information about all icing conditions including flight into freezing drizzle/freezing rain conditions. The FAA anticipates issuance of the bulletin by February 1997. I will provide the Board with a copy of the bulletin as soon as it is issued.
4/24/1997	Addressee	The FAA issued FSAT 97-03 to direct POI's to ensure that training programs include information about all icing conditions including flight into freezing drizzle/freezing rain conditions. I have enclosed a copy of the bulletin for the Board's information. I consider the FAA's action to be completed on this safety recommendation, and I plan no further action.

8/20/1997	NTSB	A-96-61 URGED THE FAA TO REQUIRE ALL POIS OF 14 CFR PART 121 & 135 OPERATORS TO ENSURE THAT TRAINING PROGRAMS INCLUDE INFO ABOUT ALL ICING CONDITIONS, INCLUDING FLIGHT INTO FREEING DRIZZLE & FREEZING RAIN CONDITIONS. BASED ON A REVIEW OF THE FSIB, THE BOARD CLASSIFIES A-96-61 "CLOSED--ACCEPTABLE ACTION."

Recommendation # A-96-065

Overall Status
CAA

Priority
CLASS II

THE NTSB RECOMMENDS THAT THE FAA: EVALUATE THE NEED TO REQUIRE A STERILE COCKPIT ENVIRONMENT FOR AIRPLANES HOLDING IN SUCH WEATHER CONDITIONS AS ICING & CONVECTIVE ACTIVITY, REGARDLESS OF ALTITUDE.

FAA	Closed - Acceptable Action	8/20/1997

10/30/1996	Addressee	The FAA agrees with the intent of this safety recommendation and will revise AC 120-51B, Crew Resource Management, Appendix 3, Appropriate Training Topics. The AC will include new information about the need to require a sterile cockpit environment for airplanes holding in such weather conditions as icing and convective activity regardless of altitude. I will provide the Board with a copy of the AC as soon as it is issued.
4/23/1997	Addressee	ON 2/25/97 ISSUED CHANGE 2 TO AC120-51B WHICH RECOMMENDS CRM TRAINING FOR CREWMEMBERS. THE AC SPECIFICALLY RECOMMENDS THAT THE TRAINING SHOULD EMPHASIZE THE NEED FOR MAXIMUM SITUATIONAL AWARENESS & THE APPROPRIATENESS OF STERILE COCKPIT DISCIPLINE, REGARDLESS OF ALTITUDE.
8/20/1997	NTSB	A-96-65 ASKED THE FAA TO EVALUATE THE NEED TO REQUIRE A STERILE COCKPIT ENVIRONMENT FOR AIRPLANES HOLDING IN SUCH WEATHER CONDITIONS AS ICING & CONVECTIVE ACTIVITY, REGARDLESS OF ALTITUDE. BASED ON THE FAA'S CHANGE TO AC 120-51B, THE BOARD CLASSIFIES A-96-65 "CLOSED--ACCEPTABLE ACTION."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Log Number 2529B

Issue Date 8/15/1996 **ROSELAWN IN** **10/31/1994**

ON OCTOBER 31, 1994, ABOUT 1600 CENTRAL STANDARD TIME A SIMMONS AIRLINES AVIONS DE TRANSPORT REGIONAL ATR-72-210, OPERATING AS AMERICAN EAGLE FLIGHT 4184, CRASHED INTO A SOYBEAN FIELD 3 MILES SOUTH OF ROSELAWN, INDIANA. THE FLIGHT WAS ON AN INSTRUMENT FLIGHT RULES FLIGHT PLAN FROM INDIANAPOLIS, INDIANA, TO O'HARE INTERNATIONAL AIRPORT, CHICAGO, ILLINOIS, AND HAD BEEN PLACED IN A HOLDING PATTERN OVER ROSELAWN BECAUSE OF WEATHER DELAYS BEING EXPERIENCED AT O'HARE. THE AIRPLANE'S PRIMARY AND SECONDARY RADAR RETURNS DISAPPEARED FROM THE AIR TRAFFIC CONTROL RADAR SHORTLY AFTER THE FLIGHT WAS CLEARED TO CONTINUE THE HOLDING PATTERN AND TO DESCEND FROM 10,000 TO 8,000 FEET. WITNESSES OBSERVED THE AIRPLANE DESCEND OUT OF A LOW OVERCAST AND STRIKE THE GROUND IN A STEEP NOSE-DOWN ATTITUDE. ALL 64 PASSENGERS AND 4 CREWMEMBERS WERE KILLED IN THE ACCIDENT. THE SAFETY BOARD INVESTIGATED ONE SUCH EVENT THAT OCCURRED ON DECEMBER 22, 1988, AT MOSINEE, WISCONSIN.

Recommendation # A-96-070

Overall Status **Priority**

CAA **CLASS II**

THE NTSB RECOMMENDS THAT THE NOAA: DEVELOP METHODS TO PRODUCE WEATHER FORECASTS THAT BOTH DEFINE SPECIFIC LOCATIONS OF ATMOSPHERIC ICING CONDITION (INCLUDING FREEZING DRIZZLE & FREEZING RAIN), & THAT PRODUCE SHORT RANGE FORECASTS ("NOWCASTS") THAT IDENTIFY ICING CONDITIONS FOR A SPECIFIC GEOGRAPHIC AREA WITH A VALID TIME OF 2 HOURS OR LESS. ENSURE THE TIMELY DISSEMINATION OF ALL SIGNIFICANT FINDINGS TO THE AVIATION COMMUNITY IN AN APROPRIATE MANNER.

NOAA	Closed - Acceptable Action	3/20/1997

12/12/1996	Addressee	THE NWS CONCURS WITH THIS RECOMMENDATION. THE NWS IS ACTIVELY INVOLVED IN ONGOING RESEARCH RELATED TO AIRCRAFT ICING. IN ADDITION, CONSIDERABLE PROGRESS HAS BEEN MADE IN FORECASTING SUPERCOOLED LARGE DROPLETS (SLD) BY USING ALGORITHMS DEVELOPED AT THE NATIONAL CENTER FOR ATMOSPHERIC RESEARCH (NCAR). USING THESE ALGORITHMS IN CONJUNCTION WITH LOCALLY DERIVED ICING MODELS, THE AVIATION WEATHER CENTER (AWC) BEGAN ISSUING ENHANCED IN-FLIGHT ADVISORIES (AIRMETS) THAT FLAG THE PRESENCE OF SLD BY USING TERMINOLOGY SUCH AS "MIXED ICING IN PRECIPITATION (SIZED DROPS), ESPECIALLY IN FREEZING DRIZZLE/RAIN ALOFT." THE AWC WILL CONTINUE ITS EFFORTS SUPPORTING THE DEVELOPMENT OF FORECASTING METHODS SUCH AS THOSE ADDRESSED WITHIN A-96-70.
3/20/1997	NTSB	BECAUSE THESE ACTIONS ARE RESPONSIVE TO A-96-70, THIS RECOMMENDATION IS CLASSIFIED "CLOSED--ACCEPTABLE ACTION." HOWEVER, GIVEN THE IMPORTANCE OF THE CONTINUED DEVELOPMENT OF ACCURATE & DETAILED FORECASTS OF IN-FLIGHT AIRCRAFT ICING, THE STAFF WILL CONTINUE TO MONITOR & PERIODICALLY REQUEST UPDATES ON THE EFFORTS OF THE NWS IN THESE AREAS.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Log Number 2529C

Issue Date 8/15/1996 **ROSELAWN IN** **10/31/1994**

ON OCTOBER 31, 1994, ABOUT 1600 CENTRAL STANDARD TIME A SIMMONS AIRLINES AVIONS DE TRANSPORT REGIONAL ATR-72-210, OPERATING AS AMERICAN EAGLE FLIGHT 4184, CRASHED INTO A SOYBEAN FIELD 3 MILES SOUTH OF ROSELAWN, INDIANA. THE FLIGHT WAS ON AN INSTRUMENT FLIGHT RULES FLIGHT PLAN FROM INDIANAPOLIS, INDIANA, TO O'HARE INTERNATIONAL AIRPORT, CHICAGO, ILLINOIS, AND HAD BEEN PLACED IN A HOLDING PATTERN OVER ROSELAWN BECAUSE OF WEATHER DELAYS BEING EXPERIENCED AT O'HARE. THE AIRPLANE'S PRIMARY AND SECONDARY RADAR RETURNS DISAPPEARED FROM THE AIR TRAFFIC CONTROL RADAR SHORTLY AFTER THE FLIGHT WAS CLEARED TO CONTINUE THE HOLDING PATTERN AND TO DESCEND FROM 10,000 TO 8,000 FEET. WITNESSES OBSERVED THE AIRPLANE DESCEND OUT OF A LOW OVERCAST AND STRIKE THE GROUND IN A STEEP NOSE-DOWN ATTITUDE. ALL 64 PASSENGERS AND 4 CREWMEMBERS WERE KILLED IN THE ACCIDENT. THE SAFETY BOARD INVESTIGATED ONE SUCH EVENT THAT OCCURRED ON DECEMBER 22, 1988, AT MOSINEE, WISCONSIN.

Recommendation # A-96-072

Overall Status **Priority**

CAA **CLASS II**

THE NTSB RECOMMENDS THAT THE AMR EAGLE: ENCOURAGE CAPTAINS TO OBSERVE A "STERILE COCKPIT" ENVIRONMENT WHEN AN AIRPLANE IS HOLDING, REGARDLESS OF ALTITUDE, IN METEOROLOGICAL CONDITIONS SUCH AS CONVECTIVE AREAS OR ICING CONDITIONS, THAT HAVE THE POTENTIAL TO DEMAND SIGNIFICANT ATTENTION OF A FLIGHTCREW.

AMR EAGLE	Closed - Acceptable Action	1/30/2001

7/19/2000	NTSB	THE SAFETY BOARD'S RECORDS DO NOT INDICATE THAT AMR EAGLE HAS EVER RESPONDED TO THESE RECOMMENDATIONS. THE BOARD WOULD APPRECIATE LEARNING OF ANY ACTIONS AMR EAGLE HAS TAKEN OR INTENDS TO TAKE TO ADDRESS A-96-71, A-96-72, AND A-96-73. IF AMR EAGLE CONSIDERS ITS ACTION COMPLETE, OR IF NO ACTION IS PLANNED, THE SAFETY BOARD WOULD APPRECIATE BEING SO INFORMED SO THAT WE MAY CLOSE THESE RECOMMENDATONS.
9/25/2000	Addressee	Letter Mail Controlled 10/06/2000 12:57:11 PM MC# 2001494 Lance McDonald, VP of Safety, American Eagle Airlines, 9/25/00 American Eagle Airlines enhanced the cockpit management policy and procedures contained in Flight Manual Part -1, to define "Sterile Cockpit" definitions and nonessential duties during critical phases of flight. A sample page from an American Eagle Flight Manual Part-1, reflecting the actual language, is included as an attachment to this letter.
1/30/2001	NTSB	American Eagle reports that it enhanced the cockpit management policy and procedures contained in Flight Manual Part 1, to define "Sterile Cockpit" definitions and nonessential duties during critical phases of flight. The Safety Board reviewed a sample page from the manual, which reflects the revised language. Accordingly, Safety Recommendation A-96-72 is classified "Closed--Acceptable Action."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Log Number 2630

Issue Date 5/21/1997 **DETROIT MI** **1/9/1997**

INFOMATION FROM THE CVR INDICATES THAT THE FLIGHTCREW ACTIVATED THE ANTI-ICE EQUIPMENT FOR THE WINDSHIELD, PROPELLERS, PITOT PROBES, ANGLE-OF ATTACK VANES, SIDESLIP ANGLE VANE, & TOTAL AIR TEMPERATURE PROBES. THERE IS NO EVIDENCE FROM THE CVR, FDR, PERFORMANCE OF THE AIRCRAFT, OR AIRCRAFT WRECKAGE TO DETERMINE IF THE FLIGHTCREW ACTIVATED THE DE-ICING BOOTS. THESE FACTS & THE AIRPLANE'S DEGRADED AERODYNAMIC PERFORMANCE STRONGLY SUGGEST THAT ICE HAD ACCUMULATED ON AIRFRAME, BUT MAY NOT HAVE SEEN OR RECOGNIZED AS A HAZARD BY THE FLIGHT CREW OF COMAIR 3272. THERE WERE SEVEN ACCIDENTS INVOLVING AIRCRAFT EMBRAER EMB- 120: (1) 1/9/97, EMBRAER EMB-120, MONROE, MICHIGAN, (2) IN APRIL OF 1995, EMBRAER EMB -120, TALLAHASSEE, FLORIDA, (3) 10/16/94, EMBRAER EMB-120, ELKO, NEVADA, (4) 4/29/93, EMBRAER EMB -120, PINE BLUFF, ARKANSAS, (5) 11/22/91, EMBRAER EMB - 120, CLERMONT-FERRAND, FRANCE, (6) IN SEPTEMBER, 1991, EMBRAER EMB -120, FORT SMITH, ARKANSAS,& (7) 6/28/89, EMBRAER EMB- 120, KLAMATH FALLS, OREGON.

Recommendation # A-97-031

Overall Status **Priority**

CAA **CLASS I**

THE NTSB RECOMMENDS THAT THE FAA: REQUIRE AIR CARRIERS TO REFLECT FAA-APPROVED MINIMUM AIRSPEEDS FOR ALL FLAP SETTINGS & PHASES OF FLIGHT, INCLUDING FLIGHT IN ICING CONDITIONS, IN THEIR EMB-120 OPERATING MANUALS.

FAA	Closed - Acceptable Action	8/20/1999

6/18/1997 Addressee — THE FAA PUBLISHED A NOTICE OF PROPOSED RULEMAKING (NPRM) 97-NM-46-AD ON 5/13/97, TO ADDRESS EMB-120 ICING ISSUES. THE NPRM PROPOSES SEVERAL ACTIONS CONCERNING EMB-120 ICING: (1) REQUIRE INSTALLING AN ICE DETECTION SYSTEM; (2) REVISE THE "LIMITATIONS" SECTION OF THE FAA-APPROVED EMB-120 AIRPLANE FLIGHT MANUAL (AFM) TO INCLUDE REQUIREMENTS FOR ACTIVATION OF THE ICE PROTECTION & DE-ICING SYSTEMS; & (3) REQUIRE REVISION OF THE "NORMAL PROCEDURES" SECTION OF THE AFM TO ESTABLISH A MINIMUM SPEED OF 160 KNOTS IN ICING CONDITIONS (EXCEPT DURING APPROACH TO LANDING, WHEN IT REQUIRES ADDING 10 KNOTS TO THE APPROVED SPEEDS FOR EACH FLAP POSITION).

9/30/1997 NTSB — THE BOARD ACKNOWLEDGED IN ITS MAY 21 LETTER THE FAA'S NOTICE OF PROPOSED RULEMAKING (NPRM) TO ADDESS EMB-120 ICING ISSUES. THE NPRM PROPOSES THE ADOPTION OF A NEW AIRWORTHINESS DIRECTIVE (AD) TO ACCOMPLISH THE FOLLOWING: (1) REQUIRE INSTALLING AN ICE DETECTING & ALERTING SYSTEM; (2) REVISED THE "LIMITATIONS" SECTION OF THE FAA-APPROVED EMB-120 AIRPLANE FLIGHT MANUAL (AFM) TO INCLUDE REQUIREMENTS FOR ACTIVATION OF THE ICE PROTECTION & DE-ICING SYSTEMS; & (3) REQUIRE REVISION OF THE "NORMAL PROCEDURES" SECTION OF THE AFM TO ESTABLISH A MINIMUM SPEED OF 160 KNOTS IN ICING CONDITIONS (EXCEPT DURING APPROACH TO LANDING, WHEN IT REQUIRES ADDING 10 KNOTS TO THE APPROVED SPEEDS FOR EACH FLAP POSITION). THE BOARD'S 7/1/97, LETTER COMMENTING ON THE NPRM PROVIDES ADDITIONAL DETAILS ON THE BOARD'S POSITION BEYOND WHAT IS STATED IN THIS LETTER. THE PROVISIONS IN THE PROPOSED AD PARALLEL THE BOARD'S RECOMMENDATIONS IN MANY RESPECTS. HOWEVER, THE NPRM DOES NOT ADDRESS SEVERAL KEY ISSUES RAISED IN THE BOARD'S RECOMMENDATIONS, & THE FAA'S LETTER 6/18/97, DOES NOT PROVIDE ANY ADDITIONAL INFO BEYOND WHAT WAS AVAILABLE TO THE BOARD PRIOR TO ITS ISSUANCE OF THESE RECOMMENDATIONS. THE BOARD BELIEVES THAT THE PROPOSED 160-KNOT MINIMUM SPEED IN ICING CONDITIONS WILL PROVIDE AN IMPORTANT IMPROVEMEMENT IN SAFETY & SHOULD BE IMPLEMENTED IMMEDIATELY. HOWEVER, FURTHER ICING TESTS PLANNED BY THE FAA & EMBRAER (INCLUDING THOSE WITH INTER-CYCLE MARGIN. IT IS ALSO NOT CLEAR IF THE LANGUAGE CONTAINED IN THE NPRM ESTABLISHES APPROPRIATE MINIMUM SPEEDS FOR ALL FLAP SETTINGS & PHASES OF FLIGHT IN DRY ATMOSPHERIC CONDITIONS. PENDING CLARIFICATION OF THE FAA'S PLANS REGARDING ADDITIONAL ICING TESTS & THE IMPLEMENTATION OF APPROVED MINIMUM AIRSPEEDS, THE BOARD CLASSIFIES A-97-31 "OPEN--AWAIT RESPONSE."

10/29/1998	Addressee	Letter Mail Controlled 11/2/98 5:26:13 PM MC# 981311 ON 8/13/98, THE FAA ISUED FLIGHT STANDARDS INFORMATION BULLETIN FOR AIR TRANSPORTATION 98-16, EMBRAER EMB-120 AIRPLANES (ALL MODELS): COMPANY OPERATING MANUALS AND TRAINING PROGRAM REVISION FOR COMPLIANCE WITH AIRWORTHINESS DIRECTIVE (AD) 97-26-06. THE BULLETIN DIRECTS PRINCIPAL OPERATIONS INSPECTORS (POI) WHO HAVE OVERSIGHT RESPONSIBILITIES FOR EMBRAER EMB-120 AIRPLANES TO ENSURE THAT: OPERATORS HAVE AN FAA-APPROVED AIRPLANE FLIGHT MANUAL (AFM) CONTAINING ALL CURRENT REVISIONS AND APPLICABLE AD'S; COMPANY FLIGHT MANUALS ARE CONSISTENT WITH AND REFLECT FAA-APPROVED EMB-120 AFM DEICING INFORMATION AND PROCEDURES AND MINIMUM AIRSPEEDS FOR ALL FLAP SETTINGS AND PHASES OF FLIGHT, INCLUDING FLIGHT IN THE ICING CONDITIONS, AND CHANGES TO COMPANY FLIGHT MANUALS ARE DISSEMINATED TO ALL FLIGHTCREW PERSONNEL; COMPANY TRAINING PROGRAMS IN ALL CATEGORIES (INITIAL, TRANSITION, UPGRADE, RECURRENT, AND REQUALIFICATION) ARE REVISED TO REFLECT THE CHANGES IN THE COMPANY FLIGHT MANUALS AND TO ENSURE THAT ALL FLIGHTCREW PERSONNEL HAVE RECEIVED TRAINING ON THESE CHANGES NO LATER THAN 9/30/98; EMB-120 OPERATORS PROVIDE FLIGHTCREWS WITH TRAINING THAT EMPHASIZES THE IMPORTANCE OF RECOGNITION OF ICING CONDITIONS AND THE IMPORTANCE OF ADHERING TO ANTI-ICE/DEICE PROCEDURES CONTAINED IN THE REVISED COMPANY FLIGHT MANUALS. I HAVE ENCLOSED A COPY OF THE BULLETIN FOR THE BOARD'S INFORMATION, AND I CONSIDER THE FAA'S ACTION TO BE COMPLETED.
8/20/1999	NTSB	THE SAFETY BOARD STILL HAS CONCERNS REGARDING THE ADEQUACY OF THE 160-KNOT MINIMUM AIRSPEED FOR OPERATING THE EMB-120 IN ICING CONDITIONS; HOWEVER, THIS ISSUE WILL BE ADDRESSED IN OUR RESPONSE TO THE FAA'S MOST RECENT LETTER REGARDING A-98-94. THEREFORE, A-97-31 THROUGH -33 ARE CLASSIFIED "CLOSED--ACCEPTABLE ACTION."

Recommendation # A-97-033

Overall Status
CAA

Priority
CLASS I

THE NTSB RECOMMENDS THAT THE FAA: DIRECT PRINCIPAL OPERATIONAL INSPECTORS (POIS) TO ENSURE THAT ALL EMB-120 OPERATORS PROVIDE FLIGHTCREWS WITH TRAINING THAT EMPHASIZES THE RECOGNITION OF ICING CONDITIONS & THE NEED TO ADHERE TO TO THE PROCEDURE FOR USING DE-ICE BOOTS THAT IS SPECIFIED IN THE REVISED EMBRAER EMB-120 AIRPLANE FLIGHT MANUAL.

FAA	Closed - Acceptable Action	8/20/1999

6/18/1997	Addressee	THE FAA PUBLISHED A NOTICE OF PROPOSED RULEMAKING (NPRM) 97-NM-46-AD ON 5/13/97, TO ADDRESS EMB-120 ICING ISSUES. THE NPRM PROPOSES SEVERAL ACTIONS CONCERNING EMB-120 ICING: (1) REQUIRE INSTALLING AN ICE DETECTION SYSTEM; (2) REVISE THE "LIMITATIONS" SECTION OF THE FAA-APPROVED EMB-120 AIRPLANE FLIGHT MANUAL (AFM) TO INCLUDE REQUIREMENTS FOR ACTIVATION OF THE ICE PROTECTION & DE-ICING SYSTEMS; & (3) REQUIRE REVISION OF THE "NORMAL PROCEDURES" SECTION OF THE AFM TO ESTABLISH A MINIMUM SPEED OF 160 KNOTS IN ICING CONDITIONS (EXCEPT DURING APPROACH TO LANDING, WHEN IT REQUIRES ADDING 10 KNOTS TO THE APPROVED SPEEDS FOR EACH FLAP POSITION).
9/30/1997	NTSB	THE BOARD IS PARTICULARLY CONCERNED ABOUT HOW THE PROPOSED CHANGES TO THE MINIMUM ICING AIRSPEED & ICE PROTECTION SYSTEM OPERATING PROCEDURES IN THE "NORMAL PROCEDURES" SECTION OF THE FAA-APPROVED AFM WILL BE IMPLEMENTED IN ALL OPERATOR FLIGHT MANUALS & TRAINING PROGRAMS. THE BOARD'S CONCERN STEMS FROM THE FACT THAT EMBRAER ISSUED REVISION 43 TO THE "NORMAL PROCEDURES" SECTION OF ITS AFM TO REQUIRE ACTIVATING THE DE-ICE BOOTS "AT THE FIRST SIGN OF ICE FORMATION" (REVISION 43 WAS APPROVED BY THE FAA), YET COMAIR DID NOT IMPLEMENT THIS NEW ICING PROCEDURE IN ITS MANUALS OR TRAINING PROGRAMS. ANOTHER ISSUE THAT NEEDS SPECIFIC ATTENTION IS THAT THE FACT THAT, FOR YEARS TURBOPROP PILOTS HAVE BEEN TRAINED TO OPERATE DE-ICE BOOTS ONLY AFTER 1/4 TO 1/2 INCH OF ICE HAS ACCUMULATED ON THE WINGS. THUS, THE BOARD BELIEVES THAT ALL EMB-120 PILOT NEED TO BE PROVIDED UPDATED MANUALS & TRAINING TO UNLEARN OLD HABITS & TO EMPHASIZE THE NEW DE-ICING PROCEDURES. PENDING CLARIFICATION OF THE FAA'S PLANNED ACTIONS IN THIS REGARD, THE BOARD CLASSIFIES A-97-32 & A-97-33 "OPEN--AWAIT RESPONSE."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

10/29/1998	Addressee	Letter Mail Controlled 11/2/98 5:26:13 PM MC# 981311 ON 8/13/98, THE FAA ISSUED FLIGHT STANDARDS INFORMATION BULLETIN FOR AIR TRANSPORTATION 98-16, EMBRAER EMB-120 AIRPLANES (ALL MODELS): COMPANY OPERATING MANUALS AND TRAINING PROGRAM REVISION FOR COMPLIANCE WITH AIRWORTHINESS DIRECTIVE (AD) 97-26-06. THE BULLETIN DIRECTS PRINCIPAL OPERATIONS INSPECTORS (POI) WHO HAVE OVERSIGHT RESPONSIBILITIES FOR EMBRAER EMB-120 AIRPLANES TO ENSURE THAT: OPERATORS HAVE AN FAA-APPROVED AIRPLANE FLIGHTMANUAL (AFM) CONTAINING ALL CURRENT REVISIONS AND APPLICABLE AD'S; COMPANY FLIGHT MANUALS ARE CONSISTENT WITH AND REFLECT FAA-APPROVED EMB-120 AFM DEICING INFORMATION AND PROCEDURES AND MINIMUM AIRSPEEDS FOR ALL FLAP SETTINGS AND PHASES OF FLIGHT, INCLUDING FLIGHT IN ICING CONDITIONS, AND CHANGES TO COMPANY FLIGHT MANUALS ARE DISSEMINATED TO ALL FLIGHTCREW PERSONNEL; COMPANY TRAINING PROGRAMS IN ALL CATEGORIES (INITIAL, TRANSITION, UPGRADE, RECURRENT, AND REQUALIFICATION) ARE REVISED TO REFLECT THE CHANGES IN THE COMPANY FLIGHT MANUALS AND TO ENSURE THAT ALL FLIGHTCREW PERSONNEL HAVE RECEIVED TRAINING ON THESE CHANGES NO LATER THAN 9/30/98; AND EMB-120 OPERATORS PROVIDE FLIGHTCREWS WITH TRAINING THAT EMPHASIZES THE IMPORTANCE OF RECOGNITION OF ICING CONDITIONS AND THE IMPORTANCE OF ADHERING TO ANTI-ICE/DEICE PROCEDURES CONTAINED IN THE REVISED COMPANY FLIGHT MANUALS. I HAVE ENCLOSED A COPY OF THE BULLETIN FOR THE BOARD'S INFORMATION, AND I CONSIDER THE FAA'S ACTION TO BE COMPLETED.
8/20/1999	NTSB	THE SAFETY BOARD STILL HAS CONCERNS REGARDING THE ADEQUACY OF THE 160-KNOT MINIMUM AIRSPEED FOR OPERATING THE EMB-120 IN ICING CONDITIONS; HOWEVER, THIS ISSUE WILL BE ADDRESSED IN OUR RESPONSE TO THE FAA'S MOST RECENT LETTER REGARDING A-98-94. THEREFORE, A-97-31 THROUGH -33 ARE CLASSIFIED "CLOSED--ACCEPTABLE ACTION."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Log Number 2630A

Issue Date 11/30/1998 **MONROE MI** **1/9/1997**

On January 9, 1997, an Empresa Brasileira de Aeronautica, S/A (Embraer) EMB-120RT, operated by COMAIR Airlines, Inc., crashed during a rapid descent after an uncommanded roll excursion near Monroe, Michigan. The flight was a scheduled, domestic passenger flight from the Cincinnati/Northern Kentucky International Airport, Covington, Kentucky, to Detroit Metropolitan/Wayne County Airport, Detroit, Michigan. The flight departed Covington with 2 flightcrew, 1 flight attendant, and 26 passengers on board. There were no survivors. The airplane was destroyed by ground impact forces and a postaccident fire. IMC prevailed at the time of the accident, and the flight was operating on an IFR flight plan.The probable cause of this accident was the FAA's failure to establish adequate aircraft certification standardds for flight in icing conditions.

Recommendation # A-98-088

Overall Status **Priority**

CAA

THE NTSB RECOMMENDS THAT THE FAA: AMEND THE DEFINITION OF TRACE ICE CONTAINED IN FAA ORDER 7110.10L, "FLIGHT SERVICES," (AND IN OTHER FAA DOCUMENTS AS APPLICABLE) SO THAT IT DOES NOT INDICATE THAT TRACE ICING IS NOT HAZARDOUS.

FAA	Closed - Acceptable Action	3/9/2000

2/26/1999	Addressee	Letter Mail Controlled 02/16/2000 9:05:41 AM MC# 990203 THE FAA AGREES WITH THIS RECOMMENDATION AND WILL REVISE THE DEFINITION OF TRACE ICING TO REMOVE THE REFERENCE TO "NON-HAZARDOUS." THE DEFINITION OF TRACE ICING IS USED IN SEVERAL PUBLICATIONS, INCLUDING ORDER 7110.10, FLIGHT SERVICES, THE AERONAUTICAL INFORMATION MANUAL, AND THE PILOT/CONTROLLER GLOSSARY. THE PILOT/CONTROLLER GLOSSARY IS ALSO INCLUDED IN SEVERAL AIR TRAFFIC ORDERS. IT IS ANTICIPATED THAT ALL DOCUMENTS REQUIRING CHANGE WILL BE COMPLETED BY 7/15/99.
3/9/2000	Addressee	Letter Mail Controlled 03/14/2000 3:45:12 PM MC# 2000388: The Federal Aviation Administration (FAA) agrees with this safety recommendation and has revised the definition of trace ice as follows: Trace: Ice becomes perceptible. Rate of accumulation slightly greater than sublimation. Deicing/anti-icing equipment is not utilized unless encountered for an extended period of time (over 1 hour). The revised definition has been incorporated into Order 7110.10N, Flight Services; the Aeronautical Information Manual; the Pilot/Controller Glossary, which is part of Order 7110.10N; and Order 7110.65, Air Traffic Control. I have enclosed copies of the pertinent pages from these documents for the Board's information. I consider the FAA's action to be completed on this safety recommendation, and I plan no further action.
3/9/2000	NTSB	THE SAFETY BOARD HAS REVIEWED THESE CHANGES; THEREFORE, A-98-88 IS CLASSIFIED "CLOSED--ACCEPTABLE ACTION."
5/24/2000	NTSB	Thank you for the Federal Aviation Administration’s (FAA) March 9, 2000, response to the National Transportation Safety Board’s Safety Recommendation A-98-88. On the same day the Safety Board sent the FAA a letter also, classifying this safety recommendation as “Closed—Acceptable Action.” Enclosed is a copy of the Board’s March 9, 2000, letter.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Recommendation # A-98-090

Overall Status
CAA

Priority

THE NTSB RECOMMENDS THAT THE FAA: WITH THE NASA AND OTHER INTERESTED AVIATION ORGANIZATIONS, ORGANIZE AND IMPLEMENT AN INDUSTRY-WIDE TRAINING EFFORT TO EDUCATE MANUFACTURERS, OPERATORS, AND PILOTS OF AIR CARRIER AND GENERAL AVIATION TURBOPROPELLER DRIVEN AIRPLANES REGARDING THE HAZARDS TO THIN, POSSIBLY IMPERCEPTIBLE, ROUGH ICE ACCUMULATIONS, THE IMPORTANCE OF ACTIVATING THE LEADING EDGE DEICING BOOTS AS SOON AS THE AIRPLANE ENTERS ICING CONDITIONS (FOR THOSE AIRPLANES IN WHICH BRIDGING IS NOT A CONCERN), AND THE IMPORTANCE OF MAINTAINING MINIMUM AIRSPEEDS IN ICING CONDITIONS.

FAA	Closed - Acceptable Action	1/3/2002

2/26/1999	Addressee	THE FAA SPONSORED AN IN-FLIGHT ICING CONFERENCE FEBRUARY 2-4, 1999. REPRESENTATIVES FROM AIRFRAME MANUFACTURERS, DEICING EQUIPMENT MANUFACTURERS, AVIONICS MANUFACTURERS, PILOT GROUPS, INDUSTRY ASSOCIATIONS, THE SAFETY BOARD, AND THE INTERESTED PUBLIC ATTENDED THIS CONFERENCE. THE CONFERENCE INCLUDED WORKING GROUPS IN THE AREAS OF ICE PROTECTION (I.E., ICE BRIDGING), TRAINING, DISSEMINATION OF INFORMATION, AUTOPILOT OPERATION, WEATHER INFORMATION IMPROVEMENTS, AND MANUALS AND CURRENCY OF AIRPLANE OPERATING INFORMATION. THE PRODUCTS RESULTING FROM THIS CONFERENCE WILL BE USED FOR POSSIBLE CHANGES TO PILOT INFORMATION, TRAINING, AND ICING REGULATIONS.
3/9/2000	NTSB	THE SAFETY BOARD NOTES THAT THE FAA'S IN-FLIGHT ICING CONFERENCE IS A POSITIVE FIRST STEP IN ADDRESSING THE ISSUES OUTLINED IN A-98-90. HOWEVER, THE BOARD REMAINS CONCERNED THAT THE SERIOUSNESS OF PROBLEMS RELATING TO ICING, ESPECIALLY IN THE TURBOPROPELLER AIRCRAFT, HAS NOT BEEN ADEQUATELY ADDRESSED. THESE CONCERNS ARE REFLECTED IN THE ROSELAWN, INDIANA, ACCIDENT AND, MORE RECENTLY, THE MONROE, MICHIGAN, ACCIDENT. PENDING FURTHER INFORMATION FROM THE FAA, A-98-90 IS CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."
7/7/2000	Addressee	Letter Mail Controlled 07/12/2000 9:46:00 AM MC# 2000878 THE FAA SPONSORED AN IN-FLIGHT ICING CONFERENCE, FEBRUARY 2-4, 1999. REPRESENTATIVES FROM AIRFRAME MANUFACTURERS, DEICING EQUIPMENT MANUFACTUERS, AVIONICS MANUFACTURERS, PILOT GROUPS, INDUSTRY ASSOCIATIONS, THE SAFETY BOARD, AND THE GENERAL PUBLIC ATTENDED THIS CONFERENCE. THE CONFERENCE INCLUDED WORKING GROUPS IN THE AREAS OF ICE PROTECTION (ICE BRIDGING), TRAINING, DISSEMINATION OF INFORMATION, AUTOPILOT OPERATION, WEATHER INFORMATION IMPROVEMENTS, AND CURRENCY OF AIRPLANE OPERATING INFORMATION IN MANUALS. AS A RESULT OF THE IN-FLIGHT ICING CONFERENCE, THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), IN COOPERATION WITH THE FAA, PRODUCED TWO VIDEOS ENTITLED "TAILPLANE ICING" AND "ICING FOR REGIONAL AND CORPORATE PILOTS." THE FAA HAS DISTRIBUTED COPIES OF THESE VIDEOS TO ALL REGIONAL AND FLIGHT STANDARDS DISTRICT OFFICES AND HAS MADE THEM AVAILABLE TO THE PUBLIC. I HAVE ENCLOSED COPIES OF THE VIDEOS FOR THE BOARD'S INFORMATION. THE VIDEO ENTITLED "TAILPLANE ICING" IS AN EDUCATIONAL VIDEO THAT PROVIDES INFORMATION ABOUT ICE-CONTAMINATED HORIZONTAL STABILIZERS. THE VIDEO PRESENTS A PHYSICAL DESCRIPTION OF THE TAILPLANE ICING PROBLEM, SYMPTOMS OF ICE CONTAMINATION, AND SUGGESTED RECOVERY PROCEDURES. THE VIDEO ENTITLED "ICING FOR REGIONAL AND CORPORATE PILOTS" IS INTENDED FOR PILOTS OF TURBOPROP AIRCRAFT AND DISCUSSES ICE PROTECTION SYSTEMS, HOW ICE ACCRETES ON THE AIRCRAFT, THE EFFECTS OF ICE ON BOTH THE PERFORMANCE DEGRADATION AND HANDLING QUALITIES, SUGGESTED RECOVERY TECHNIQUES FROM ROLL OR PITCH UPSET, AND THE HAZARDS OF SUPERCOOLED LIQUID DROPLETS. THE FAA IS CONTINUING TO WORK WITH NASA ON TWO MORE VIDEOS DEALING WITH OTHER ASPECTS OF ICING.
1/12/2001	NTSB	THE SAFETY BOARD IS PLEASED BY THE ACTIONS THE FAA HAS TAKEN BOTH IN SPONSORING THE CONFERENCE AND IN PRODUCING THE VIDEOS WITH NASA. THE BOARD IS CONCERNED, HOWEVER, ABOUT HOW THE FAA PLANS TO MAKE THIS INFORMATION AVAILABLE AND TO ENSURE ITS USE IN AN INDUSTRYWIDE TRAINING EFFORT TO EDUCATE MANUFACTURERS, OPERATORS, AND PILOTS OF AIR CARRIER AND GENERAL AVIATION TURBOPROPELLER-DRIVEN AIRPLANES. THEREFORE, THE BOARD WOULD LIKE A DESCRIPTION FROM THE FAA OF ITS PLANNED ACTIVITIES TO DISTRIBUTE THIS INFORMATION INDUSTRYWIDE. PENDING RECEIPT OF SUCH A DESCRIPTION AND COMPLETION OF THE TWO REMAINING VIDEOS, A-98-90 REMAINS CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."

8/2/2001	Addressee	Letter Mail Controlled 08/10/2001 1:11:47 PM MC# 2010634: As a result of the In-Flight Icing Conference, the National Aeronautics and Space Administration (NASA), in cooperation with the Federal Aviation Administration (FAA), produced two videos entitled "Tailplane Icing" and "Icing for Regional and Corporate Pilots." The FAA distributed copies of these videos to all regional and flight standards district offices and has made them available to the public. The video entitled "Tailplane Icing" is an educational video that provides information about ice-contaminated horizontal stabilizers. The video presents a physical description of the tailplane icing problem, symptoms of ice contamination, and suggested recovery procedures. The video entitled "Icing for Regional and Corporate Pilots" is intended for pilots of turboprop aircraft and discusses ice protection systems, how ice accretes on the aircraft, the effects of ice on both the performance degradation and handling qualities, suggested recovery techniques from roll or pitch upset, and the hazards of supercooled liquid droplets. NASA is planning to produce four additional videos dealing with icing effects. On January 12, 2001, the Board expressed concern about how the FAA plans to make this information available and ensure its use in an industrywide training effort to educate manufacturers, operators, and pilots of air carrier and general aviation turbopropeller-driven airplanes. In response, the FAA will distribute the videos as they become available to aircraft manufacturers and all FAA regional and flight standards district offices for use in air carrier flight training programs and for general aviation training through the FAA Aviation Safety Program. However, I want to add that completion of these additional videos is entirely dependent on NASA funding. I believe that the FAA has met the full intent of this safety recommendation, and I consider the FAA's action to be completed.
1/3/2002	NTSB	The FAA has previously supplied the Safety Board with copies of the two videos. The production and distribution of this information satisfies the intent of Safety Recommendation A-98-90, which is now classified "Closed--Acceptable Action."

Recommendation # A-98-091

Overall Status **Priority**

CUAS

THE NTSB RECOMMENDS THAT THE FAA: REQUIRE MANUFACTURERS AND OPERATORS OF MODERN TURBOPROPELLER-DRIVEN AIRPLANES IN WHICH ICE BRIDGING IS NOT A CONCERN TO REVIEW AND REVISE THE GUIDANCE CONTAINED IN THEIR MANUALS AND TRAINING PROGRAMS TO INCLUDE UPDATED ICING INFORMATION AND TO EMPHASIZE THAT LEADING EDGE DEICING BOOTS SHOULD BE ACTIVATED AS SOON AS THE AIRPLANE ENTERS ICING CONDITIONS.

FAA	Closed - Unacceptable Action/Superseded	2/27/2007

2/26/1999	Addressee	ON 10/1/98, THE FAA ISSUED LETTERS REQUESTING MANUFACTURERS OF TURBOPROPELLER-POWERED TRANSPORT-CATEGORY AIRCRAFT TO PROVIDE DATA SHOWING THAT THEIR AIRCRAFT HAVE SAFE OPERATING CHARACTERISTICS WITH ICE ACCRETED ON THE PROTECTED SURFACES. AIRCRAFT MANUFACTURERS WERE REQUESTED TO CONSIDER ICE ACCRETION BEFORE ACTIVATION OF THE DEICE SYSTEM AND INTERCYCLE ICE. THE LETTERS INFORMED THE MANUFACTURERS THAT THE FAA IS CONSIDERING MANDATORY ACTION TO REQUIRE THAT DEICING SYSTEMS BE ACTIVATED AT THE FIRST INDICATION OF ICING CONDITIONS AND OPERATED THEREAFTER SO AS TO MINIMIZE ICE ACCRETION. IN JANUARY 1999, FAA SPECIALISTS MET TO ENSURE THE USE OF CONSISTENT REVIEW CRITERIA AND TO REACH A PRELIMINARY POSITION ON WHETHER OR NOT MANDATORY ACTIONS ARE WARRANTED. FEBRUARY 2-4, 1999, THE FAA HELD A CONFERENCE WITH AIRFRAME MANUFACTURERS, AIRLINE OPERATORS, WORLDWIDE CIVIL AVIATION AUTHORITIES, AND OTHER AVIATION ORGANIZATIONS. AT THE CONFERENCE, INFORMATION WAS EXCHANGED ON VARIOUS TOPICS INCLUDING THE ACCEPTABILITY OF ACTIVATING THE AIRFRAME DEICING SYSTEMS AT THE FIRST SIGN OF ICING CONDITIONS. THE FAA WILL EVALUATE THE INFORMATION OBTAINED AT THE CONFERENCE TO DETERMINE IF MANDATORY ACTION NEEDS TO BE TAKEN FOR TRANSPORT-CATEGORY AIRCRAFT. THE FAA WILL REVIEW THAT POSITION FOR APPLICABILITY TO SMALL AIRPLANES AND IMPLEMENT AS APPROPRIATE. ONE ELEMENT OF THE FAA IN-FLIGHT AIRCRAFT ICING PLAN PUBLISHED IN APRIL 1997 CALLS FOR THE DEVELOPMENT OF ADVISORY INFORMATION RELATED TO ICE BRIDGING. THE FAA'S IN-FLIGHT ICING NATIONAL RESOURCE SPECIALIST IS PREPARING A PAPER ON ICE BRIDGING AND ANTICIPATES RELEASING THE PAPER IN FEBRUARY 1999.
3/9/2000	NTSB	THE SAFETY BOARD CONCURS WITH THE ACTION TAKEN IN RESPONSE TO THIS RECOMMENDATION AND CLASSIFIES A-98-91 "OPEN--ACCEPTABLE RESPONSE."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

9/25/2000	Addressee	Letter Mail Controlled 10/02/2000 3:16:36 PM MC# 2001437 The Federal Aviation Administration (FAA) gathered and evaluated information regarding the initial operation of deicing boots. The FAA received information in response to its letter dated October 1, 1998, that requested information from manufacturers of turbopropeller-powered aircraft on the safe operation of its aircraft with ice accretions on the protected surfaces. The FAA also gathered information at an FAA-sponsored conference in February 1999. Based on the evaluation, the FAA concluded the following: · Activation of the deicing boots at the first sign of ice accretions anywhere on the aircraft should be mandated through the airworthiness directive (AD) process. · Deicing boots should continue to be either cycled in the automatic mode, if available, or operated manually to minimize the ice accretions on the airframe. · Mandatory action should be applicable to all aircraft equipped with deicing boots rather than limiting the action to turbopropeller-powered aircraft as the Board suggested. The FAA issued 19 notices of proposed rulemaking (NPRM) during July and August 1999 that were applicable to 14 CFR Part 25 airplanes equipped with pneumatic deicing boots to propose the following requirements: · Activating the deicing boots at the first sign of ice accretions anywhere on the aircraft. · Cycling the boots in the automatic mode, if available, or manually operating to minimize the ice accretions on the airframe. The FAA withdrew 2 of the 19 NPRM's based on data received during the comment period. These data substantiated that the affected aircraft have safe operating characteristics with ice accreted on the protected surfaces. The FAA issued 20 similar NPRM's in October 1999, applicable to 14 CFR Part 23 airplanes equipped with pneumatic deicing boots and issued 1 additional 14 CFR Part 23 NPRM in March 2000. The FAA is in the process of withdrawing 5 of these NPRM'S. Between November 1999 and March 2000, 27 NPRM's for 14 CFR Parts 23 and 25 airplanes became final rules. During the comment period for the remaining NPRM'S, it was brought to the FAA's attention that McDonnell Douglas DC-3 and DC-4 aircraft and Gulfstream G-159 aircraft were initially certificated with older style boots that may be susceptible to ice bridging. Therefore, six supplemental NPRM's were issued proposing to require activation of the boots at the first sign of ice accretion if an aircraft had been retrofitted with modern style boots. Two supplemental NPRM's were issued to address McDonnell Douglas DC-3 and DC-4 aircraft and Gulfstream G-159 aircraft that may be equipped with either modern or older style deicing boots. The McDonnell Douglas and Gulfstream supplemental NPRM's became final rules in February 2000 and May 2000, respectively. The FAA is evaluating the comments for the Gulfstream G-159 supplemental NPRM and three 14 CFR Part 23 NPRM'S. I have enclosed copies of a sample AD that has been issued for the Board's information. The Aviation Rulemaking Advisory Committee's (ARAC) Ice Protection Harmonization Working Group is addressing the issue of the flightcrew having an adequate means to know when to operate the ice protection system. Therefore, the AD's should be viewed as interim actions to the committee's Ice Protection Harmonization Working Group's activities. I will keep the Board informed of the FAA's progress on this safety recommendation.
3/12/2001	NTSB	Although these actions are responsive to Safety Recommendation A-98-91, the Safety Board is concerned because these ADs require activation of the deicing boots at the first sign of ice accretions anywhere on the aircraft; the recommendation asks for deicing boot activation as soon as the airplane enters icing conditions. The Board notes that the accident that prompted this recommendation is a lesson in the potentially catastrophic consequences of small, imperceptible ice accumulations. Therefore, the Board continues to believe that deicing boots should always be activated as soon as icing conditions are encountered. The Safety Board urges the FAA and the ARAC Working Group to consider this important distinction. Pending the FAA's issuance of a rule that requires manufacturers and operators of modern turbopropeller-driven airplanes for which ice bridging is not a concern to include updated icing information and to emphasize that leading edge deicing boots should be activated as soon as the airplane enters icing conditions, Safety Recommendation A-98-91 remains classified "Open--Acceptable Response."
9/21/2001	Addressee	Letter Mail Controlled 10/22/2001 11:44:27 AM MC# 2010866: The Aviation Rulemaking Advisory Committee (ARAC) is considering a proposed revision to 14 CFR Part 121 and advisory material. The proposed rule is applicable to airplanes operated under 14 CFR Part 25 with takeoff weights less than 60,000 pounds. The proposed rule addresses when to activate the ice protection system and when the flightcrew should exit icing conditions. The latter aspect is limited to airplanes with unpowered roll controls. The ARAC is also considering a similar certification standard for transport-category airplanes under 14 CFR Part 121. I will keep the Board informed of the FAA's progress on this safety recommendation.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

7/11/2002 NTSB

The FAA reports that the Aviation Rulemaking Advisory Committee (ARAC) is considering a proposed revision to Title 14 Code of Federal Regulations (CFR) Part 121 and advisory material. Although the FAA's actions continue to be responsive to the recommendation, the Safety Board reiterates the point made in its March 12, 2001, letter to the FAA concerning the airworthiness directives (AD) that the FAA planned to issue in response to this recommendation:

The Safety Board is concerned because these ADs require activation of the deicing boots at the first sign of ice accretions anywhere on the aircraft; the recommendation asks for deicing boot activation as soon as the airplane enters icing conditions. The Board notes that the accident that prompted this recommendation is a lesson in the potentially catastrophic consequences of small, imperceptible ice accumulations. Therefore, the Board continues to believe that deicing boots should always be activated as soon as icing conditions are encountered. The Safety Board urges the FAA and the ARAC Working Group to consider this important distinction.

Pending the FAA's issuance of a rule that requires manufacturers and operators of modern turbopropeller-driven airplanes, for which ice bridging is not a concern, to include updated icing information and to emphasize that leading edge deicing boots should be activated as soon as the airplane enters icing conditions, Safety Recommendation A-98-91 remains classified "Open--Acceptable Response."

5/19/2003 Addressee

Letter Mail Controlled 5/28/2003 2:49:05 PM MC# 2030264 In September 2002, the Aviation Rulemaking Advisory Committee's Transport Airplane and Engine Issues Group voted to forward a proposed revision to 14 CFR Part 121 and advisory material to the FAA for consideration. The proposed rule is applicable to airplanes with takeoff weights less than 60,000 pounds, and addresses when to activate the ice protection system and when the flightcrew should exit icing conditions. The latter aspect is limited to airplanes with unpowered roll controls. The FAA is processing a 14 CFR Part 25 proposed rule that addresses when to activate the ice protection system for all 14 CFR Part 25 airplanes. It is proposed that the activation of the airframe ice protection system be based on one of the following:

· a primary ice detector;
· visual cues and an advisory ice detector; or
· visible moisture and a temperature conducive to airframe icing.

The Board expressed concern in previous correspondence over airworthiness directives that require the activation of deicing boots based on the visual observation of ice accretions. The Board believes the deicing boots should be activated based on icing conditions. This is option number three in the proposed rule. The other two options require either a primary ice detector or visual cues supplemented by an advisory ice detector. Each of the options provides an acceptable means of knowing when the airframe ice protection system must be activated.

The FAA anticipates publishing the notices of proposed rulemaking this year. I will keep the Board informed of the FAA's progress on this safety recommendation.

9/15/2003 NTSB

The Safety Board notes that, before the end of this year, the FAA plans to issue a notice of proposed rulemaking (NPRM) to revise 14 Code of Federal Regulations (CFR) Part 121. The NPRM will be applicable to airplanes with takeoff weights less than 60,000 pounds and will address when to activate the ice protection system and when to exit icing conditions. We also note that the FAA is working on a revision to 14 CFR Part 25 that addresses when to activate the ice protection system. For the Part 121 and Part 25 revisions, activation of the ice protection system will be based on one of the following:

· a primary ice detector;
· visual cues and an advisory ice detector; or
· visible moisture and a temperature conducive to airframe icing.

The Safety Board believes that activation of the ice protection system should be triggered by any of these conditions, rather than just by one. Thus, if there is a failure of the ice detection system or the airplane accretes ice not detected by the ice detector, the crew will probably notice and activate the ice protection system. The recommendation asks that the FAA require the crew to turn on the ice protection system whenever flying in conditions conducive to icing. An automatic system that is activated by an ice detection system will be working even if the crew does not notice accumulating ice.

Pending issuance of a rule requiring activation of the ice protection system as soon as the airplane enters icing conditions, Safety Recommendation A-98-91 remains classified "Open--Acceptable Response."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

10/26/2005 Addressee

Letter Mail Controlled 10/27/2005 2:12:40 PM MC# 2050501 Marion C. Blakey, Administrator, FAA, 10/26/05 On May 19, 2003, the FAA provided the Board with information on two draft proposed rules for the activation of ice protection systems. These proposed rules would require activation of the of ice protection systems based on one of the following:

"a primary ice detector;

"visual cues and an advisory ice detector; or

"visible moisture and a temperature conducive to airframe icing

On September 15, 2003, the Board responded that the ice protection system should be activated based on icing conditions regardless of whether the airplane is equipped with an ice detector. The Board reasoned that if the ice detector fails the flightcrew would probably notice and activate the ice protection system.

The FAA does not agree with the Board's position. Operation of the airframe ice protection system based on visible moisture and a temperature conducive to airframe icing will result in the operation of the ice protection system during times where there are no ice accretions on the airframe. This can lead to a decreased life of the ice protection system and a decrease in airplane performance. The FAA's position is that operation of the ice protection system when there are no ice accretions present is not necessary providing there are acceptable alternatives. We find that a primary ice detector system and visual cues with an advisory ice detector provide equivalent levels of safety to the operation of an ice protection system based only on potential icing conditions (i.e., visible moisture and temperature). Primary ice detector systems must be designed to be highly reliable to meet the requirements of 14 CFR 25.1309. This means the combination of system failure to detect ice that is hazardous to the airplane's operation and failure to annunciate the failed condition to the flightcrew must be extremely improbable. This degree of reliability is commensurate with a catastrophic failure case. Therefore, the FAA does not find that it is necessary to require activation of the ice protection system based on visible moisture and temperature in addition to a primary ice detector system.

With regard to the option of certificating visual cues and an advisory ice detector, an ARAC working group examined accidents and incidents and found a history of problems with the flightcrew knowing when they should activate the ice protection system. The working group reasoned that the flightcrew's observation of ice accumulations can be difficult during times of high workload, operations at night, or when clear ice has accumulated. Therefore, the working group concluded that an advisory ice detection system in conjunction with substantiated visual cues would provide a much higher level of safety than visual cues alone. This device would mitigate the effects of high workload and of human sensory limitations in detecting ice. The working group has developed improved certification advisory material on an acceptable means of substantiating visual cues. The advisory ice detector along with the improved guidance provides an equivalent level of safety to operation of the airframe ice protection system based only on visible moisture and temperature. The FAA has accepted the working group recommendations.

The ARAC forwarded their recommendation for rulemaking to the FAA in January 2003. The next step is for the FAA to prepare a regulatory evaluation of the two rules. Due to the higher priority of other safety-related rulemaking activities the regulatory evaluations have been delayed. The FAA anticipates publishing the NPRMs this year.

The need to include similar rulemaking for 14 CFR Part 23 airplanes will be assessed when the 14 CFR Part 23 SLD rule is developed in response to Safety Recommendation A-96-54. In the interim, the FAA added guidance to AC 23.1419-2B that addressed the following:

"Recommended the Airplane Flight Manual procedure for boot operation should be to operate the boots in an appropriate continuous mode at the first sign of ice and not to wait for a specific amount of ice to accumulate;

"For applicants that choose to recommend a measurable ice accumulation prior to activation of the boots, stated that flight tests in simulated or natural icing conditions should be accomplished to verify that the crew could detect and recognize the specified ice accumulation thickness under all operation conditions; and

"For applicants that choose to recommend a measurable ice accumulation prior to boot activation, stated that this preactivation ice accretion must be considered when determining critical ice accretions for performance, stability, control, and stall testing.

5/10/2006 NTSB

The FAA previously wrote to the Safety Board about this recommendation on May 19, 2003. At that time, the FAA provided information on two draft proposed rules for the activation of ice protection systems that the ARAC had sent to the FAA in September 2002. The proposed rules were applicable to airplanes with takeoff weights less than 60,000 pounds, and addressed when to activate the ice protection system and when to exit icing conditions. It was proposed that activation of the airframe ice protection system be based on one of the following:

"a primary ice detector
"visual cues and an advisory ice detector
"visible moisture and a temperature conducive to airframe icing

On September 15, 2003, the Safety Board responded that the ice protection system should be activated based on icing conditions regardless of whether the airplane is equipped with an ice detector; this would increase the probability that if the ice detector failed, the flightcrew would notice and activate the ice protection system. In its current letter, the FAA states that it does not agree with the Board's position. The FAA notes that operation of the ice protection system based only on visible moisture and a temperature conducive to icing will result in operation of the ice protection system when there is no ice accretion on the airframe, leading to a decreased life of the system and a decrease in airplane performance. The FAA's position is that operation of the ice protection system when there is no ice accretion is not necessary, providing there are alternatives to alert the crew to the start of icing. The FAA believes that a primary ice detector system and visual cues with an advisory ice detector provide equivalent levels of safety to the operation of an ice protection system based only on potential icing conditions such as visible moisture and an appropriate temperature. In its current letter, the FAA provided the basis for this belief. The Safety Board has considered and accepts the FAA's arguments.

In January 2003, the ARAC forwarded recommendations to the FAA to revise Part 25 and Part 121 to address the issues in this recommendation. In the intervening 3 years, the FAA has not taken any further action such as preparing necessary regulatory analyses, issuing an NPRM, or issuing the final rule. With regard to Part 23 airplanes, the FAA indicates that this rulemaking will be included in the regulatory revisions planned in response to Safety Recommendation A-96-54. However, in the interim, the FAA added guidance to AC 23.1419 2C that addresses this recommendation.

The regulatory revisions suggested by the ARAC in January 2003 appear to be responsive to this recommendation. The Board notes that this recommendation is now 7 years old. It is not acceptable that in the past 3 years, the FAA has taken no further action to implement these needed changes. Pending issuance of an NPRM and a final rule adopting the regulatory changes proposed by the ARAC in response to this recommendation, Safety Recommendation A-98-91 is classified "Open-Unacceptable Response."

2/27/2007 NTSB

In May 2002, the FAA issued an icing test report that recommended an "early and often" approach to deice boot usage to limit the size of residual and intercycle ice accretions. Further, in January 2003, an Aviation Rulemaking Action Committee (ARAC) Ice Protection Harmonization Working Group (IPHWG) recommended revisions to Parts 25 and 121 to require that deice systems be activated as soon as an airplane enters icing conditions. However, since that time, the FAA has taken no action to issue a final rule adopting the regulatory changes proposed by the ARAC IPHWG.

Although the accident airplane most likely accumulated less than 1/4-inch-thick ice while operating in the lower cloud layer, the pilots' failure to activate the deice boots during the approach led to the continued accumulation of thin, rough ice on the protected surfaces, which can severely degrade an airplane's performance. The circumstances of this accident, information gathered during the Comair flight 3272 accident, and reports issued by the FAA and the ARAC IPHWG clearly demonstrate that existing guidance instructing pilots to delay activation of the deice boots until they observe 1/4- to 1/2-inch-thick ice accumulation is not adequate because it does not protect against the detrimental effects caused by thin, rough ice accumulation on or aft of the protected surfaces. If pilots continue to adhere to guidance about delaying deice boot activation, similar accidents could still occur.

The Safety Board concludes that activating the deice boots as soon as an airplane enters icing conditions provides the greatest safety measure. On the basis of this accident and the Board's continued concerns in this area, the Board believes that the FAA should require manufacturers and operators of pneumatic deice boot-equipped airplanes to revise the guidance contained in their manuals and training programs to emphasize that leading edge deice boots should be activated as soon as the airplane enters icing conditions. The new recommendation [A-07-14] will supersede Safety Recommendation A-98-91 and will be classified Open Unacceptable Response.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Recommendation # A-98-093

Overall Status
CUA

Priority

THE NTSB RECOMMENDS THAT THE FAA: ACTIVELY PURSUE RESEARCH WITH AIRFRAME MANUFACTURERS AND OTHER INDUSTRY PERSONNEL TO DEVELOP EFFECTIVE ICE DETECTION/PROTECTION SYSTEMS THAT WILL KEEP CRITICAL AIRPLANE SURFACES FREE OF ICE; THEN REQUIRE THEIR INSTALLATION ON NEWLY MANUFACTURED AND IN SERVICE AIRPLANES CERTIFICATED FOR FLIGHT IN ICING CONDITIONS.

FAA	Closed - Unacceptable Action	3/12/2001

2/26/1999	Addressee	THE ICE DETECTION AND PROTECTION SYSTEMS ON NEWLY MANUFACTURED AND IN-SERVICE AIRPLANES SATISFY THE REGULATORY REQUIREMENTS FOR FLIGHT IN ICING CONDITIONS AND, IN MANY CASES, ARE STATE OF THE ART. THE USE AND EFFECTIVENESS OF THESE SYSTEMS MUST BE CONSIDERED IN THE TOTAL CONTEXT OF THE FLIGHTCREW OPERATIONAL PROCEDURES, PILOT TRAINING PROGRAMS, AND PROGRAMS TO PROVIDE CURRENT AND ACCURATE WEATHER INFORMATION TO FLIGHTCREWS. THIS TOTAL REQUIREMENT APPROACH TO ADDRESSING ICING ISSUES IS REFLECTED IN THE FAA'S IN-FLIGHT AIRCRAFT ICING PLAN. THE FAA DOES AND WILL CONTINUE TO SUPPORT CERTIFICATION OF NEW AND INNOVATIVE ICE DETECTION AND PROTECTION SYSTEMS, AND ENCOURAGES RESEARCH AND DEVELOPMENT OF INNOVATIVE TECHNOLOGIES. THE FAA ALSO WORKS CLOSELY WITH INDUSTRY IN PARTNERSHIP EFFORTS TO UPGRADE THE LEVEL OF SAFETY FOR THE FLYING PUBLIC. AN EXAMPLE IS THE "WEEPING" LEADING EDGE ICE PROTECTION SYSTEM THAT HAS BEEN CERTIFIED ON SEVERAL 14 CFR PART 23 AIRPLANES AND 14 CFR PART 25 BUSINESS JETS. HOWEVER, THE LEADERSHIP ROLE, FUNDING, AND DEVELOPMENT OF RESEARCH INITIATIVES ARE PRIMARILY VESTED IN PRIVATE INDUSTRY. AS THE REGULATORY AGENCY, THE FAA GENERALLY LIMITS ITS FUNDING TO RELATED APPLICATIONS LIKE NEW REGULATORY STANDARDS AND ADVISORY MATERIAL TO ENSURE THE SAFE OPERATION OF AIRPLANES THAT INCORPORATE NEW TECHNOLOGY ADVANCEMENTS. IN SOME INSTANCES, THE FAA HAS COMBINED RESOURCES WITH OTHER GOVERNMENT AGENCIES TO SUPPORT PRIVATE INDUSTRY IN DEVELOPING TECHNOLOGIES THAT WILL PROVIDE SAFETY BENEFITS FOR ALL PARTIES INVOLVED. AN EXAMPLE OF SUCH RESEARCH AND DEVELOPMENT FUNDING IS THE COLLABORATION OF THE FAA, NASA, DEPT. OF DEFENSE, AND PRIVATE INDUSTRY TO INVESTIGATE POSSIBILITIES FOR AIRBORNE REMOTE DETECTION OF ICING CONDITIONS. THIS EFFORT IS INCLUDED IN ONE ELEMENT OF THE FAA'S IN-FLIGHT AIRCRAFT ICING PLAN PUBLISHED IN APRIL 1997. CURRENT CERTIFICATION PRACTICES ENSURE, REGARDLESS OF THE MECHANISM USED FOR ICE PROTECTION, ADEQUATE OPERATIONAL SAFETY MARGINS EXIST. ONGOING EFFORTS BY THE AVIATION RULEMAKING ADVISORY COMMITTEE (APAC), BY THE ICE PROTECTION HARMONIZATION WORKING GROUP AND THE FLIGHT TEST HARMONIZATION WORKING GROUP, WILL DETERMINE WHETHER ICE DETECTION EQUIPMENT SHOULD BE REQUIRED AND WHAT, IF ANY, ADDITIONAL OPERATIONAL REQUIREMENTS NEED TO BE IN PLACE TO ENSURE SAFE AIRCRAFT OPERATION IN ICING CONDITIONS. HOWEVER, NEW SYSTEMS WILL NOT BE MANDATED AUTOMATICALLY FOR INSTALLATION ON NEW AIRPLANES OR BE RETROFITTED ON IN-SERVICE AIRPLANES UNLESS THERE IS SPECIFIC DETERMINATION OF BENEFIT FOR EACH SYSTEM. I PLAN NO FURTHER ACTION IN RESPONSE TO THIS SAFETY RECOMMENDATION.
3/9/2000	NTSB	THE SAFETY BOARD DOES NOT BELIEVE THAT THE FAA'S RESPONSE ADEQUATELY ADDRESSES A-98-93, WHICH ASKED THE FAA TO ACTIVELY PURSUE RESEARCH TO DEVELOP ICE DETECTION/PROTECTION SYSTEMS. THE SAFETY BOARD BELIEVES THAT ADEQUATE SAFETY MARGINS DO NOT ALWAYS EXIST WITH PRESENT DEICING SYSTEMS, AS DEMONSTRATED BY THE LARGE NUMBER OF SERIOUS ACCIDENTS AND INCIDENTS DUE TO ICE ACCUMULATION. IT IS OUR VIEW THAT THESE SYSTEMS SHOULD BE DESIGNED SO THAT CRITICAL AIRPLANE SURFACES ARE KEPT FREE OF ANY ICE ACCUMULATION. THE BOARD STRONGLY ENCOURAGES THE FAA TO ASSUME A LEADERSHIP ROLE IN DEVELOPING NEW AND EFFECTIVE ICE DETECTION/PROTECTION EQUIPMENT RATHER THAN ALLOWING PRIVATE INDUSTRY TO BE THE PRIMARY AGENT OF RESEARCH. ALTHOUGH THE FAA HAS STATED THAT IT INTENDS NO FURTHER ACTION, A-98-93 IS CLASSIFIED "OPEN--UNACCEPTABLE RESPONSE," PENDING FURTHER RESPONSE ON THIS ISSUE.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

9/25/2000	Addressee	Letter Mail Controlled 10/02/2000 3:16:36 PM MC# 2001437 In its letter dated March 9, 2000, the Board asked that the FAA pursue research to develop ice detection/protection systems so critical airplane surfaces are kept free of any ice accumulation. The Board further stated that it believes adequate safety margins do not always exist with present deicing systems, and that FAA should assume a leadership role in developing new and effective ice detection/protection equipment rather than allowing private industry to be the primary agent of research. Since 14 CFR 121.629(b) currently requires that critical surfaces be free of ice, frost, or snow prior to takeoff, the FAA will address this recommendation as it pertains to "inflight" operations. The FAA does not agree that the critical airplane surfaces must be kept free of ice accumulation during inflight operations. 14 CFR Part 25 requires that an airplane must be shown to operate safely in icing conditions defined by Federal Aviation Regulations. The regulations do not preclude certification of an airplane with ice accretions on the critical surfaces. In its letter dated March 9, 2000, the Board also questioned the adequacy of safety margins with ice protection systems that allow ice to form on the airframe. The FAA recognizes the need for improved regulations to ensure safe operations in icing conditions. In response to Safety Recommendation A-96-54, the Flight Test Harmonization Working Group has developed proposed regulatory changes to 14 CFR Part 25 flight requirements that will clearly define what is meant by the term "safely operate." The proposed certification process will require evaluation of airplane performance and handling characteristics with the ice accretions that form in all phases of flight, including those that would accrete on protected surfaces .prior to activation of the ice protection systems. These changes address the Board's concern of adequate safety margins with ice protection systems that allow ice to form on the airframe. Since it is possible to demonstrate safe operations with ice accumulations on the airframe, the FAA does not agree that devices need to be required that keep critical airplane surfaces free of ice and does not plan to fund research in this area. The FAA believes that the current regulations to require that an airplane must be shown to operate safely in icing conditions address the full intent of this safety recommendation. I consider the FAA's action to be completed on this safety recommendation.
3/12/2001	NTSB	The Safety Board is disappointed that the FAA disagrees with the need for the recommended research and activities and that the FAA does not plan to take any action. The Board notes that icing accidents it has investigated in the last 10 years, including United Express flight 2415, a British Aerospace Jetstream that crashed in Pasco, Washington; American Eagle flight 4184, an ATR-72 that crashed in Roselawn, Indiana; and the accident that prompted this recommendation, all demonstrate that despite the icing certification requirements, aircraft became uncontrollable and crashed when ice accumulated on critical surfaces. Because the FAA does not plan to pursue the recommended action, Safety Recommendation A-98-93 is classified Closed--Unacceptable Action.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

5/28/2004 NTSB

[Response to FAA NPRM 2004-NM-36-AD, 5/28/2004] The National Transportation Safety Board has reviewed the Federal Aviation Administration (FAA) Notice of Proposed Rulemaking, "Airworthiness Directives; Empresa Brasileira Aeronautica S.A. (EMBRAER) Model EMB-135BJ and EMB-145XR Series Airplanes," Docket No. 2004-NM-36-AD, published in the Federal Register (Vol. 69, No. 85) on May 3, 2004. The notice proposes the adoption of a new airworthiness directive (AD) that is applicable to certain EMBRAER airplanes and that would require the installation of an additional indication device (a lamp on the instrument panel) to the clear ice indication system.

The discussion of the notice states that the Departamento de Aviacao Civil (DAC), which is the airworthiness authority for Brazil, has notified the FAA of an unsafe condition that may exist on certain EMBRAER Model EMB-135BJ and EMB-145XR series airplanes. The DAC advises that a risk assessment has shown that the reliability level of the clear ice indication system is not sufficient to comply with the requirements established for the system. This condition, if not corrected, could result in undetected in-flight buildup of clear ice on airplane control surfaces, which could lead to reduced controllability of the airplane. The reliability problem identified by the DAC relates to the function of the indication system that alerts pilots after ice is detected, and not with the performance or operation of the icing sensor itself. The clear ice indication system sensor is a flush-mounted, vibrating type ice detector that is installed on the top surface of both wings of the EMB-135BJ and EMB-145XR to detect the presence of clear ice on the top surface of the wings. The addition of the indication lamp on the instrument panel will provide a redundant indicator to the current clear ice detection message displayed on the Engine and Instrument Crew Alerting System (EICAS). The DAC issued airworthiness directive AD No. 2004-01-01 on January 27, 2004, requiring the installation of an additional indication device to the clear ice indication system to ensure the continued airworthiness of these airplanes in Brazil. Instructions and procedures to accomplish the AD are described in Embraer Service Bulletins No. 145-30-0035 (Revision 01) for the EMB 145XR and No. 145LEG-30-0002 for the EMB?135BJ.

The location and function of the clear ice detection system on the EMB-135BJ and EMB?145XR are a relatively new type of installation and operation, and the FAA should encourage other manufacturers to use enhanced ice detection systems similar to this one. Development of advanced ice detection and protection systems was the subject of Safety Board Recommendation A-98-93, which was classified Closed-Unacceptable Action on March 12, 2001, and which recommended the FAA to accomplish the following:

Actively pursue research with airframe manufacturers and other industry personnel to develop effective ice detection/protection systems that will keep critical airplane surfaces free of ice; then require their installation on newly manufactured and in-service airplanes certificated for flight in icing conditions.
The Safety Board believes that airworthiness directive action is warranted for any improvements to icing detection and indication systems that will give flight crews accurate information that enables them to recognize undetected or unnoticed airframe icing quickly. The Safety Board continues to believe that airframe structural icing is an important safety issue, and airframe structural icing remains on our Most Wanted list of transportation safety improvements.

The Safety Board agrees with the proposed airworthiness directive and believes that the FAA should require installation of the additional indication device on the Model EMB-135BJ and EMB-145XR Series Airplanes as described in the applicable EMBRAER service bulletins.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Recommendation # A-98-094

Overall Status
CAA

Priority

THE NTSB RECOMMENDS THAT THE FAA: REQUIRE MANUFACTURERS OF ALL TURBINE-ENGINE DRIVEN AIRPLANES (INCLUDING THE EMB-120) TO PROVIDE MINIMUM MANEUVERING AIRSPEED INFORMATION FOR ALL AIRPLANE CONFIGURATIONS, PHASES, AND CONDITIONS OF FLIGHT (ICING AND NONICING CONDITIONS); MINIMUM AIRSPEEDS ALSO SHOULD TAKE INTO CONSIDERATION THE EFFECTS OF VARIOUS TYPES, AMOUNTS, LOCATIONS OF ICE ACCUMULATION, INCLUDING THIN AMOUNTS OF VERY ROUGH ICE, ICE ACCUMULATED IN SUPERCOOLED LARGE DROPLET ICING CONDITIONS, AND TAILPANE ICING.

FAA	Closed - Acceptable Action	1/19/2006

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

2/26/1999	Addressee	THE NEW 1-G STALL SPEED REQUIREMENTS REPRESENT THE CULMINATION OF A MULTIYEAR HARMONIZATION EFFORT TO DEFINE STALL SPEEDS THAT WILL PROVIDE CONSISTENT MANEUVERING CAPABILITY FOR ALL 14 CFR PART 25 AIRPLANES IN ALL CONFIGURATIONS AND ALL PHASES OF FLIGHT. FOR THE UNCONTAMINATED AIRPLANE, THE FAA ANTICIPATES AMENDING 14 CFR PART 25 TO DEFINE 1-G STALL SPEEDS. ONE ELEMENT OF THAT AMENDMENT WILL BE A NEW RULE REQUIRING A FLIGHT DEMONSTRATION OF CONSTANT SPEED TURNING MANEUVERS IN TERMINAL AREA AIRPLANE CONFIGURATIONS (I.E., TAKEOFF, FINAL TAKEOFF, APPROACH, AND LANDING). THE FLIGHT DEMONSTRATION WILL ENSURE THAT STALL WARNING WILL NOT BE ENCOUNTERED AT THE SCHEDULED OPERATING SPEEDS--THIS NEW REQUIREMENT WILL ENSURE THAT THE OPERATING SPEEDS IN THE AFM PROVIDE ADEQUATE MANEUVERING CAPABILITY FOR THE AIRPLANE WITHOUT ICE ACCRETIONS IN NORMAL FLIGHT OPERATIONS. FOR FLIGHT IN THE ICING CONDITIONS OF APPENDIX C, THE FLIGHT TEST HARMONIZATION WORKING GROUP IS PROPOSING A REGULATORY AMENDMENT. THE AMENDMENT WILL REQUIRE COMPLIANCE WITH THE SAME MANEUVERING REQUIREMENTS WITH THE ICE ACCRETION APPROPRIATE TO THE AIRPLANE CONFIGURATION AND PHASE OF FLIGHT AS FOR THE AIRPLANE WITHOUT ICE ACCRETIONS (REFERENCE THE 1-G STALL SPEED REQUIREMENTS DESCRIBED IN THE PRECEDING PARAGRAPH). CONSEQUENTLY, THE PROPOSED REGULATIONS WILL RESULT IN AFM OPERATING SPEEDS THAT PROVIDE ADEQUATE MANEUVERING CAPABILITY FOR THE AIRPLANE, WITH OR WITHOUT ICE ACCRETIONS, IN ALL CONFIGURATIONS AND PHASES OF FLIGHT. COMPLETION OF THE FLIGHT TEST HARMONIZATION WORKING GROUP PROJECT IS SCHEDULED FOR DECEMBER 2000 AND WILL COMPLETE A TASK OUTLINED IN THE FAA'S IN-FLIGHT AIRCRAFT ICING PLAN PUBLISHED IN APRIL 1997. IN SPECIFYING ICE SHAPES APPROPRIATE TO THE PHASE OF FLIGHT, THE FLIGHT TEST HARMONIZATION WORKING GROUP HAS INCLUDED INTERCYCLE ICE ON PROTECTED SURFACES. THE WORKING GROUP IS ALSO DEVELOPING MATERIAL RELATED TO AN ICE ACCRETION THAT WOULD FORM ON BOTH THE UNPROTECTED AND PROTECTED SURFACES PRIOR TO NORMAL OPERATION OF THE ICE PROTECTION SYSTEM (I.E., THIN, ROUGH ICE). THE FLIGHT TEST HARMONIZATION WORKING GROUP IS ALSO PROPOSING A 14 CFR PART 25 REQUIREMENT TO INVESTIGATE AN AIRPLANE'S SUSCEPTIBILITY TO TAILPLANE STALL OVER THE OPERATING SPEED RANGE FOR THE CRITICAL AIRPLANE CONFIGURATION. THE TASKS DESCRIBED IN THIS AND THE PRECEEDING PARAGRAPHS RELATE TO THE ENVIRONMENTAL CONDITIONS OF APPENDIX C OF 14 CFR PART 25 ONLY. APPLICABILITY OF THE PRODUCTS OF THE FLIGHT TEST HARMONIZATION WORKING GROUP AND CHANGES TO 14 CFR PART 25 WILL ALSO BE CONSIDERED FOR APPLICATION TO TURBINE ENGINE-POWERED AIRPLANES CERTIFICATED UNDER 14 CFR PART 23 ACCOUNTING FOR RELEVANT DIFFERENCES SUCH AS SCALE, COMPLEXITY, SIZE, AND MASS. WITH REGARD TO OPERATIONS IN SUPERCOOLED LIQUID DROPLET ICING ENVIRONMENTS, ONE ELEMENT OF THE FAA'S IN-FLIGHT AIRCRAFT ICING PLAN PUBLISHED IN APRIL 1997 CALLS FOR TASKING THE ARAC WITH A LONG-TERM HARMONIZATION PROJECT. THE HARMONIZATION PROJECT WILL DEVELOP CERTIFICATION CRITERIA AND ADVISORY MATERIAL FOR SAFE OPERATION OF AIRPLANES IN SUPERCOOLED LARGE DROPLET ICING CONDITIONS BEYOND THE CURRENT APPENDIX C ENVELOPE. THIS TASK WAS ASSIGNED TO THE ICE PROTECTION HARMONIZATION WORKING GROUP IN DECEMBER 1997. THE WORKING GROUP WILL BEGIN DISCUSSIONS ON THE DEFINITION OF THE SUPERCOOLED LARGE DROPLET ICING ENVIRONMENT IN FEBRUARY 1999. FOR CURRENTLY CERTIFICATED 14 CFR PART 25 AIRPLANES, THE FAA ISSUED LETTERS ON 10/1/98, REQUESTING MANUFACTURERS OF TRANSPORT-CATEGORY AIRCRAFT TO REVIEW AFM'S TO ENSURE THAT APPROPRIATE OPERATING SPEEDS IN ICING CONDITIONS ARE PROVIDED. IF SUCH SPEEDS WERE NOT IN THE AFM'S, THE MANUFACTURERS WERE REQUESTED TO PROVIDE A SCHEDULE FOR REVISION OF THE AFM'S. THE LETTERS ALSO INFORMED THE MANUFACTURERS THAT THE REVISIONS MAY BE USED IN MANDATORY ACTIONS TO BRING THE INFORMATION TO THE ATTENTION OF FLIGHTCREWS. IN JANUARY 1999, FAA SPECIALISTS MET TO REVIEW THE STATUS OF THE AFM'S AND TO REACH A PRELIMINARY POSITION ON WHETHER MANDATORY ACTIONS ARE WARRANTED. THE FAA HELD A CONFERENCE WITH AIRFRAME MANUFACTURERS, AIRLINE OPERATORS, WORLDWIDE CIVIL AVIATION AUTHORITIES, AND OTHER AVIATION ORGANIZATIONS FEBRUARY 2, 1999. AT THE CONFERENCE, INFORMATION WAS EXCHANGED ON VARIOUS TOPICS INCLUDING THE INCLUSION OF MINIMUM OPERATING SPEEDS IN ICING CONDITIONS IN THE AFM. FOLLOWING THE CONFERENCE, THE FAA WILL REACH A FINAL POSITION ON WHETHER MANDATORY ACTION SHOULD BE TAKEN.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

3/9/2000	NTSB	THE SAFETY BOARD BELIEVES THE ACTIONS OUTLINED ABOVE FOR DETERMINING MINIMUM MANEUVERING SPEEDS IN ALL CONFIGURATIONS AND ALL PHASES OF FLIGHT WITH AND WITHOUT ICE ACCRETIONS WILL PROVIDE SIGNIFICANT SAFETY IMPROVEMENTS IN NEWLY CERTIFICATED AIRPLANES. HOWEVER, THE SAFETY BOARD IS CONCERNED THAT FOR ALL CURRENT 14 CFR PART 25 AIRCRAFT, THE FAA WILL ONLY REQUEST THAT MANUFACTURERS REVIEW THEIR AFM'S TO ENSURE APPROPRIATE SPEEDS IN ICING CONDITIONS ARE PROVIDED. THE SAFETY BOARD EXPRESSED THE SAME CONCERN IN ITS RESPONSE TO NOTICE OF PROPOSED RULEMAKING 97-NM-46-AD, WHICH PROPOSED ESTABLISHING FOR THE EMB-120 A FLAPS-ZERO MINIMUM AIRSPEED OF 160 KNOTS FOR OPERATING IN ICING CONDITIONS. DESPITE THE SAFETY BOARD'S CONCERNS, THE FAA'S FINAL RULE, AIRWORTHINESS DIRECTIVE 97-26-06, CURRENTLY REQUIRES A 160-KNOT MINIMUM AIRSPEED FOR OPERATING THE EMB-120 IN ICING CONDITIONS. AS THE BOARD INDICATED IN THE LETTER CONTAINING A-98-94, EVIDENCE OF COMAIR FLIGHT 3272'S LOSS OF CONTROL WAS APPARENT AT 156 KNOTS--WITH A SLIGHTLY DIFFERENT ICE ACCUMULATION SCENARIO, THE LOSS OF CONTROL MAY HAVE OCCURRED EARLIER IN THE EVENT. THE SAFETY BOARD NOTES THAT AFTER THIS ACCIDENT, COMAIR ESTABLISHED A 170-KNOT MINIMUM AIRSPEED FOR OPERATING THE EMB-120 IN ICING CONDITIONS BECAUSE THE COMPANY DID NOT BELIEVE THAT A 160-KNOT AIRSPEED ENSURED AN ADEQUATE STALL MARGIN. THE SAFETY BOARD IS CONCERNED THAT IN THE ABSENCE OF A SCIENTIFICALLY DETERMINED MINIMUM AIRSPEED IN ICING CONDITIONS, OPERATORS OF CURRENTLY CERTIFICATED AIRPLANES WHO ELECT TO INCREASE THEIR MINIMUM AIRSPEEDS, LIKE COMAIR, MAY INCREASE THEM TOO MUCH, INCREASING THE RISK OF A TAILPLANE STALL. OTHER OPERATORS MAY CONTINUE TO FOLLOW FAA GUIDELINES, WHICH THE SAFETY BOARD CONSIDERS TO PROVIDE AN INADEQUATE SAFETY MARGIN. THEREFORE, A-98-94 IS CLASSIFIED "OPEN--UNACCEPTABLE RESPONSE," PENDING FAA ACTION TO PRODUCE A MORE THOROUGHLY RESEARCHED MINIMUM AIRSPEED.
9/25/2000	Addressee	Letter Mail Controlled 10/02/2000 3:16:36 PM MC# 2001437 1.For future airplane designs, the FAA is continuing its efforts as outlined in its letter to the Board dated February 26, 1999. These efforts include publishing the 1-g stall rule, developing 14 CFR Part 25 regulatory requirements for airplane performance and handling characteristics in icing conditions, and defining a supercooled large droplet icing environment. For currently certificated 14 CFR Part 25 airplanes, the FAA had requested that manufacturers of transport-category aircraft review their Airplane Flight Manuals to ensure that appropriate operating speeds in icing conditions are provided. The FAA has reviewed the information received from these manufacturers and additional input from aircraft certification specialists. As a result of this review, the FAA is considering a rulemaking project to develop the following regulatory requirements to be applied retroactively: · Stall warning to be provided by a cockpit warning system at speeds appropriate for operations with ice accretions. · Operating speeds for icing conditions to provide constant speed banked-turn capability free of stall warning. · Operating speeds for icing conditions to be provided in Airplane Flight Manuals and Flightcrew Operating Manuals. I believe that these new actions address the Board's concerns. I will keep the Board informed of the FAA's progress on this safety recommendation.
3/12/2001	NTSB	In previous correspondence on this recommendation, the Board noted its concerns that the FAA's actions for currently certificated aircraft would only request that manufacturers review their AFMs to ensure that appropriate speeds in icing conditions were provided. Although the actions now being taken by the FAA for new and currently certificated aircraft are responsive to the recommendation, there is no mention in FAA's letter of any plans to develop minimum maneuvering airspeeds for flight in non-icing conditions. During its investigation of the Conair Flight 3272 accident, the Board found that guidance on minimum airspeeds was insufficient for all phases of flight, in or out of icing conditions. Therefore, the Board requests that the FAA specifically address flight in non-icing conditions and all phases of flight in response to Safety Recommendation A-98-94. Pending provision of minimum maneuvering airspeed information for all airplane configurations, phases, and conditions of flight for new and currently certificated aircraft, Safety Recommendation A-98-94 is classified Open--Acceptable Response.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

9/21/2001	Addressee	Letter Mail Controlled 10/22/2001 11:44:27 AM MC# 2010866: For future airplane designs, the FAA is continuing its efforts as outlined in its letter to the Board dated September 25, 2000. These efforts include publishing the 1-g stall rule, developing 14 CFR Part 25 regulatory requirements for airplane performance and handling characteristics in icing conditions, and defining a supercooled large droplet icing environment. The 1-g stall rule is expected to be adopted in late 2001, and the proposed 14 CFR Part 25 requirements for airplane performance and handling characteristics are scheduled to be published for public comment in late 2002. The ARAC's Ice Protection Harmonization Working Group has been tasked to define an icing environment that includes supercooled large droplets (SLD). The working group determined in February 2001 that there was sufficient data for use in defining SLD certification conditions. Following development of the SLD certification conditions, a determination will be made as to what flight capabilities will be required in those conditions. For currently certificated 14 CFR Part 25 airplanes, the FAA is developing a rulemaking project to develop the following regulatory requirements to be applied retroactively: * Stall warning to be provided by a cockpit warning system at speeds appropriate for operations with ice accretions. * Operating speeds for icing conditions to provide constant speed banked-turn capability free of stall warning. * Operating speeds for icing conditions to be provided in Airplane Flight Manuals and Flightcrew Operating Manuals. I will keep the Board informed of the FAA's progress on this safety recommendation.
7/11/2002	NTSB	Although the FAA's reported actions in response to Safety Recommendation A-98-94 meet the recommendation's intent with respect to icing conditions, the recommendation also asks for minimum maneuvering airspeed information for all airplane configurations, phases, and conditions of flight in non-icing conditions. The FAA has not indicated that it is taking any actions for conditions other than icing. The Safety Board continues to believe that minimum maneuvering airspeeds for all airplane configurations, phases, and conditions of flight (icing and non-icing conditions) should be in the flight manuals of all aircraft operated under Title 14 CFR Part 121 or Part 135. For example, the Board is aware that such minimum maneuvering airspeeds for all approach and landing configurations are in the flight manuals for the DC?9 and Boeing 727 aircraft of a major air carrier. Pending receipt and review of additional information requiring the provision of minimum maneuvering airspeed information for all airplane configurations, phases, and conditions of flight (icing and non-icing conditions) for new and currently certificated aircraft, Safety Recommendation A-98-94 is classified "Open--Unacceptable Response."
2/3/2004	NTSB	SWAT Meeting: This recommendation was on the Most Wanted List for several years in the icing issue area. Although the recommendation remains open-unacceptable, it was recently removed from the Most Wanted List because the FAA had satisfactorily addressed the icing issues in this recommendation. However, the recommendation explicitly asks for minimum maneuvering airspeeds in both icing and nonicing conditions, and to date the FAA has not addressed the nonicing airspeeds. The FAA indicated its concern with retroactively applying this requirement to existing airplanes. The Board noted that for some aircraft it is difficult for a pilot flying to quickly find needed information on minimum airspeeds for the conditions present. As an example, during the investigation of several accidents where the airplane’s airspeed appeared to have been below minimums, a possible cause of the accident, Board staff wanted to determine if the aircrew had made a mistake, or whether there was some other cause of failure to maintain sufficient airspeed. In order to do this analysis, Board staff needed to determine what was the appropriate (and manufacturer recommended) airspeed for the given conditions. In these accidents it has sometimes taken Board staff several weeks to locate and determine this information, clearly much longer than the time available to a pilot flying an aircraft. This recommendation seeks to put this critically needed information in an easily accessible format that pilots can quickly refer to. Results FAA will provide examples of appropriate operating speeds being effectively presented to pilots, and what the intent would be for reviewing existing airplanes concerning ease of presentation of various operating speeds. If the FAA can show that airplanes are now required to provide minimum airspeed information in an easily accessible quick reference format for pilots, this recommendation will be classified "Closed-Acceptable Action."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

9/1/2005 Addressee

From FAA after SWAT meeting, faxed again 9/1/05 Following up on the discussions regarding safety recommendation A-98-94 that took place during the Safety With A Team (SWAT) II meeting, we would like to provide further information to address the remaining concerns with the availability and accessibility of minimum maneuvering speed information in existing airplanes.
To ensure that our response is complete and comprehensive, we requested airplane manufacturers to provide the following information:
1)In what ways is minimum airspeed speed information (including minimum maneuvering airspeeds) provided to flightcrews for each airplane configuration, phase of flight (takeoff, climb, cruise, descent, holding, approach and landing), and flight condition (icing and non-icing)?
2)How are these maneuvering speeds determined (i.e., what are they based on)?
The following airplane models were covered in this survey:
ManufacturerModel

Airbus- -A300-600, A310, A318/319/320,
A330, A340
Aerospatiale- -ATR-42, ATR-72
Boeing- -717, 737 (Classics and New Generation), 747-400, 757, 767, 777
Bombardier- -Challenger 604, Regional Jet, Learjet Models 31, 45, 60, Dash 8- 400
Cessna- -Models 550, 560, 560XL
Embraer- -EMB-l20/-135/-145/-170
Gulfstream- -Gulfstream 200

The airplane manufacturers' responses are considered to be proprietary information, so a summary of this information is provided below.
In all cases, we found that the manufacturers provide sufficient and accessible maneuvering speed information covering all phases of flight and airplane configurations for both icing and non-icing conditions. The means to convey the maneuvering speed information to pilots include flight deck displays, flight management systems, quick reference handbooks, flightcrew operating manuals, flightcrew training manuals, and Airplane Flight Manuals.
For airplanes with electronic speed displays (except for the Bombardier Challenger and Regional Jet), minimum maneuvering speeds are shown on the airspeed indicator as part of a low speed awareness bar. The low speed awareness bar is typically composed of differently colored bands (e.g., white, amber, red) that appear In a strip next to the airspeed indication scale. Although the implementation of the bar differs slightly between airplane types, the top of the amber band generally represents the minimum maneuvering speed for the current flight condition.
Minimum speeds for icing conditions are only provided when they are different from the minimum speeds for non-icing conditions. In general, the same maneuvering capability must be provided in icing conditions as for non-icing conditions. If the activation point of the stick shaker (i.e., stall warning) is different for flight in icing conditions in order to provide sufficient stall. warning margin, the minimum maneuvering speeds must be adjusted to provide an adequate maneuvering capability without encountering stall warning.
A description of the minimum maneuvering speeds applicable to each flight phase and how that information is conveyed to the crew is provided below:
Takeoff -Initial takeoff climb
After takeoff, the minimum maneuver speed is Vz + XX (where XX varies with airplane model). If an engine fails or is shut down during the takeoff, the minimum maneuvering speed is V2. 14 Code of Federal Regulations part 25 specify the requirements that the selected V2 speed must meet.
For airplanes certificated to the criteria contained in Amendment 25-108 (which includes most transport category airplanes certificated since the early 1980's), V2 must allow the pilot to use bank angles up to 30 degrees without encountering stall warning or any other characteristic that might interfere with normal maneuvering. The all-engines- operating minimum maneuvering speed, V2 + XX, must provide a 40-degree bank angle capability. For some airplanes that were not certificated to the Amendment 25-108 criteria, the maneuvering bank angle capability may be somewhat less, but it may not be less than that resulting from a V2 speed that is at least 20 percent higher than the airplane's stall speed. V2 must be provided in the AFM. V2 is also available from the flight management system (for airplanes so equipped), FCOM's, wick reference handbooks, and takeoff data tabulations produced by the operator. V2 is also shown on the airspeed display. On airplanes with electronic speed displays (except for the Learjet Models 45 and 60), a V, speed marker is automatically placed on the airspeed display. For airplanes without electronic speed displays, a speed marker is set manually by the pilot at the V2, speed.
Takeoff - Flap retraction
The minimum maneuvering speeds for intermediate flap configurations during flap retraction are provided in the FCOM and other documents containing airplane operating information. Although the Federal Aviation Regulations do not contain specific requirements for minimum flap retraction speeds, the standard practice is to use the same criteria in defining these speeds as are used for the all- engines-operating minimum maneuvering speed with takeoff flaps (described above) and the final takeoff segment climb speed with flaps retracted (described below).
Flap retraction speeds may also be shown on the airspeed display. On airplanes with electronic

speed displays (except for the Bombardier Challenger and Regional Jet, and the Learjet Models 45 and 60), flap retraction speed markers are automatically placed on the airspeed display. For airplanes without electronic speed displays, markers may be placed manually by the pilot for the intermediate flap settings, or the maneuver speed can be determined relative to the takeoff flaps and flaps retracted maneuvering speed markers.
Takeoff-Final takeoff climb
The final takeoff climb speed must meet part 25 requirements. For airplanes certificated to the criteria contained in Amendment 25-108, the final takeoff climb speed must allow the pilot to use bank angles up to 40 degrees without encountering stall warning or any other characteristic that might interfere with normal maneuvering. For some airplanes that were not certificated to the Amendment 25-108 criteria, the maneuvering bank angle capability may be somewhat Less, but it may not be less than that resulting from a final takeoff climb speed that is at least 25 percent higher than the airplane's stall speed.
The final takeoff climb speed represents the minimum maneuvering speed with flaps retracted. It must be provided in the AFM, and can also be obtained from the flight management system (for airplanes so equipped), FCOM's, quick reference handbooks, and other operating manuals. The final takeoff climb speed is also shown on the airspeed display. On airplanes with electronic speed displays (except fox the Bombardier Challenger and Regional Jet, and the Learjet Models 45 and 60), the flaps up speed marker is automatically placed on the airspeed display. For airplanes without electronic speed displays, a speed marker can be placed manually by the pilot.
Climb. cruise. descent. and holding
Recommended speeds for climb, cruise, descent, and holding are given in the FCOM and other operating manuals. Typically, minimum airspeeds for climb, cruise, and descent are not an issue since the recommended speeds are typically much higher than the flaps retracted minimum maneuvering speed. The recommended holding speed is usually the speed for minimum fuel consumption, but not less than that needed to maintain the selected maneuvering margin.
Part 25 requires the buffet onset envelope to be provided in the AFM. The buffet onset envelope shows the maneuvering margin available as a function of speed, weight, and pressure altitude. Operators can use this information as an aid in selecting climb speeds and cruise altitudes.
On airplanes with electronic speed displays (except for the Bombardier Challenger and Regional Jet. and the Learjet Models 45 and 60), the minimum maneuvering speed fox climb, cruise, and descent are identified as the top of the amber band of the low speed awareness bar. Below 20,000 feet, the top of the amber band corresponds to a speed that provides a 30 to 40 degree (depending on the airplane model) bank angle to stick shaker. Above 20,000 feet, the top of the amber band provides a selectable maneuver margin to stick shaker (generally 0.2 to 0.3 g margin, which is equivalent to 34 and 40 degrees of bank angle, respectively).
Approach and landing
Flap extension speeds for the approach phase are provided in the FCOM and other operating manuals in a similar manner to the flap retraction speeds after takeoff. Recommended approach speeds generally provide 40 to 45 degrees of bank capability without encountering stall warning. Some manufacturers recommend additional speed additives for maneuvering prior to final approach.
The reference landing speed must meet part 25 requirements. For aixplanes certificated to the criteria contained in Amendment 25-108, the reference landing speed must allow the pilot to use bank angles up to 40 degrees without encountering stall warning or any other characteristic that might interfere with normal maneuvering. For some airplanes that were not: certificated to the Amendment 25- 108 criteria, the maneuvering bank angle capability may be somewhat less, but it may not be lees than that resulting from a reference landing speed that is at least 30 percent higher than the airplane's stall speed.
On airplanes with electronic speed displays (except for the Bombardier Challenger and Regional Jet, and the Learjet Models 45 and 60), a reference landing speed marker is automatically placed on the airspeed display. Far airplanes Without electronic speed displays, the pilot would place a speed marker manually.
We believe the above information address the remaining concerns with the availability and accessibility of minimum maneuvering speed information in existing airplanes, and consequently request that the recommendations be classified as "Closed Acceptable"

10/7/05 Email from Don Stimson, FAA Transport Standards Staff to Judy Leach, FAA, answering question posed by Jeff Marcus, NTSB Question: For older aircraft without a glass cockpit (like the EMB-120), how are minimum maneuvering airspeeds in non-icing conditions made available to operating pilots, and how has this changed?
Response: For older airplanes that do not have a glass cockpit, maneuvering speed information is provided to pilots in quick reference handbooks, flightcrew operating manuals, flightcrew training manuals, and airplane flight manuals as well as winter safety bulletins and operator's pilot training programs. The content of this information and the manner in which it is conveyed to pilots has changed since the time of the Embraer 120 accident that resulted in safety recommendation A-98-94. These changes are a result of:
1) Airworthiness Directives. For example, airworthiness directives have been issued against the Embraer EMB-120 and the Cessna 560 to increase the minimum maneuvering speeds in icing conditions.

2) Notice N8400.39. This notice reminded principal operations inspectors of the importance of aircraft manufacturers' minimum maneuvering airspeeds for various airplane configurations and phases and conditions of flight. It also noted that these minimum maneuvering airspeeds, especially for icing conditions, should be promptly incorporated in operating manuals and training programs in a clear and concise manner, regardless of the means in which the information was issued by the manufacturer.
3) Advisory circular (AC) 25.1419-1A. This AC states that the operating limitations section of the airplane flight manual should provide the minimum airspeed that should be maintained for each normal aircraft configuration whenever ice exists on the critical surfaces. This same information is conveyed in draft AC's 20-73A and 25.21-1.
4) A letter sent by the FAA to the airplane manufacturers requesting descriptions of how minimum airspeed speed information (including minimum maneuvering airspeeds) is provided to flightcrews for each airplane configuration, phase of flight (takeoff, climb, cruise, descent, holding, approach and landing), and flight condition (icing and non-icing) in order to respond to this safety recommendation. (Manufacturers made further changes as a result of this letter.)
5) Increased industry awareness of the importance of conveying minimum maneuvering speed information to pilots, especially in icing conditions.
Examples of how minimum maneuvering airspeed information is conveyed to pilots of non-glass cockpit airplanes:
Aerospatiale:
For all ATR models, minimum airspeed and minimum maneuvering airspeed information for icing and non-icing conditions are provided to flight crews in the airplane flight manual (AFM), flightcrew operating manual (FCOM), and quick reference handbook (QRH). These speeds cover flight condition (icing or non-icing), phase of flight, and maneuvering bank angles, weight, and center-of-gravity. The minimum maneuvering/operating airspeeds for icing conditions are provided for each phase of flight and also specify a maximum bank angle.
Boeing:
The primary sources for operating speed information for all Boeing models, including those models without glass cockpits, are:
1. Flight Management Computer or Flight Management System
2. Flight Crew Operations Manual, including the Quick Reference Handbook
3. Airplane Flight Manual or software databases based on the AFM.

In addition, the Flight Crew Training Manual provides information on speed schedules, minimum maneuvering speeds, and the maneuver margins to stick shaker for different phases of flight and airplane configurations.
Bombardier:
Dash 8: Detailed speed information is provided to crews via a quick reference handbook.
Learjet Models 31 and 31A: Flight manuals and pilot operating handbooks (including Quick Reference Handbooks) contain recommended airspeeds for every phase of flight and airplane configuration, and are applicable to both icing and non-icing conditions.
Embraer:
EMB-120: Minimum airspeed information provided in the AFM and FCOM. In addition, the EMB-120 has a system to warn the flight crew if the airspeed is allowed to decay below the minimum speed while operating in icing conditions. This system will sound a horn and illuminate a "LOW SPD" visual annunciation if the airspeed is allowed to decay below 155 KIAS.
Gulfstream:
Minimum maneuvering speed information for all airplane configurations and icing and non-icing conditions are presented in the AFM and the airplane operating manual for all models evaluated, including the non-glass cockpit Model G-III.

1/19/2006 NTSB

The Safety Board previously indicated that the FAA had taken the recommended action of requiring manufacturers to provide minimum maneuvering airspeeds for icing conditions. However, the Board was concerned that the FAA had not described any activities to ensure that minimum maneuvering airspeeds for nonicing conditions were readily available to pilots. Because the FAA had not addressed nonicing conditions, on July 11, 2002, Safety Recommendation A-98-94 was classified "Open-Unacceptable Response."

After the February 3, 2004, meeting, the FAA provided the Board with information on activities that it had undertaken in response to this recommendation. The FAA asked aircraft manufacturers to describe how minimum airspeed information is provided to flight crews for each airplane configuration, phase of flight, and flight condition (icing and nonicing). The FAA found that manufacturers provide sufficient and accessible maneuvering speed information covering all phases of flight and airplane configurations for both icing and nonicing conditions. This information is available to pilots through flight deck displays, flight management systems, quick reference handbooks (QRH), flight crew operating manuals (FCOM), flight crew training manuals, and airplane flight manuals (AFM).

The FAA's survey revealed that for airplanes with electronic speed displays (known as having a "glass cockpit"), minimum maneuvering speeds are shown on the airspeed indicator as part of a low-speed awareness bar. The Safety Board recognized that glass cockpit airplanes typically and readily display the appropriate minimum maneuvering airspeed for all airplane configurations, phases, and conditions of flight. The Board, however, was concerned with older airplanes that do not have a glass cockpit. In response to the Board's question about availability of minimum maneuvering flight speeds in these older aircraft, the FAA indicated that this information is available for all phases of flight and airplane configurations for both icing and nonicing conditions in the QRH, the FCOM, or the AFM.

Based on the information supplied, the FAA has completed the recommended action. Consequently, Safety Recommendation A-98-94 is classified "Closed-Acceptable Action."

Recommendation # A-98-095

Overall Status
CAAA

Priority

THE NTSB RECOMMENDS THAT THE FAA: REQUIRE THE OPERATORS OF ALL TURBINE-ENGINE DRIVEN AIRPLANES (INCLUDING THE EMB-120) TO INCORPORATE THE MANUFACTURER'S MINIMUM MANEUVERING AIRSPEEDS FOR VARIOUS AIRPLANE CONFIGURATIONS AND PHASES AND CONDITIONS OF FLIGHT IN THEIR OPERATING MANUALS AND PILOT TRAINING PROGRAMS IN A CLEAR AND CONCISE MANNER, WITH EMPHASIS ON MAINTAINING MINIMUM SAFE AIRSPEEDS WHILE OPERATING IN ICING CONDITIONS.

FAA	Closed - Acceptable Alternate Action	9/15/2003

9/16/1999 Addressee

Letter Mail Controlled 9/22/99 9:22:50 AM MC# 991064 THE FAA AGREES WITH THE INTENT OF THIS SAFETY RECOMMENDATION AND ON 5/28/99, ISSUED JOINT FLIGHT STANDARDS HANDBOOK BULLETIN FOR AIR TRANSPORTATION (HBAT), AIRWORTHINESS (HBAW), AND GENERAL AVIATION (HBGA), FLIGHT STANDARDS POLICY - COMPANY OPERATING MANUALS AND COMPANY TRAINING PROGRAM REVISIONS FOR COMPLIANCE. THE BULLETIN CLARIFIES THE OPERATIONAL INTENT CONCERNING CURRENT MANUAL REVISIONS AND CURRENT TRAINING PROGRAMS. THE BULLETIN ALSO REEMPHASIZES THAT EACH OPERATOR IS REQUIRED TO KEEP ITS AFM, RFM, COMPANY FLIGHT MANUAL, AND TRAINING PROGRAMS CURRENT ON AN ONGOING BASIS. EACH OPERATOR MUST UPDATE AFFECTED MANUALS AND TRAINING PROGRAMS TO INCORPORATE FAA-APPROVED MATERIAL PERTAINING TO OPERATING LIMITATIONS, OPERATING PROCEDURES, PERFORMANCE INFORMATION, LOADING INFORMATION, AND OTHER INFORMATION NECESSARY FOR SAFE OPERATIONS. I HAVE ENCLOSED A COPY OF THE BULLETIN FOR THE BOARD'S INFORMATION. I CONSIDER THE FAA'S ACTION TO BE COMPLETED, AND I PLAN NO FURTHER ACTION.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

4/11/2000	NTSB	IN REGARD TO A-98-95, ALTHOUGH HBAT 99-07, HBAW 99-07, AND HBGA 9910, CLARIFY THAT OPERATORS AND POI'S MUST ENSURE THAT ALL OPERATIONAL MANUALS AND PROCEDURES USED ARE CORRECT AND UP-TO-DATE, AND THE BOARD BELIEVES THAT MINIMUM MANEUVERING AIRSPEEDS ARE PART OF THE OPERATIONAL PROCEDURES FOR ANY AIRCRAFT, THE SAFETY BOARD IS DISSAPPOINTED THAT THE BULLETIN DOES NOT SPECIFICALLY MENTION MINIMUM MANEUVERING AIRSPEEDS. ADEQUATELY ADDRESSING THIS TOPIC IS THE SOLE POINT OF A-98-95 AND WAS A SIGNIFICANT FACTOR IN THE ACCIDENT THAT PROMPTED THE RECOMMENDATION. THE RECOMMENDATION ALSO ASKED THAT EMPHASIS BE GIVEN TO THE IMPORTANCE OF MAINTAINING MINIMUM MANEUVERING AIRSPEEDS IN ICING CONDITIONS; HOWEVER, THE BULLETIN DOES NOT MENTION ICING CONDITIONS. PENDING REVISIONS TO THE BULLETIN OR THE ISSUANCE OF A SEPARATE DOCUMENT DISCUSSING MANUFACTURERS' MINIMUM MANEUVERING AIRSPEEDS FOR VARIOUS AIRPLANE CONFIGURATIONS AND PHASES AND CONDITIONS OF FLIGHT, WITH EMPHASIS ON MAINTAINING MINIMUM SAFE AIRSPEEDS WHILE OPERATING IN ICING CONDITIONS, A-98-95 IS CLASSIFIED "OPEN--UNACCEPTABLE RESPONSE."
2/11/2003	Addressee	"FAA Staff advised via telephone that the NPRM package with changes to 14 CFR subparts N and O is in internal FAA coordination at this time. The document is 1000 pages and they expect to have it submitted to OST in May 2003."
6/3/2003	Addressee	Letter Mail Controlled 6/11/2003 3:49:27 PM MC# 2030281 On 1/6/03 the FAA issued Notice N8400.39, Minimum Maneuvering Airspeeds, and Flight in Icing Conditions. This was direction to the principle operations inspectors to insure that these air speed be strongly encouraged to be incorporated into operating manuals and training programs. Advisory Circular 91-74, Pilot Guide: Flight in Icing Conditions, dated 12/12/02, was also included and mentioned in the Notice.
9/15/2003	NTSB	The Safety Board notes that the FAA issued Notice N8400.39, "Minimum Maneuvering Airspeeds, and Flight in Icing Conditions," on January 16, 2003. This notice addresses the importance of incorporating manufacturers' minimum maneuvering airspeeds for various airplane configurations and phases and conditions of flight in operating manuals and training programs of air carrier pilots, with an added emphasis on flight in icing conditions. Because the notice emphasizes our recommendation but does not require it, Safety Recommendation A-98-95 is classified "Closed--Acceptable Alternate Action."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Recommendation # A-98-096

Overall Status
OUA

Priority

THE NTSB RECOMMENDS THAT THE FAA: REQUIRE THE MANUFACTURERS AND OPERATORS OF ALL AIRPLANES THAT ARE CERTIFICATED TO OPERATE IN ICING CONDITIONS TO INSTALL STALL WARNING/PROTECTION SYSTEMS THAT PROVIDE A COCKPIT WARNING (AURAL WARNING AND/OR STICK SHAKER) BEFORE THE ONSET OF STALL WHEN THE AIRPLANE IS OPERATING IN ICING CONDITIONS.

FAA	Open - Unacceptable Response

2/26/1999 Addressee

FOR 14 CFR PART 25 AIRPLANES, THE FLIGHT TEST HARMONIZATION WORKING GROUP IS PROPOSING A REQUIREMENT TO EVALUATE STALL WARNING IN ALL AIRPLANE HIGH-LIFT DEVICE CONFIGURATIONS WITH ICE ACCRETIONS. THIS PROPOSAL WOULD REQUIRE ADEQUATE STALL WARNING TO BE SHOWN WITH THE MOST CRITICAL ICE ACCRETION IN THE 14 CFR PART 25 TAKEOFF PATH FOR TAKEOFF CONFIGURATIONS, AND AN ICE ACCRETION THAT WOULD ACCUMULATE DURING A HOLDING PHASE FOR ALL OTHER HIGH-LIFT DEVICE CONFIGURATIONS. THE PROPOSED CRITERIA WOULD ALLOW THE NON-CONTAMINATED AIRPLANE STALL WARNING SETTINGS TO BE RETAINED IF THE PILOT CAN PREVENT THE AIRPLANE FROM STALLING BY TAKING ACTION 3 SECONDS AFTER STALL WARNING WITH A 1 KT./SEC. DECELERATION AND 1 SECOND AFTER STALL WARNING WITH A 3 KTS./SEC. DECELERATION. THE APPLICANT WOULD ALSO HAVE TO DEMONSTRATE THAT STALL (WITH ICE ACCRETIONS) CAN BE PREVENTED IN 1-G ACCELERATED ENTRY RATE MANEUVERS WHEN THE PILOT DELAYS ONE SECOND AFTER STALL WARNING BEFORE TAKING PREVENTATIVE ACTION. IF ANY OF THE ABOVE CRITERIA CANNOT BE MET, THE STALL WARNING FOR OPERATION IN ICING CONDITIONS WOULD HAVE TO BE RESET TO THE REGULATORY MINIMUM SIMILAR TO THE UNCONTAMINATED AIRPLANE (I.E., UNDER THE 1-G STALL CRITERIA, THE GREATER OF 3 KNOTS OR 3 PERCENT OF THE STALL REFERENCE SPEED DEFINED WITH THE ICE ACCRETION (VSR ICE) APPROPRIATE TO THE PHASE OF FLIGHT). THE FAA BELIEVES THE FLIGHT TEST HARMONIZATION WORKING GROUP'S PROPOSED CRITERIA WILL PROVIDE ADEQUATE STALL WARNING IN ICING CONDITIONS FOR AIRPLANES THAT WILL BE CERTIFICATED TO THE FUTURE REQUIREMENTS OF 14 CFR PART 25. FOR CURRENTLY CERTIFICATED 14 CFR PART 25 AIRPLANES, THE FAA BELIEVES THE SAFETY OBJECTIVE OF THIS SAFETY RECOMMENDATION CAN BE MET BY DEFINING APPROPRIATE OPERATING SPEEDS FOR OPERATIONS IN ICING CONDITIONS. THESE SPEEDS WOULD MAINTAIN ADEQUATE MARGINS ABOVE THE STALL SPEEDS DETERMINED WITH ICE ACCRETIONS, THUS PROVIDING PROTECTION FROM INADVERTENT STALL. THIS APPROACH WOULD REQUIRE A COMPREHENSIVE REVIEW OF EXISTING ICING CERTIFICATION DATA TO DETERMINE IF ICING STALL SPEEDS WERE DETERMINED FOR ALL OPERATIONAL CONFIGURATIONS OF WING HIGH-LIFT DEVICES. IF THE ASSOCIATED ICE ACCRETIONS WERE APPROPRIATE, FURTHER ANALYSIS MAY BE REQUIRED TO ESTABLISH THE STALL SPEEDS FOR AIRPLANES WITH ICE ACCRETIONS. THE POSITIONS ESTABLISHED ON THIS ISSUE AT A JANUARY 1999 MEETING OF FAA CERTIFICATION SPECIALISTS WAS FURTHER DISCUSSED WITH AIRFRAME MANUFACTURERS, AIRLINE OPERATORS, WORLDWIDE CIVIL AVIATION AUTHORITIES, AND OTHER AVIATION ORGANIZATIONS AT THE IN-FLIGHT ICING CONFERENCE HELD FEBRUARY 2-4, 1999. FOR 14 CFR PART 23 AIRPLANES, THE PRINCIPAL ISSUE IN THIS SAFETY RECOMMENDATION APPEARS TO RELATE TO THE ADEQUACY OF THE STALL WARNING/PROTECTION SYSTEM WHEN ICE IS PRESENT. SECTION 23.1419(A) NOW INCLUDES A REQUIREMENT FOR AIRPLANES CERTIFICATED FOR FLIGHT IN ICING CONDITIONS. IT STATES, IN PART, THAT TESTS OF THE ICE PROTECTION SYSTEM MUST BE CONDUCTED TO DEMONSTRATE THAT THE AIRPLANE IS CAPABLE OF OPERATING SAFELY IN CONTINUOUS MAXIMUM AND INTERMITTENT MAXIMUM ICING CONDITIONS AS DESCRIBED IN 14 CFR PART 25. AS USED IN 14 CFR PART 25, "CAPABLE OF OPERATING SAFELY" MEANS THAT AIRPLANE PERFORMANCE, CONTROLLABILITY, MANEUVERABILITY, AND STABILITY MUST NOT BE LESS THAN REQUIRED IN 14 CFR PART 23, SUBPART B. THE STALLING SPEED AND HANDLING CHARACTERISTICS ARE CONTAINED IN SUBPART B REQUIREMENTS. ACCORDINGLY, THE FAA BELIEVES THAT THE 14 CFR PART 23 REGULATION MEETS THE INTENT OF THIS SAFETY RECOMMENDATION FOR NEW AIRPLANES. ONCE THE FLIGHT TEST HARMONIZATION WORKING GROUP'S CRITERIA FOR 14 CFR PART 25 AIRPLANES ARE FINALIZED, THE FAA WILL CONSIDER ADOPTING THOSE OR SIMILAR CRITERIA FOR SMALL AND 14 CFR PART 23 COMMUTER-CATEGORY AIRPLANES. THE APPLICATION OF RETROACTIVE REQUIREMENTS FOR 14 CFR PART 23 AIRPLANES NOW IN SERVICE WILL BE EXAMINED CAREFULLY FOR AIRPLANE TYPES USED IN REGULARLY SCHEDULED REVENUE PASSENGER SERVICE AND OTHER TYPES WHOSE IN-SERVICE HISTORY WARRANTS CORRECTIVE ACTION.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

3/9/2000	NTSB	THE SAFETY BOARD NOTES THAT ALTHOUGH THE FAA'S PROPOSED ACTIONS HOLD SIGNIFICANT POTENTIAL TO ACCOMPLISH THE INTENT OF THIS RECOMMENDATION FOR NEWLY CERTIFICATED AIRCRAFT, THE CONCEPTS PROPOSED FOR CURRENT IN-SERVICE AIRCRAFT DO NOT. THE BOARD DOES NOT CONSIDER THE SETTING OF OPERATING SPEEDS AN ADEQUATE SUBSTITUTE FOR RELIABLE STALL WARNINGS IN ICING CONDITIONS. THE BOARD STRONGLY URGES THE FAA TO REVIEW ITS PROPOSED ACTIONS AND CONSIDER REGULATORY ACTION THAT RESULTS IN THE NECESSARY CHANGE TO STALL WARNING SYSTEMS FOR CURRENT IN-SERVICE AIRCRAFT. PENDING SUCH A REVIEW, A-98-96 IS CLASSIFIED "OPEN--UNACCEPTABLE RESPONSE."
9/25/2000	Addressee	Letter Mail Controlled 10/02/2000 3:16:36 PM MC# 2001437 For future airplane designs, the FAA is continuing to develop 14 CFR Part 25 regulatory requirements for airplane performance and handling characteristics in icing conditions. For currently certificated 14 CFR Part 25 airplanes, the FAA had requested that manufacturers of transport-category aircraft review their Airplane Flight Manuals to ensure that appropriate operating speeds in icing conditions are provided. The FAA has reviewed the information received from manufacturers and additional input from aircraft certification specialists. As a result of this review, the FAA is considering a rulemaking project to develop regulatory requirements that would, in part, require stall warning to be provided by a cockpit warning system at speeds appropriate for operations with ice accretions. These regulatory requirements would be applied retroactively. I will keep the Board informed of the FAA's progress on this safety recommendation
3/12/2001	NTSB	The Safety Board notes that the FAA is taking the actions recommended and that the information for currently certified airplanes on appropriate operating speeds in icing conditions will be used to develop stall warning systems for operations in icing conditions. Pending the development of regulatory requirements for a stall warning system that provides a warning before the onset of a stall in icing conditions, for newly certificated and currently operating aircraft, Safety Recommendation A-98-96 is classified Open--Acceptable Response.
9/21/2001	Addressee	Letter Mail Controlled 10/22/2001 11:44:27 AM MC# 2010866 For future airplane designs, the FAA is continuing to develop 14 CFR Part 25 regulatory requirements for airplane performance and handling characteristics in icing conditions. For currently certificated 14 CFR Part 25 airplanes, the FAA is developing a rulemaking project that would, in part, require stall warning to be provided by a cockpit warning system at speeds appropriate for operations with ice accretions. These regulatory requirements would be applied retroactively. I will keep the Board informed of the FAA's progress on this safety recommendation.
7/11/2002	NTSB	The Safety Board is pleased that the FAA is taking action for both new and current designs. Pending issuance of the changes to Title 14 CFR Part 25, Safety Recommendation A-98-96 remains classified "Open--Acceptable Response."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

10/26/2005 Addressee

Letter Mail Controlled 10/27/2005 2:12:40 PM MC# 2050501
Marion C. Blakey, Administrator, FAA, 10/26/05 The FAA is continuing its plans to adopt new 14 CFR Part 25 regulatory requirements that would require adequate stall warning margin to be shown with the most critical ice accretion for airplanes approved to fly in icing conditions. Except for the short time before icing conditions are recognized and the ice protection system activated, this stall warning must be provided by the same means as for non-icing conditions. Although neither the current nor the proposed new 14 CFR Part 25 requirements mandate use of an aural warning or stick shaker, all recently certificated transport-category airplanes have used either a stick shaker or an aural warning to warn the pilot of an impending stall. The FAA does not anticipate any future airplane designs without a cockpit warning of an impending stall.
The proposed stall warning requirements for icing conditions are part of the NPRM referenced in response to Safety Recommendation A-91-87. It is anticipated that the NPRM will be published for public comment by October 2005. In the meantime, the FAA is working with applicants to ensure that new airplane designs have adequate stall warning in icing conditions.
After further review, considering the actions that the FAA and industry have taken and are intending to take in the future to improve flight safety in icing conditions, the FAA has determined that requiring all airplanes currently in service to be modified to provide a stall warning in advance of a stall in icing conditions would impose a cost burden that is not commensurate with the potential safety benefits. In some cases, the stall warning system would need significant hardware modifications, including external modifications to the airplane (i.e., changing from wing-mounted angle-of-attack vanes to fuselage mounted vanes). In other cases, significant software and avionics systems and equipment changes would be needed. These changes would result in considerable costs to design, test, certify, and implement throughout the fleet.
The FAA will, however, take appropriate action on those airplane designs already in service if an unsafe condition is identified. For example, we have been working closely with Embraer to improve the critical ice shapes for evaluating stall warning and operating speed margins for the Embraer EMB-120. This work has recently concluded and Embraer has produced a service bulletin to modify stall warning computers to provide adequate stall warning margin and revise the airplane flight manual to provide increased operating speeds for icing conditions. The FAA plans to issue an AD to mandate incorporation of this service bulletin.
A recent review of operating speed information provided to flightcrews indicates that the operating speeds now being provided to flightcrews contain additional maneuvering and stall margins for icing conditions where necessary. On August 9, 2004, the FAA provided a comprehensive summary of this review in response to Safety Recommendation A-98-94 at the "Safety With A Team" meeting. The FAA looks forward to hearing the Board's position on the comprehensive summary.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

5/10/2006 NTSB

This recommendation was issued because aerodynamic changes due to icing can raise the stall speed and lower the angle of attack that leads to a stall, and these events may lead to little or no margin between the warning and the start of a stall. For example, in the Comair accident that prompted this recommendation, the autopilot disengaged and the roll upset began before the stick shaker (i.e., the stall warning) activated. Had the pilots been warned of an impending stall before the roll upset started, they might have been able to avoid the accident. The FAA's November 4, 2005, NPRM on icing considerations in aircraft certification proposes to require for newly certificated aircraft to have an adequate stall warning margin with the most critical ice accretion for airplanes approved to fly in icing conditions. The FAA indicated that until this NPRM becomes a final rule, it is working to ensure that new airplane designs have adequate stall warning margins in icing conditions.

In its September 21, 2001, letter to the Safety Board, the FAA stated that it was pursuing regulatory development projects for both new and currently operating aircraft to address this recommendation, and that the new rules would be applied retroactively. The FAA now indicates that after further review, it has determined that requiring all airplanes currently in service to be modified to provide a stall warning in advance of a stall in icing conditions would impose a cost burden not commensurate with the potential safety benefits. However, the FAA states that it will take appropriate action on those airplane designs already in service if an unsafe condition is identified. The FAA gave the EMB-120 as an example. Embraer recently produced a service bulletin to modify stall warning computers to provide an adequate stall warning margin and to revise the airplane flight manual to provide increased operating speeds for icing conditions. The FAA stated that it plans to issue an AD to mandate compliance with this service bulletin.

The Safety Board submitted detailed technical comments to the docket for the NPRM. The NPRM appears to address the intent of this recommendation for newly type-certificated aircraft, and the FAA has indicated that until the NPRM becomes a final rule, it will ensure that new airplane designs have adequate stall warning margins in icing conditions. The Board is disappointed that the FAA does not believe that an inadequate stall warning margin in icing conditions is an unsafe condition that needs to be identified and rectified. The FAA indicated that when a problem with an in-service airplane is identified, it will take appropriate action, as with the EMB-120. This is not an acceptable response to this recommendation. The Safety Board does not believe that the FAA should wait for an accident or serious incident to identify an aircraft with an insufficient stall warning margin in icing conditions.

The problem of inadequate stall warning margins in icing conditions remains a problem with in-service airplanes. The Board is currently investigating the February 15, 2005, crash of a Cessna Citation 560 aircraft while on approach to Pueblo Memorial Airport, Pueblo, Colorado. This accident was fatal to 8 people, and the aircraft was destroyed. Although the Board's investigation is continuing, it has revealed that icing was an important consideration in this accident, and that the airplane stalled in icing conditions before the stall warning activated.

The Safety Board notes that if the FAA has conducted analyses of the stall warning margins in icing conditions for in-service aircraft, and identified those aircraft in need of revision, this may be the basis for an acceptable alternate response to the recommendation. However, delaying action until there is an accident or serious incident is not acceptable. Pending issuance of the final rule associated with the November 4, 2005, NPRM, with a requirement that airplanes be equipped with stall warning/protection systems that provide a cockpit warning before the onset of stall when the airplane is operating in icing conditions, and a similar requirement for currently certificated aircraft (or an acceptable alternative), Safety Recommendation A-98-96 is classified "Open-Unacceptable Response."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Recommendation # A-98-099

Overall Status
CR

Priority

THE NTSB RECOMMENDS THAT THE FAA: EXPEDITE THE RESEACH, DEVELOPMENT, AND IMPLEMENTATION OF REVISION TO THE ICING CERTIFICATION TESTING REGULATIONS TO ENSURE THAT AIRPLANES ARE ADEQUATELY TESTED FOR THE CONDITIONS IN WHICH THEY ARE CERTIFICATED TO OPERATE; THE RESEARCH SHOULD INCLUDE IDENTIFICATION (AND INCORPORATION INTO ICING CERTIFICATION REQUIREMENTS) OF REALISTIC ICE SHAPES AND THEIR EFFECTS AND CRITICALITY.

FAA	Closed - Reconsidered	3/9/2000

2/26/1999	Addressee	THERE ARE TWO ISSUES OUTLINED IN THIS RECOMMENDATION THAT THE FAA BELIEVES ARE BEING ADDRESSED IN COMPANION RECOMMENDATIONS A-92, -94, AND -96. THE FIRST ISSUE IN THIS RECOMMENDATION IS TO REVISE ICING CERTIFICATION TESTING REGULATIONS TO ENSURE AIRPLANES ARE ADEQUATELY TESTED FOR THE CONDITIONS IN WHICH THEY ARE CERTIFIED FOR OPERATION. THE ARAC FLIGHT TEST HARMONIZATION WORKING GROUP ACTIVITIES OUTLINED IN RESPONSE TO A-98-94 AND -96 ADEQUATELY ADDRESS THIS PORTION OF THE RECOMMENDATION. THE SECOND ISSUE ADDRESSES RESEARCH ON THE IDENTIFICATION OF REALISTIC ICE SHAPES AND THEIR EFFECTS AND CRITICALITY, AND INCORPORATION OF THESE SHAPES INTO ICING CERTIFICATION REQUIEMENTS. WE BELIEVE THAT THIS ISSUE IS ALREADY BEING ADDRESSED IN RESPONSE TO A-98-92. CONSEQUENTLY, I ASK THAT THE BOARD CLASSIFY THIS RECOMMENDATION IN A "CLOSED ACCEPTABLE" STATUS. I WILL CONTINUE TO KEEP THE BOARD INFORMED OF ITS ACTION IN RESPONSE TO A-98-94, -96, AND -92.
3/9/2000	NTSB	THE SAFETY BOARD AGREES THAT THE INTENT OF A-98-99 CAN BE MET THROUGH ACCEPTABLE ACTION IN RESPONSE TO A-98-92, -94, AND -96. THEREFORE, A-98-99 IS CLASSIFIED "CLOSED--RECONSIDERED."

Recommendation # A-98-100

Overall Status
CUAS

Priority

THE NTSB RECOMMENDS THAT THE FAA: WHEN THE REVISED ICING CERTIFICATION STANDARDS AND CRITERIA ARE COMPLETE, REVIEW THE ICING CERTIFICATION OF ALL TURBOPROPELLER-DRIVEN AIRPLANES THAT ARE CURRENTLY CERTIFICATED FOR OPERATION IN ICING CONDITIONS AND PERFORM ADDITIONAL TESTING AND TAKE ACTION AS REQUIRED TO ENSURE THAT THESE FULFILL THE REQUIREMENTS OF THE REVISED ICING CERTIFICATION STANDARDS.

FAA	Closed - Unacceptable Action/Superseded	2/27/2007

2/26/1999	Addressee	AFTER THE ICING CERTIFICATION REGULATIONS AND ADVISORY MATERIAL ARE REVISED, THE FAA WILL DETERMINE IF ADDITIONAL ACTIONS ARE REQUIRED TO CORRECT UNSAFE CONDITIONS ON CURRENTLY CERTIFICATED TURBOPROPELLER-DRIVEN AIRPLANES. I WILL INFORM THE BOARD OF THE FAA'S COURSE OF ACTION TO ADDRESS THIS RECOMMENDATION UPON COMPLETION OF THE ICING CERTIFICATION REGULATIONS AND ADVISORY MATERIAL.
3/9/2000	NTSB	PENDING THE FAA'S REVIEW OF ALL NEW MATERIALS AND ITS SUBSEQUENT ACTION, A-98-100 IS CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."
9/25/2000	Addressee	Letter Mail Controlled 10/02/2000 3:16:36 PM MC# 2001437 After the icing certification regulations and advisory material are revised in response to Safety Recommendations A-98-92, -94, and -96, the FAA will determine if additional actions are required to correct unsafe conditions on currently certificated turbopropeller-driven airplanes. I will keep the Board informed of the FAA's progress on this safety recommendation.
3/12/2001	NTSB	The FAA indicates that, after the icing certification regulations and advisory material are revised in response to Safety Recommendations A-98-92, -94, and -96, it will determine whether additional actions are required to correct unsafe conditions on currently certificated turbopropeller-driven airplanes. Pending development and application of revised icing certification standards and criteria to currently certificated aircraft, Safety Recommendation A-98-100 remains classified Open--Acceptable Response.

Recommendation Report

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MODE:AVIATION KEYWORD 1:icing

9/21/2001	Addressee	Letter Mail Controlled 10/22/2001 11:44:27 AM MC# 2010866: As discussed in response to Safety Recommendations A-98-94 and A-98-96, the FAA is developing a regulatory project to address currently certificated 14 CFR Part 25 airplanes. The proposed regulatory action will introduce requirements for operating speeds in icing conditions that provide adequate maneuver capability and for stall warning to be provided by a warning device in the flightdeck. Upon completion of the efforts to address Safety Recommendation A-98-92, the FAA will evaluate the need for additional actions related to critical ice shapes on currently certificated turbopropeller airplanes. I will keep the Board informed of the FAA's progress on this safety recommendation.
7/11/2002	NTSB	The Safety Board recognizes that the FAA's actions in response to this recommendation are contingent on the FAA's action in response to Safety Recommendation A-98-92. Pending completion of action on that recommendation and the development and application of revised icing certification standards to currently certificated aircraft, Safety Recommendation A-98-100 remains classified "Open--Acceptable Response."
2/1/2005	Addressee	In its 2/1/2005 annual report to Congress, Regulatory Status of the National Transportation Safety Board's "Most Wanted" Recommendations to the Department of Transportation, the DOT wrote: The FAA is issuing a draft rule to address certain currently certificated turbo-propellerdriven airplanes. This draft rule would introduce requirements for operating speeds that provide adequate maneuver capability in icing conditions. It would also require stall warning to be provided by a warning device in the flight deck. Upon completion of its efforts to address Safety Recommendation A-98-92, -94, and -96, the FAA will evaluate the need for additional actions related to critical ice shapes on currently certificated turbo-propeller airplanes.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

10/26/2005	Addressee	Letter Mail Controlled 10/27/2005 2:12:40 PM MC# 2050501 Marion C. Blakey, Administrator, FAA, 10/26/05 In the original response to this safety recommendation, the FAA agreed that after the icing certification regulations and advisory material are revised we would determine if additional actions are required to correct unsafe conditions on currently certificated turbopropeller-driven airplanes. Subsequently, the FAA has reported on the progress of various icing certification rulemaking and advisory material activities. The FAA believes the icing certification regulations and advisory material are now sufficiently defined to determine whether additional actions are needed to correct unsafe conditions on currently certificated turbopropeller-driven airplanes. Based on the information provided below, the FAA has determined that no unsafe conditions exist that warrant actions beyond those that have already been completed or are in the process of being completed. Proposed Rules - Part 25 and Part 121 Activation of Ice Protection Systems. These rules will provide the flightcrew with a means to determine when the ice protection systems must be activated. The FAA has already addressed the issue of activation of ice protection systems for existing turbopropeller-driven airplanes through the issuance of ADs that require activation of pneumatic deicing boots at the first signs of ice accumulation. The ADs address the unsafe condition of the pilot determining whether the amount of ice accumulated on the wing warrants activation of the ice protection system. The FAA acknowledges that the flightcrews' observation of ice accumulations can be difficult during times of high workload, operations at night, or when clear ice has accumulated. Therefore the proposed Part 25 and Part 121 rules will require improved ice protection activation means to address these situations. The proposed Part 121 rule will apply to all airplanes operating under Part 121, including current turbopropeller-driven airplanes that have a maximum certified takeoff weight less than 60,000 pounds. Proposed Rules - Part 25 Supercooled Large Droplet (SLD) and Part 121 Exiting Icing Conditions. The proposed Part 25 rule will require the safe operation of airplanes in SLD conditions. A proposed Part 121 rule will require flightcrews of airplanes equipped with unpowered roll controls that have not been certificated to the proposed Part 25 SLD rule to exit conditions that are conducive to the formation of ice accretion aft of the protected surfaces. The FAA has already addressed the issue of exiting severe icing conditions for existing turbopropeller airplanes through the issuance of a series of ADs issued in the 1999 and 2000 timeframe. The ADs require these airplanes to exit icing when the conditions exceed the capabilities of the ice protection equipment. The FAA acknowledges that most of the visual cues for determining the flightcrew must act to exit icing conditions are subjective and can result in varying interpretations. The proposed Part 121 rule is being written to require less subjective means of determining when the flightcrew should exit icing conditions. The proposed Part 121 rule will apply to all airplanes operating under Part 121, including current turbopropeller airplanes that have a maximum certified takeoff weight less than 60,000 pounds and are equipped with unpowered flight controls in the pitch and/or roll axis. Proposed Rule - Part 25 Airplane Performance and Handling Characteristics in the Icing Conditions of Appendix C. As reported in response to Safety Recommendation A-91-87, the proposed rule will provide a comprehensive set of new certification requirements to evaluate airplane performance and handling characteristics in icing conditions in order to improve the level of safety for operation in icing conditions. Two significant safety issues addressed by the proposed rule are susceptibility to ice-contaminated tailplane stall and the stall warning margin in icing. The FAA has already taken action on both issues for existing airplanes that are a concern. For airplanes with unpowered control systems operating under the Parts 121 or 135 operating rules, the FAA evaluated the airplanes for susceptibility to ice-contaminated tailplane stall. The FAA mandated changes to improve tailplane stall margins for airplanes found to be susceptible. As reported in response to Safety Recommendation A-98-96, the FAA will take appropriate action if unsafe conditions associated with stall warning are identified. The update cited the critical ice shape work done by Embraer on the EMB-120 that has resulted in a service bulletin to modify stall warning computers to provide adequate stall warning margin and increase operating speeds in icing conditions. The FAA plans to issue an AD to mandate incorporation of the service bulletin. Proposed Advisory Circular Material for Critical Ice Shapes. As reported in response to Safety Recommendation A-98-92, the FAA has completed draft advisory material that provides guidance to FAA certification engineers and airframe manufacturers. This guidance material will be utilized by FAA certification engineers and airframe manufacturers and will be available as guidance during icing certifications and icing investigations. The FAA does not plan on revising the aircraft certification requirements since there has never been a question that the critical ice shapes should be considered during certification. As noted above, the FAA plans to mandate changes to the EMB-120 minimum operating speeds and stall warning computers for operation icing conditions to reflect refined critical ice shapes.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

3/1/2006	Addressee	In its 3/1/2006 annual report to Congress, Regulatory Status of the National Transportation Safety Board's "Most Wanted" Recommendations to the Department of Transportation, the DOT wrote: The icing certification regulations and advisory material being developed by the FAA are sufficiently defined to determine whether additional actions are needed to correct unsafe conditions on currently certificated turbo-propeller-driven airplanes. The FAA has determined that no unsafe conditions exist that warrant actions beyond those which have already been completed or are in the process ofbeing completed. 1. Proposed Rule: Part 25 and Part 121 Activation of Ice Protection Systems. The FAA has already addressed the issue of activation of IPS for existing turbo-propeller-driven airplanes through the issuance of Airworthiness Directives (ADS) that require the activation of pneumatic deicing boots at the first sign of ice accumulation. 2. Proposed Rule: Part 25 Super-cooled Large Droplet and Part 121 Exiting Icing Conditions. The FAA has already addressed the issue of exiting severe icing conditions for existing turbo-propeller-driven airplanes through the issuance of ADS that require the flight crew ofthese airplanes to exit icing when the conditions exceed the capabilities ofthe ice protection equipment. 3. Proposed Rule: Part 25 Airplane Performance and Handling Characteristics in the Icing Conditions of Appendix C. Two significant safety issues addressed by the proposed rule are the susceptibility to ice-contaminated tail plane stall and the stall warning margin in icing conditions. The FAA evaluated airplanes with unpowered control systems operating under parts 121 or 135 for susceptibility to tail plane stall. The FAA mandated changes to improve tail plane stall margins for airplanes found to be susceptible. The FAA will take appropriate action if unsafe conditions associated with stall warning are identified. For example, the FAA has worked with Embraer on the EMB-I20 on the critical ice shapes which has resulted in a service bulletins to modify stall warning computers to provide adequate stall warning margin and increased operating speeds in icing conditions. The FAA plans to issue an AD to mandate incorporation of the service bulletin.

5/10/2006 NTSB

In previous correspondence, the FAA has indicated that it needed to complete revisions to the icing certification standards and advisory material before it could act on this recommendation. In its current letter, the FAA states that the icing certification regulations and advisory material are now sufficiently defined to determine whether additional actions are needed. The FAA further states that no unsafe conditions exist to warrant actions beyond those that it has already completed or is in the process of completing. Among these regulatory changes completed or in process are the following:

1.Revisions to Part 25 and Part 121 Concerning Activation of Ice Protection Systems The FAA noted that it has already addressed this issue for existing turbo propeller driven airplanes through the issuance of ADs that require activation of deicing boots at the first signs of ice accumulation.

2.Revisions to Part 25 for SLD and Part 121 on Exiting Icing Conditions
The FAA indicates that it has already addressed the issue of exiting severe icing conditions for existing turbo-propeller airplanes through the issuance of a series of ADs in 1999 and 2000 that require these airplanes to exit icing when the conditions exceed the capabilities of the ice protection equipment.

3.Revisions to Part 25 Airplane Performance and Handling Characteristics in the Icing Conditions of Appendix C
The FAA states that the November 4, 2005, NPRM provides a comprehensive set of new certification requirements to evaluate airplane performance and handling characteristics in icing conditions, and that it has already taken action on tailplane stalls and stall warning margins in icing conditions for existing airplanes that are a concern. For airplanes with unpowered control systems, the FAA evaluated susceptibility to ice-contaminated tailplane stall, and mandated changes for airplanes found to be susceptible. The FAA also states that it will take appropriate action if unsafe conditions associated with stall warning margins are identified.

4.Proposed AC for Critical Ice Shapes
The FAA states this new AC will provide guidance to FAA certification engineers and airframe manufacturers. However, the FAA does not plan to revise the aircraft certification requirements because it believes there has never been a question that the critical ice shapes should be considered during certification.

The Safety Board agrees with the FAA that suitable information is now available to determine whether additional action is required for any airplanes currently certificated and in service. The Board does not agree, however, that the FAA has applied the new information to all turbo propeller airplanes in service. The FAA indicates that there are no airplanes for which an unsafe condition exists. The Board is concerned that the FAA has reached this conclusion based on the absence of accidents or serious incidents. During the 1990s, there were a number of accidents involving airplanes that had passed the certification standards and for which the FAA believed there was no unsafe condition requiring action. Lessons learned from these accidents generated new information which the FAA can now use. Before another accident or serious incident occurs, the FAA should evaluate all existing turbo-propeller driven airplanes in service using the new information available, such as critical ice shapes and stall warning margins in icing conditions.

To meet the intent of this recommendation, the FAA will need to formally evaluate (perhaps by conducting flight tests) all existing turbo-propeller driven aircraft in service to ensure that these aircraft comply with all current icing certification criteria for new aircraft. The Board asks the FAA to supply a list of those aircraft that it has formally evaluated and a summary of the findings and resultant actions. Pending receipt of such a list, Safety Recommendation A-98-100 is classified "Open-Unacceptable Response."

2/27/2007 NTSB

Further, icing tunnel tests conducted as part of the Comair flight 3272 accident investigation indicated that the effects of ice accretion on airplane performance could vary widely depending on the size, distribution, and type of ice accumulated on the airplane's surfaces. However, the Board learned that manufacturers are not required to demonstrate an airplane's flight handling characteristics or stall margins using thin, rough ice that can accrete on protected surfaces before the activation of the deice boot system or between activation cycles. As a result of its findings, the Board issued Safety Recommendation A-98-92, which asked the FAA (in cooperation with the National Aeronautics and Space Administration and other interested aviation organizations) to do the following:

[C]onduct additional research to identify realistic ice accumulations, to include intercycle and residual ice accumulations and ice accumulations on unprotected surfaces aft of the deicing boots, and to determine the effects and criticality of such ice accumulations; further, the information developed through such research should be incorporated into aircraft certification requirements and pilot training programs at all levels.

The Safety Board also issued Safety Recommendation A-98-100, which asked the FAA to review the icing certification of all turbopropeller-driven airplanes currently certificated for operation in icing conditions, perform additional testing, and take action as required to ensure that these airplanes fulfill the requirements of the revised icing certification standards asked for in Safety Recommendation A-98-92.

The FAA indicated in a March 6, 2006, response to Safety Recommendation A-96-54 that the ARAC IPHWG is continuing to develop a revision to Part 25 to require a demonstration that an airplane can safely operate in SLD conditions for an unrestricted time or can detect SLD and safely exit icing conditions. However, the FAA has still not received the recommendations from the IPHWG, prepared regulatory analyses, issued the NPRM, analyzed comments, or completed the many other tasks involved in issuing new regulations.

The FAA indicated in an October 26, 2005, response to Safety Recommendation A-98-92 that it had completed and would shortly issue a draft revision to AC 20-73, which included the certification guidance on determining critical ice shapes, descriptions of intercycle and residual ice accretions, and the aerodynamic penalties associated with these ice shapes. Although the FAA issued AC 20-73A on August 16, 2006, it has still not provided the Safety Board with information regarding any new research conducted in response to this recommendation.

Regarding Safety Recommendation A-98-100, the FAA issued a notice of proposed rulemaking (NPRM) in November 2005, which proposed to expand 14 CFR Part 25 to include specific certification requirements for airplane performance or handling qualities for flight in icing conditions and to specify the ice accumulations that must be considered for each phase of flight. Further, the FAA proposed changes to AC 25-1X, which intended to provide guidance for implementing the regulations proposed in the NPRM.

In May 2006, the Safety Board expressed concern that, although it agreed with the proposed regulatory changes, the FAA had not applied the new standards to all in-service turbopropeller-driven aircraft. The FAA further indicated that no airplanes have an unsafe condition in icing environments despite a number of accidents in the 1990s that involved airplanes that had passed the certification standards. The Board stated that, to meet the intent of Safety Recommendation A-98-100, the FAA would need to formally evaluate (perhaps by conducting flight tests) all in-service turbopropeller-driven aircraft to ensure that these aircraft comply with all current icing certification criteria for new aircraft. The Board asked the FAA to provide a list of the aircraft that it had formally evaluated and a summary of the findings and resultant actions. To date, this information has not been received. The circumstances of the Comair flight 3272, American Eagle 4184, and Pueblo accidents and the icing tunnel test data show that the ice shapes used during initial certification flight tests were not adequate because the tests did not account for thin, rough ice on the wing. The 1996 ice shapes tests on the Cessna 560 were also inadequate because, although tests were conducted with ice shapes on the protected surfaces, tests were not conducted using thin, rough ice. Therefore, additional ice sizes, distribution patterns, and types need to be considered during flight testing to more adequately gauge an airplane's performance in icing conditions.

The Safety Board concludes that existing flight test certification requirements for flight into icing conditions do not test the effects of thin, rough ice on or aft of an airplane's protected surfaces, which can cause severe aerodynamic penalties. The circumstances of this accident clearly show that the actions requested in Safety Recommendations A-96-54 and A-98-92 are needed to improve the safety of all airplanes operating in icing conditions. Therefore, the Safety Board reiterates Safety Recommendations A-96-54 and A-98-92.

As noted, Safety Recommendation A-98-100 only addressed turbopropeller-driven airplanes. The circumstances of this accident clearly demonstrate that deice boot-equipped turbojet airplanes also

require additional testing in an expanded Appendix C icing certification envelope, which would include thin, rough ice accumulations and intercycle and residual ice. Therefore, the Safety Board believes that the FAA should, when the revised icing certification standards and criteria are complete, review the icing certification of all pneumatic deice boot-equipped airplanes that are currently certificated for operation in icing conditions and perform additional testing and take action as required to ensure that these airplanes fulfill the requirements of the revised icing certification standards. The new recommendation (A-07-16) will supersede Safety Recommendation A-98-100 and will be classified Open Unacceptable Response.

Recommendation # A-98-101

Overall Status
CAA

Priority

THE NTSB RECOMMENDS THAT THE FAA: REVIEW TURBOPROPELLER-DRIVEN AIRPLANE MANUFACTURERS' AIRPLANE FLIGHT MANUALS AND AIR CARRIER FLIGHTCREW OPERATING MANUALS (WHERE APPLICABLE) TO ENSURE THAT THESE MANUALS PROVIDE OPERATIONAL PROCEDURES FOR FLIGHT IN ICING CONDITIONS, INCLUDING THE ACTIVATION OF LEADING EDGE DEICING BOOTS, THE USE OF INCREASED AIRSPEEDS, AND DISENGAGEMENT OF AUTOPILOT SYSTEMS BEFORE ENTERING ICING CONDITIONS (THAT IS, WHEN OTHER ANTI-ICING SYSTEMS HAVE TRADITIONALLY BEEN ACTIVATED).

FAA	Closed - Acceptable Action	5/10/2006

2/26/1999	Addressee	ON 10/1/98, THE FAA ISSUED LETTERS REQUESTING MANUFACTURERS OF TURBOPROPELLER-POWERED TRANSPORT-CATEGORY AIRCRAFT TO SUBMIT COPIES OF EXISTING AFM LIMITATIONS AND PROCEDURES RELATED TO OPERATION IN ICING CONDITIONS INCLUDING PROCEDURES RELATED TO OPERATION OF THE AUTOPILOT DURING ICING CONDITIONS. IN JANUARY 1999, FAA SPECIALISTS MET TO ENSURE THE USE OF CONSISTENT REVIEW CRITERIA AND TO REACH A PRELIMINARY POSITION ON WHETHER OR NOT MANDATORY ACTION TO MODIFY THE AFM'S IS WARRANTED. THE FAA HELD AN IN-FLIGHT ICING CONFERENCE FEBRUARY 2-4, 1999, WITH AIRFRAME MANUFACTURERS, AIRLINE OPERATORS, WORLDWIDE CIVIL AVIATION AUTHORITIES, AND OTHER AVIATION ORGANIZATIONS. AT THE CONFERENCE, INFORMATION WAS EXCHANGED ON VARIOUS TOPICS INCLUDING THE ACCEPTABILITY OF ACTIVATING THE AIRFRAME DEICING SYSTEMS AT THE FIRST SIGN OF ICING CONDITIONS, USE OF THE AUTOPILOT IN ICING CONDITIONS, AND MINIMUM SPEEDS IN ICING CONDITIONS. THE FAA WILL EVALUATE THE INFORMATION OBTAINED AT THE CONFERENCE TO DETERMINE IF MANDATORY ACTION NEEDS TO BE TAKEN REGARDING AFM CHANGES. I WILL KEEP THE BOARD INFORMED OF THE FAA'S PROGRESS ON THIS RECOMMENDATION.
3/9/2000	NTSB	THE SAFETY BOARD ENCOURAGES THE FAA TO EXPEDITE ITS REVIEW OF THIS SAFETY CONCERN AND TAKE APPROPRIATE ACTION. PENDING COMPLETION OF THAT REVIEW AND SUBSEQUENT ACTION, A-98-101 IS CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."
9/25/2000	Addressee	Letter Mail Controlled 10/02/2000 3:16:36 PM MC# 2001437 The FAA has evaluated the information obtained at the February 2-4, 1999, In-Flight Icing Conference, which was attended by airframe manufacturers, airline operators, worldwide civil aviation authorities, and other aviation organizations. Following the evaluation, the FAA issued AD 99-19-14 to require a revision to the Airplane Flight Manual operating procedures to require activation of deicing boots at the first sign of ice accretion anywhere on the airframe for turbopropeller-powered airplanes with pneumatic de-icing boots. Flight Standards Handbook Bulletin for Air Transportation 99-07 addressed incorporating similar revisions to Flight Crew Operating Manuals. The FAA is initiating rulemaking action to address the retroactive application of minimum operating speeds appropriate for the safe operation of turbopropeller-driven airplanes in icing conditions. An integral part of this rulemaking action will be to require the resulting operating speeds for icing conditions to be included in the Airplane Flight Manuals and Flight Crew Operating Manuals of the affected airplanes. It is anticipated that the rulemaking project will be approved by the end of 2000. Autopilot operation in icing conditions and whether or not it should be prohibited for airplanes with certain design characteristics was discussed at the February 1999 FAA In-Flight Icing Conference. The FAA is currently formulating action plans to address this issue. I will keep the Board informed of the FAA's progress on this safety recommendation.
3/12/2001	NTSB	The actions being taken by the FAA are responsive to this recommendation. However, regardless of the discussions held at the February 1999 In-flight Icing Conference, the Safety Board believes that accident experience has shown that the autopilot should not be used in icing conditions. Pending rulemaking action to address the retroactive application of minimum operating speeds appropriate for the safe operation of turbopropeller-driven airplanes in icing conditions and to prohibit the use of autopilots in icing conditions, Safety Recommendation A-98-101 remains classified Open--Acceptable Response.

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9/21/2001	Addressee	Letter Mail Controlled 10/22/2001 11:44:27 AM MC# 2010866 The FAA is initiating rulemaking action to address the retroactive application of minimum operating speeds appropriate for the safe operation of turbopropeller-driven airplanes in icing conditions. An integral part of this rulemaking action will be to require the resulting operating speeds for icing conditions to be included in the Airplane Flight Manuals and Flight Crew Operating Manuals of the affected airplanes. I will keep the Board informed of the FAA's progress on this safety recommendation.
7/11/2002	NTSB	The FAA's action is responsive to Safety Recommendation A-98-101. Pending rulemaking to address the retroactive application of minimum operating speeds appropriate for the safe operation of turbopropeller-driven airplanes in icing conditions and to prohibit the use of autopilots in icing conditions, Safety Recommendation A-98-101 remains classified "Open--Acceptable Response."
10/26/2005	Addressee	Letter Mail Controlled 10/27/2005 2:12:40 PM MC# 2050501 Marion C. Blakey, Administrator, FAA, 10/26/05 In 1999 and 2000, the FAA issued a series of 20 ADs mandating immediate use of deicing boots at the first sign of ice formation anywhere on the aircraft or upon alert of the ice detector system, whichever occurs first. The ADs applied to the following airplane types: Aerospatiale Models ATR-42 and ATR-72, Bombardier Models DHC-7 and DHC-8, British Aerospace Model HS 748, CASA Models C-212 and CN-235, Cessna Models 425 and 441, Dornier Model Dornier 328-100, Fairchild Models SA226, SA227, F27 and FH227, Fokker Model F27 Mark 100, 200, 300, 400, 500, 600 and 700 series aircraft, and Fokker Model F27 Mark 050, Gulfstream Aerospace Model G-159, Gulfstream American (Frakes Aviation) Models G-73 (Mallard) and G-73T, Jetstream Model BAe ATP, Lockheed Models L-14 and L-18 and Models 1329-23 and 1329-25, McDonnell Douglas Models DC-3 and DC-4, Mitsubishi Models YS-11 and YS-1 IA, Saab Models SF-340A, 340B, and Saab 2000, Sabreliner Models NA-265-40, NA-265-60, and NA-265-80, and Short Brothers Models SD3-30, SD3-60, SD3-Sherpa, and SD3-60 Sherpa. Similar ADs had been proposed for the Cessna Models 500,501,550,551, and 560 and Jetstream Model 4101 airplanes, but were withdrawn based on testing and substantiation that these airplanes are safe for operations with ice accretions on the deicing boots. The FAA recently conducted another review of operating procedures and information available to the flightcrew for minimum maneuvering speed information, including the use of increased speeds in icing conditions. On August 9, 2004, the FAA provided a comprehensive summary of this review in response to Safety Recommendation A 98-94 at the "Safety With A Team" meeting. The FAA looks forward to hearing the Board's position on the comprehensive summary. The FAA found that the manufacturers provide sufficient maneuvering speed information accessible to the flightcrew covering all phases of flight and airplane configurations for both icing and non-icing conditions. The means to convey the maneuvering speed information to pilots include flight deck displays, flight management systems, quick reference handbooks, flightcrew operating manuals, flightcrew training manuals, and Airplane Flight Manuals. In consideration of the information above, the FAA no longer intends to pursue the rulemaking referenced in our previous responses that would have mandated retroactive application of minimum operating speed requirements for icing conditions. The FAA's position regarding the disengagement of autopilot systems before entering icing conditions is detailed in response to Safety Recommendation A-98-97, which recommended that we require all operators of turbopropeller-driven air carrier airplanes to require pilots to disengage the autopilot and fly the airplane manually when they activate the anti-ice systems. On February 17, 2000, we issued Joint Flight Standards Information Bulletin for Air Transportation 00-02 and General Aviation 00-01, "Use of Autopilot During In-Flight Icing Conditions for Turbopropeller-Driven Airplanes." This bulletin directs principal operations inspectors to ensure that the information and procedures in the bulletin and any other approved pilot training for operations during in-flight icing are provided to each air carrier and included in the carrier's training program. The information should include guidance on the use of the autopilot in icing conditions and procedures to check for unusual trim forces and aircraft response. If disconnecting the autopilot is an approved procedure, the guidance to pilots should address the conditions under which this should be done. Furthermore, the FAA issued additional ADs that prohibit use of the autopilot in severe icing conditions that exceed the capability of the airplane's ice protection system. These ADs were applicable to the same airplanes as the ADS mandating immediate use of the deicing boots except that the Cessna Models 500, 501, 550, 551, and 560, Jetstream Model 4101, and Embraer Model 120 airplanes were included, and the Lockheed Models 1329-23 and 1329-25 were excluded. A list of these ADS is enclosed for the Board's information.

5/10/2006	NTSB	The Safety Board reviewed the FAA's response to Safety Recommendation A-98-94, which the FAA provided to the Board in August 2004 following a Safety With A Team (SWAT) meeting. That response detailed the FAA's review of information available to pilots in the airplane flight manuals and flightcrew operating manuals. Based on that information, the FAA has reviewed these manuals, as recommended, to ensure that they provide operational procedures for flight in icing conditions. In addition, on February 17, 2000, the FAA issued Joint Flight Standards Information Bulletin for Air Transportation 00-02 and General Aviation 00-01, "Use of Autopilot During In-Flight Icing Conditions for Turbopropeller-Driven Airplanes," which directs the FAA's principal operations inspectors to ensure that an airline's approved operating procedures include guidance on the use of the autopilot in icing conditions and procedures to check for unusual trim forces and aircraft response. With the completion of the review of the manuals performed in response to Safety Recommendation A-98-94, and issuance of Joint Flight Standards Information Bulletin for Air Transportation 00-02 and General Aviation 00-01, the FAA has completed the work recommended. Consequently, Safety Recommendation A-98-101 is classified "Closed-Acceptable Action.

Recommendation # A-98-105

Overall Status
CAA

Priority

THE NTSB RECOMMENDS THAT THE FAA: REEMPHASIZE TO PILOTS, ON A PERIODIC BASIS, THEIR RESPONSIBILITY TO REPORT METEOROLOGICAL CONDITIONS THAT MAY ADVERSELY AFFECT THE SAFETY OF OTHER FLIGHTS, SUCH AS IN-FLIGHT ICING AND TURBULENCE, TO THE APPROPRIATE FACILITY AS SOON AS PRACTICABLE.

FAA	Closed - Acceptable Action	5/6/2003

2/26/1999	Addressee	THE FAA AGREES WITH THE INTENT OF THIS RECOMMENDATION AND IS DEVELOPING AN ADVISORY CIRCULAR (AC) THAT WILL ADVISE PILOTS OF THEIR RESPONSIBILITY TO REPORT METEOROLOGICAL CONDITIONS THAT MAY ADVERSELY AFFECT THE SAFETY OF OTHER FLIGHTS (I.E., IN-FLIGHT ICING AND TURBULENCE) TO THE APPROPRIATE FACILITY AS SOON AS PRACTICABLE. IN ADDITION, THE AC WILL INCLUDE THE LATEST INFORMATION AND RECOMMENDED TECHNIQUES FOR COPING WITH ICING CONDITIONS. IT IS ANTICIPATED THAT THE AC WILL BE PUBLISHED FOR COMMENT BY DECEMBER 1999.
3/9/2000	NTSB	THE SAFETY BOARD NOTES THAT THE ISSUANCE OF AN AC INTHIS AREA IS A POSITIVE STEP. HOWEVER, THE SAFETY BOARD BELIEVES THAT THE FAA SHOULD TAKE AN EXTRA STEP TO REVIEW ALL METHODS OF COMMUNICATION AVAILABLE TO ENSURE THIS MESSAGE GETS THE WIDEST DISSEMINATION POSSIBLE. IN ADDITION, THE BOARD RECOMMENDS THAT THE FAA CONSIDER PERIODIC ISSUANCE OF THIS INFORMATION RATHER THAN THE ONE-TIME ISSUANCE OF AN AC. PENDING THESE ACTIONS BY THE FAA, A-98-105 IS CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."
7/7/2000	Addressee	Letter Mail Controlled 07/12/2000 9:46:00 AM MC# 2000878 THE FAA AGREES WITH THE INTENT OF THIS RECOMMENDATION AND IS DEVELOPING AN AC THAT WILL ADVISE PILOTS OF THEIR RESPONSIBILITY TO REPORT METEOROLOGICAL CONDITIONS THAT MAY ADVERSELY AFFECT THE SAFETY OF OTHER FLIGHTS, LIKE IN-FLIGHT ICING AND TURBULENCE, TO THE APPROPRIATE FACILITY AS SOON AS PRACTICABLE. IN ADDITION, THE AC WILL INCLUDE THE LATEST INFORMATION AND RECOMMEND TECHNIQUES FOR COPING WITH ICING CONDITIONS. IT WAS ANTICIPATED THAT THE AC WOULD BE PUBLISHED FOR COMMENT BY DECEMBER 1999. HOWEVER, THE DEVELOPMENT AND COORDINATION OF THE AC HAS TAKEN LONGER THAN ORIGINALLY ANTICIPATED. THE FAA NOW EXPECTS TO PUBLISH THE AC FOR COMMENT IN DECEMBER 2000. ON 3/9/00, THE BOARD ASKED THAT THE FAA REVIEW ALL METHODS OF COMMUNICATION AVAILABLE TO ENSURE THAT THE INFORMATION IN THE AC GETS THE WIDEST DISSEMINATION POSSIBLE. THE BOARD RECOMMENDED THAT THE FAA CONSIDER PERIODIC ISSUANCE OF THIS INFORMATION RATHER THAN THE ONE-TIME ISSUANCE OF AN AC. FOR THE BOARD'S INFORMATION, THE FAA PLANS TO UPDATE OTHER ICING GUIDANCE MATERIAL LIKE THE "WINTER OPERATIONS GUIDANCE FOR AIR CARRIERS AND OTHER ADVERSE WEATHER TOPICS" AND OTHER PUBLICATIONS IN CONJUNCTION WITH THE COMPLETION OF TASK 1B OF THE IN-FLIGHT ICING PLAN. THE FAA WILL ALSO UPDATE THE AC AS NEW INFORMATION BECOMES AVAILABLE. I BELIEVE THAT THE PROPOSED AC WILL ADDRESS THE FULL INTENT OF THIS RECOMMENDATION, AND I WILL PROVIDE THE BOARD WITH A COPY OF THE AC AS SOON AS IT IS PUBLISHED.
1/12/2001	NTSB	ALTHOUGH THE PROPOSED AC IS RESPONSIVE TO THE RECOMMENDATION, THE SAFETY BOARD IS CONCERNED BY THE DELAY AND URGES THE FAA TO EXPEDITE DEVELOPMENT AND ISSUANCE OF THE AC. PENDING THE AC'S ISSUANCE, A-8-105 REMAINS CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."

2/4/2003	Addressee	Letter Mail Controlled 2/11/2003 3:19:53 PM MC# 2030094 The Federal Aviation Administration (FAA) issued Advisory Circular (AC) 91-74, Pilot Guide - Flight In Icing Conditions, on December 12, 2002. The AC advises pilots of their responsibility to report meteorological conditions that may adversely affect the safety of other flights, like in-flight icing and turbulence, to the appropriate facility as soon as practicable. In addition, the AC includes the latest information and recommends techniques for coping with icing conditions. I have enclosed a copy of the AC for the Board's information. I believe that the FAA has satisfactorily responded to this safety recommendation, and I look forward to your response.
5/6/2003	NTSB	The Safety Board notes that on December 12, 2002, the FAA issued Advisory Circular (AC) 91-74, "Pilot Guide - Flight In Icing Conditions." The Board reviewed a copy of the AC and notes that it advises pilots of their responsibility to report meteorological conditions that may adversely affect the safety of other flights, like in-flight icing and turbulence, to the appropriate facility as soon as practicable. With the issuance of the AC, the FAA has fully addressed Safety Recommendation A-98-105, which is now classified "Closed--Acceptable Action."

Recommendation # A-98-106

Overall Status
CR

Priority

THE NTSB RECOMMENDS THAT THE FAA: AMEND FAA ORDER 7110.65, "AIR TRAFFIC CONTROL," TO REQUIRE THAT AUTOMATIC TERMINAL INFORMATION SERVICE BROADCASTS INCLUDE INFORMATION REGARDING THE EXISTENCE OF PILOT REPORTS OF ICING CONDITIONS IN THE AIRPORT TERMINAL'S ENVIRONMENT (AND ADJACENT AIRPORT TERMINAL ENVIRONMENTS AS METEOROLOGICALLY PERTINENT AND OPERATIONALLY FEASIBLE) AS SOON AS PRACTICABLE AFTER RECEIPT OF THE PILOT REPORT.

FAA	Closed - Reconsidered	3/23/2000

2/26/1999	Addressee	THE FAA'S AIR TRAFFIC OPERATIONS WILL HOST A WORK GROUP COMPOSED OF INDUSTRY, USERS, AND AIR TRAFFIC REPRESENTATIVES TO REVIEW AND, IF NECESSARY, REDEFINE THE PURPOSE AND CONTENT FOR THE AUTOMATIC TERMINAL INFORMATION SERVICE. THIS SAFETY RECOMMENDATION WILL BE INCLUDED ON THE AGENDA FOR DISCUSSION AT THIS MEETING. I WILL INFORM THE BOARD OF THE FAA'S COURSE OF ACTION TO ADDRESS THIS RECOMMENDATON AS SOON AS THE WORK GROUP EFFORT IS COMPLETED.
12/20/1999	Addressee	Letter Mail Controlled 03/02/2000 3:04:36 PM MC# 991531
12/22/1999	Addressee	Letter Mail Controlled 02/16/2000 9:07:16 AM MC# 991533 THE FAA HOSTED A WORK GROUP COMPOSED OF INDUSTRY, USERS, AND AIR TRAFFIC REPRESENTATIVES TO REVIEW AND, IF NECESSARY, REDEFINE THE PURPOSE AND CONTENT FOR THE AUTOMATIC TERMINAL INFORMATION SERVICE. THIS SAFETY RECOMMENDATION WAS DISCUSSED AT THIS MEETING. THE CONSENSUS OF THE WORK GROUP WAS THAT THE REQUIREMENTS TO INCLUDE A NOTICE TO AIRMEN AND PILOT REPORTS PERTINENT TO THE OPERATIONS IN THE TERMINAL AREA ARE ALREADY CONTAINED IN ORDER 7110.65, AIR TRAFFIC CONTROL, PARAGRAPH 2-9-3E, ATIS CONTENT. I HAVE ENCLOSED A COPY OF THIS SECTION FOR THE BOARD'S INFORMATION. THESE CURRENT PROCEDURES ACCOMPLISH THE INTENT OF THIS SAFETY RECOMMENDATION. I CONSIDER THE FAA'S ACTION TO BE COMPLETED IN RESPONSE TO THIS RECOMMENDATION, AND I PLAN NO FURTHER ACTION.
3/23/2000	NTSB	THE SAFETY BOARD HAS REVIEWED THE MOST RECENT CHANGES TO FAA ORDER 7110.65, WHICH WERE MADE BY THE FAA AFTER THE ACCIDENT BUT BEFORE THE BOARD ISSUED A-98-106, AND CONCURS WITH THE FAA THAT SECTIONS 2-6-3, "PIREP INFORMATION," AND 2-9-3, "ATIS CONTENT," WHEN COMBINED, CONTAIN THE GUIDANCE ON PROVIDING PIREP INFORMATION ON ICING IN THE ATIS SYSTEM. BASED ON THAT REVIEW, A-98-106 IS CLASSIFIED "CLOSED--RECONSIDERED."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Log Number 2630B

Issue Date 11/30/1998 **MONROE MI** **1/9/1997**

INFOMATION FROM THE CVR INDICATES THAT THE FLIGHTCREW ACTIVATED THE ANTI-ICE EQUIPMENT FOR THE WINDSHIELD, PROPELLERS, PITOT PROBES, ANGLE-OF ATTACK VANES, SIDESLIP ANGLE VANE, AND TOTAL AIR TEMPERATURE PROBES. THERE IS NO EVIDENCE FROM THE CVR, FDR, PERFORMANCE OF THE AIRCRAFT, OR AIRCRAFT WRECKAGE TO DETERMINE IF THE FLIGHTCREW ACTIVATED THE DE-ICING BOOTS. THESE FACTS AND THE AIRPLANE'S DEGRADED AERODYNAMIC PERFORMANCE STRONGLY SUGGEST THAT ICE HAD ACCUMULATED ON AIRFRAME, BUT MAY NOT HAVE SEEN OR RECOGNIZED AS A HAZARD BY THE FLIGHT CREW OF COMAIR 3272. THERE WERE SEVEN ACCIDENTS INVOLVING AIRCRAFT EMBRAER EMB- 120: (1) 1/9/97, EMBRAER EMB-120, MONROE, MICHIGAN, (2) IN APRIL OF 1995, EMBRAER EMB -120, TALLAHASSEE, FLORIDA, (3) 10/16/94, EMBRAER EMB-120, ELKO, NEVADA, (4) 4/29/93, EMBRAER EMB -120, PINE BLUFF, ARKANSAS, (5) 11/22/91, EMBRAER EMB - 120, CLERMONT-FERRAND, FRANCE, (6) IN SEPTEMBER, 1991, EMBRAER EMB -120, FORT SMITH, ARKANSAS, AND (7) 6/28/89, EMBRAER EMB- 120, KLAMATH FALLS, OREGON.

Recommendation # A-98-107

Overall Status **Priority**

CAA

THE NTSB RECOMMENDS THAT NASA: WITH THE FAA AND OTHER INTERESTED AVIATION ORGANIZATIONS, ORGANIZE AND IMPLEMENT AN INDUSTRY-WIDE TRAINING EFFORT TO EDUCATE MANUFACTURERS, OPERATORS, AND PILOTS OF AIR CARRIER AND GENERAL AVIATION TURBOPROPELLER-DRIVEN AIRPLANES REGARDING THE HAZARDS OF THIN, POSSIBLY IMPERCEPTIBLE, ROUGH ICE ACCUMULATIONS, THE IMPORTANCE OF ACTIVATING THE LEADING EDGE DEICING BOOTS AS SOON AS THE AIRPLANE ENTERS ICING CONDITIONS (FOR THOSE AIRPLANES IN WHICH ICE BRIDGING IS NOT A CONCERN), AND THE IMPORTANCE OF MAINTAINING MINIMUM AIRSPEEDS IN ICING CONDITIONS.

NASA	Closed - Acceptable Action	8/19/2004

1/13/1999	Addressee	Letter Mail Controlled 02/19/1999 10:02:22 AM MC# 990021 NASA IS WELL POSITIONED TO FULFILL A-98-107 AND -108. NASA, THE FAA, AND OTHER AVIATION ORGANIZATIONS WILL WORK TOGETHER TO DEVELOP AND IMPLEMENT A PLAN TO AGGRESSIVELY PURSUE AN INDUSTRY-WIDE TRAINING PROGRAM ON THE HAZARDS OF ICING. ADDITIONALLY, NASA WILL WORK WITH THESE SAME ORGANIZATIONS TO INCREASE UNDERSTANDING OF THE ADVERSE EFFECTS OF ICE ACCUMULATIONS ON AIRCRAFT. NASA AND THE FAA ARE PARTNERS IN THE JOINT SAFETY WORKING GROUP (SWG) SPECIFICALLY TO ADDRESS ISSUES IN RESEARCH AND DEVELOPMENT IN AVIATION SAFETY. THE SWG COORDINATES EFFORTS FOR BOTH AGENCIES IN THIS FIELD, AND THAT COORDINATION, ESSENTIAL TO THE FUNCTIONING OF NASA'S AVIATION SAFETY PROGRAM OFFICE, WIN PROVIDE THE FOCUS FOR RESPONDING TO THE RECOMMENDATIONS. THE FAA'S FLIGHT STANDARDS AND AIRCRAFT CERTIFICATION SERVICES HAVE TAKEN THE LEAD IN A WEATHER-ACCIDENT PREVENTION TRAINING EFFORT BY SETTING UP A WORKSHOP ON IN-FLIGHT OPERATIONS AND ICING CONDITIONS. NASA'S AVIATION SAFETY PROGRAM OFFICE WILL PARTICIPATE IN THAT WORKSHOP. NASA WILL WORK WITH THE FAA AND OTHER INTERESTED AVIATION ORGANIZATIONS TO DEVELOP EDUCATIONAL MATERIALS THAT WILL FOCUS ON THE HAZARDS, TECHNOLOGY, AND OPERATIONAL PROCEDURES ASSOCIATED WITH CONDUCTING FLIGHT OPERATIONS DURING ICING CONDITIONS. AN IMPORTANT PART OF NASA'S INVESTMENT IN AVIATION SAFETY RESEARCH IS WEATHER-RELATED. NASA WILL EXAMINE ITS RESEARCH PLANS TO ENSURE THAT AN UNDERSTANDING OF THE EFFECTS AND CRITICALITY OF ICE ACCUMULATIONS IS AGGRESSIVELY PURSUED. KNOWLEDGE GAINED FROM THIS RESEARCH WILL BE PROVIDED TO THE FAA FOR INCORPORATING IN AIRCRAFT CERTIFICATION REQUIREMENTS AND PILOT TRAINING PROGRAMS. NASA WILL WORK CLOSELY WITH THE FAA ACROSS MANY DIFFERENT ORGANIZATIONAL LEVELS TO ADDRESS THE PROBLEMS OF AIRCRAFT SAFETY, SUCH AS ICING. AFTER COLLABORATION WITH THE FAA, WE WILL PROVIDE YOUR STAFF WITH A MORE DETAILED APPROACH TO SATISFY A-98-107 AND -108.
3/12/1999	NTSB	A-98-107 ASKED NASA, ALONG WITH THE FAA AND OTHER INTERESTED AVIATION ORGANIZATIONS, TO ORGANIZE AND IMPLEMENT AN INDUSTRYWIDE TRAINING EFFORT TO EDUCATE MANUFACTURERS, OPERATORS, AND PILOTS OF AIR CARRIER AND GENERAL AVIATION TURBOPROPELLER-DRIVEN AIRPLANES REGARDING THE HAZARDS OF THIN, POSSIBLY IMPERCEPTIBLE, ROUGH ICE ACCUMULATIONS; THE IMPORTANCE OF ACTIVATING THE LEADING EDGE DEICING BOOTS AS SOON AS THE AIRPLANE ENTERS ICING CONDITIONS (FOR THOSE AIRPLANES IN WHICH ICE BRIDGING IS NOT A CONCERN); AND THE IMPORTANCE OF MAINTAINING MINIMUM AIRSPEEDS IN ICING CONDITIONS. PENDING MORE DETAILED INFORMATION ON NASA'S EDUCATION MATERIALS AND RESEARCH REGARDING ICING CONDITIONS, A-98-107 AND -108 ARE CLASSIFIED "OPEN--ACCEPTABLE RESPONSE."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

7/26/2000	NTSB	THE BOARD'S RECORDS INDICATE THAT THE MOST RECENT CORRESPONDENCE FROM NASA CONCERNING THESE RECOMMENDATIONS WAS DATED 1/13/99. THE SAFETY BOARD WOULD APPRECIATE LEARNING OF ANY FURTHER ACTIONS NASA HAS TAKEN OR INTENDS TO TAKE TO ADDRESS A-88-19, A-96-14, A-98-107 AND A-98-108.
10/19/2000	Addressee	Letter Mail Controlled 11/01/2000 8:13:05 AM MC# 2001575 NASA is working as a technical advisor to the FAA, the principal investigator for this recommendation, on a Residual Ice/Intercycle Ice project that was initiated in FY1999. · The work is a collaborative effort between both agencies, with representation from an ice protection manufacturer and two airframe manufacturers. At NASA, the work is conducted by the Icing Research group at our Glenn Research Center and is supported by their subject matter experts and facilities that incorporate results from the Icing Research Tunnel and the Icing Research Aircraft. · In FY2000, two tests have been conducted in an icing wind tunnel to examine the residual ice characteristics, and a follow-on test will be conducted in FY2001 in a NASA dry-air tunnel test will catalogue the aerodynamic effects. · This work will eventually provide the basis for a better understanding of residual ice and small ice accumulations and be included in training materials.
3/12/2001	NTSB	The actions being taken by NASA are responsive to the recommendation. The Safety Board has received copies of the two videos that have been released and would appreciate receiving a copy of the computer-based training aid for airline operators and any future training aids or videos produced. Pending receipt of a copy of the computer-based training aid for airline operators and the development and release of additional training aids for in-flight icing, Safety Recommendation A-98-107 remains classified "Open--Acceptable Response."
12/10/2003	NTSB	The Safety Board's records indicate that the most recent correspondence from NASA concerning these recommendations was dated October 19, 2000. In this correspondence, NASA indicated that, regarding Safety Recommendation A-98-107, it had produced two training videos on icing and was planning to produce another, as well as a computer-based training module, for general aviation pilots. Regarding Safety Recommendation A-98-108, NASA indicated that it intended to conduct additional testing in a dry-air tunnel in fiscal year 2001. NASA stated that this testing was in support of the FAA and would eventually provide a better understanding of residual ice and small ice accumulations for incorporation in training materials. Based on NASA's plans, Safety Recommendations A-98-107 and -108 were classified "Open--Acceptable Response," pending NASA's development of the additional training materials and completion and analysis of the additional testing. The Safety Board would appreciate receiving an update from NASA regarding actions taken to address Safety Recommendations A-96-14, A-98-107, and A-98-108.
3/3/2004	Addressee	Letter Mail Controlled 3/15/2004 9:38:45 AM MC# 2040117 NASA completed a computer-based training module for general aviation pilots entitled A Pilots Guide to In-Flight Icing and three training videos for pilots entitled Icing for General Aviation Pilots, Icing for Regional and Corporate Pilots, and Tailplane Icing. The training module and videos, developed in cooperation with the Federal Aviation Administration, educate pilots on how to operate in and avoid icing conditions.
8/19/2004	NTSB	NASA reported that it has completed a computer-based training module for general aviation pilots, titled A Pilot's Guide to In-Flight Icing, and three training videos for pilots, titled Icing for General Aviation Pilots, Icing for Regional and Corporate Pilots, and Tailplane Icing. The training module and videos, developed in cooperation with the FAA, educate pilots on how to operate in and avoid icing conditions. Copies of the materials were provided to Safety Board staff. The Safety Board appreciates NASA's work on this issue. The training materials are informative and meet the intent of the recommendation to provide training about the hazards associated with flight in icing conditions. Accordingly, Safety Recommendation A-98-107 is classified "Closed--Acceptable Action."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Log Number 2924
Issue Date 12/15/2004

From 1987 to 2003, 26 icing-related accidents and incidents involving Cessna 208 series airplanes occurred, resulting in at least 36 fatalities. As a result, the National Transportation Safety Board became concerned about a possible systemic problem with the airplane's design or with the operation of the airplane. In late 2003, the Board initiated an in-depth assessment of these 26 icing-related events. The Board's assessment focused on certification of the Cessna 208 for in-flight icing conditions, the atmospheric conditions often encountered during cold weather
ground and flight operations, airplane dispatch considerations, and Cessna 208 pilot experience and training information.

Recommendation # A-04-064

Overall Status
CAA

Priority

The National Transportation Safety Board recommends that the Federal Aviation Administration expeditiously do the following: Require all pilots and operators of Cessna 208 series airplanes equipped for flight into known icing conditions to undergo seasonal training for ground deicing and flight into icing conditions on an annual basis. This seasonal training should be timed to precede the operator's cold weather operations and should specifically address (1) the limitations of the Cessna 208 in icing situations; (2) the Cessna 208 deice and anti-icing systems and controls and their use; (3) pilot actions during cold weather ground operations, with emphasis on the need for careful visual and tactile examination of wing and horizontal stabilizer upper surfaces during the preflight inspection to ensure that they are free of ice before takeoff; (4) pilot actions during cold weather flight operations, with emphasis on the timely recognition of potentially dangerous accumulations of ice and the importance of having an appropriate strategy for escaping the icing conditions and acting on that strategy promptly; (5) the hazards of performance degradation caused by ice that remains after activation of the deice boots; and (6) Cessna 208 Pilot Operating Handbook icing-related limitations, warnings, and notes.

FAA	Closed - Acceptable Action	1/29/2009

3/17/2005	Addressee	Letter Mail Controlled 3/28/2005 2:05:07 PM MC# 2050133: Annual recurrent training in icing is required by existing regulations in 14 CFR Parts 121 and 135. The Board is concerned with systemic problems involving the design and operation specifically of the Cessna 208. Accordingly, the Federal Aviation Administration's Aircraft Certification Service is working with Cessna to revise the airplane flight manual (AFM) to reflect additional limitations and operating procedures developed specifically for the Cessna 208 in icing conditions. Once the revisions are made, the FAA's Flight Standards Service will require or recommend that operators of Cessna 208 airplanes implement revised training as appropriate. I will keep the Board informed of the FAA's progrcss on this safety recommendation.
9/13/2005	NTSB	The Safety Board notes that the FAA indicated that annual recurrent training in icing is required by existing regulations for Parts 121 and 135 operators and that to address the concerns in this recommendation the FAA's Aircraft Certification Service is working with Cessna to revise the airplane flight manual (AFM) to reflect additional limitations and operating procedures developed specifically for the Cessna 208 in icing conditions. The FAA further indicated that once the revisions to the AFM are made, the FAA will require or recommend that operators of Cessna 208 airplanes implement the revised training. The FAA's plans to revise the AFM in consultation with Cessna and to then require that operators implement the revised training is responsive to this recommendation. The Safety Board notes that to be fully responsive to this recommendation, the AFM revisions need to address the six specific topics in the recommendation and the implementation of the training needs to ensure it is timed to precede the operator's cold weather operations. Pending appropriate revisions to the Cessna 208 AFM and a requirement to implement this recurrent training, Safety Recommendation A-04-64 is classified "Open--Acceptable Response."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

7/11/2008	Addressee	Letter Mail Controlled 7/22/2008 2:37:42 PM MC# 2080429: Robert A. Sturgell, Acting Administrator, FAA, 7/11/08 In response to Safety Recommendations A-04-64 and A-04-67, concerning annual cold weather operations training specific to pilots of Cessna 208 series aircraft, as well as the Federal Aviation Administration surveillance of such training programs, the FAA has taken the following actions: ·In addition to the annual recurrent icing training required by 14 Code of Federal Regulations section 135.35 1, on November 1, 2006, the FAA issued Safety Alert for Operators (SAFO) 06016 (enclosure l), to operators of Cessna CE-208 and CE-208B airplanes discussing the need for increased awareness of the dangers associated with in-flight icing. The SAFO emphasized the importance of following aircraft specific limitations and procedures established for flight into icing conditions; ·On May 17, 2007, the FAA published Airworthiness Directive (AD) 2007-10-15 (enclosure 2), requiring Cessna 208 series operators to incorporate S1 supplemental revision 10 dated February 20, 2007, into the applicable section of the Airplane Flight Manual and Pilot's Operating Handbook. This AD incorporates significant improvements to flight safety, including annual documented "type specific" pilot ground training before flights into icing conditions. Cessna Aircraft Company developed an annual training course specifically to address winter operations and icing issues related to the Cessna 208 series aircraft. The Cessna 208 icing training is available on-line to registered users at no cost, and users can access it at the following web address: http://www.cessnalearnina.com; and ·On November 30, 2007, the FAA published SAFO 07009 (enclosure 3), Cessna CE-208 and CE-208B Specific Pilot Training Requirements for Flight into Icing Conditions, outlining the annual specific Cessna 208 pilot training requirements. The FAA plans to issue a policy for principal operations inspectors with oversight responsibility of carriers operating Cessna 208 series airplanes, requiring them to validate that operators have incorporated the training requirements specified in AD 2007-10-15 into the operators' approved training program. Once we issue this policy we will forward a copy to the Board. We anticipate issuing this policy within 120 days.
1/29/2009	NTSB	On May 17, 2007, the FAA published Airworthiness Directive (AD) 2007-10-15, which requires Cessna 208 series operators to incorporate S1 supplemental revision 10, dated February 20, 2007, into the applicable sections of the airplane flight manual (AFM) and the pilot's operating handbook (POH). The AD requires annual documentation of type-specific pilot ground training before flights into icing conditions. Cessna developed an annual training course specifically to address winter operations and icing issues related to Cessna 208 aircraft. The Safety Board reviewed the revisions to the AFM and POH required by the AD, in particular the additions to the limitations section of the POH that are requirements for Cessna 208 operators. The Cessna training covers the topics listed in the recommendation. Issuance of AD 2007-10-15 meets the intent of the recommendation; consequently, Safety Recommendation A-04-64 is classified Closed Acceptable Action.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Recommendation # A-04-065

Overall Status
CAA

Priority

The National Transportation Safety Board recommends that the Federal Aviation Administration expeditiously do the following: Require Cessna Aircraft Company, working with Cessna 208 operators, to develop effective operational strategies (for example, cold weather preflight strategies in remote locations, viable methods of collecting icing-related weather information before and during flight, ice detection and monitoring cues, optimal use of anti-ice and deice systems, minimum airspeeds for all phases of flight, proper use of flaps and engine power in icing conditions, and development of ice accumulation limitations and exit strategies for pilots in icing conditions) and related guidance materials to minimize the chance of Cessna 208 ground and in-flight icing accidents or incidents; the FAA should then verify that these strategies and guidance materials are incorporated into Cessna 208 operator manuals and training programs in a timely manner.

FAA	Closed - Acceptable Action	1/7/2009

3/17/2005	Addressee	Letter Mail Controlled 3/28/2005 2:05:07 PM MC# 2050133: The FAA is working with Cessna on an AFM revision to incorporate significant changes and additions to operating limitations and procedures in icing conditions. This work is based on a revicw of icing-relatcd accidents and incidents and certification data. The FAA is also working with Cessna to solicit information from Cessna C208 operators. On December 22,2004, an Airworthiness Concern Sheet was issued to pertinent user groups to solicit information on proposed AFM changes, proposed equipment requirements, and weather briefing strategies. Cessna is investigating if there are other sources of operator information beyond that provided by the Airworthiness Conccm Sheet. The FAA will initiate an ainvorthiness directive to mandate incorporation of the AFM revision as soon as it is made available. The FAA is planning icing tunnel research, with Cessna and Goodrich participation, to address pneumatic deicing boot performance and optimum deicing hoot activation procedures at Cessna C208 operating airspeeds. It is anticipated that this testing will occur in the first half of 2005. Lessons learned from this testing will be incorporated into the AFM, if required. The FAA plans on issuing guidance concurrently to operators and to FAA inspectors that will announce the existence of important new information regarding operation of Cessna 208 airplanes in icing conditions and explain how to get that information. Where the information appears in the Limitations section of the AFM, all parties will be reminded that such information is regulatory and, therefore, must be observed in operations and must be included in the manuals used by pilots and in their training programs. Inspectors will be reminded that enforcement action is appropriate to ensure compliance with the Limitation section. Where new information is found elsewhere in the AFM, the FAA will include directions on how to get it and will strongly recommend that it he observed in operations and that it be included in the manuals used by pilots and in their training programs. I will keep the Board informed of the FAA's progress on this safety recommendation.
9/13/2005	NTSB	The Safety Board notes that the FAA is working with Cessna on an AFM revision to incorporate changes and additions to operating limitations and procedures in icing conditions, based on a review of icing-related accidents, incidents, and certification data. The Board further notes that the FAA is also working with Cessna to solicit information from Cessna 208 operators and that as part of this work the FAA issued an Airworthiness Concern Sheet to solicit information on proposed AFM changes, proposed equipment requirements, and weather briefing strategies. In addition, Cessna is investigating if there are other sources of operator information beyond that provided by the Airworthiness Concern Sheet. The FAA indicates that it will issue an airworthiness directive (AD) to mandate incorporation of the AFM revision as soon as it is available. In addition to soliciting information from Cessna 208 operators, the FAA is planning icing wind tunnel research, with Cessna and Goodrich participation, to address pneumatic deicing boot performance and optimum deicing boot activation procedures. The FAA plans to incorporate lessons learned from this testing into the AFM revision. After the AFM revisions are complete, and other guidance and test results are available, the FAA plans to issue guidance to operators and to FAA inspectors. This guidance will announce the existence of the new information regarding operation of Cessna 208 airplanes in icing conditions. Where the information appears in the "limitations" section of the AFM, the guidance will reinforce that such information is regulatory and, therefore, must be observed in operations and must be included in the manuals used by pilots and in their training programs. The FAA's planned actions are responsive to this recommendation. Pending revisions to the Cessna 208 AFM and issuance of guidance reinforcing that the limitations section of the AFM must be observed by all operators, Safety Recommendation A-04-65 is classified "Open--Acceptable Response."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

3/19/2008	Addressee	Letter Mail Controlled 3/28/2008 8:15:04 AM MC# 2080153: Robert A. Sturgell, Acting Administrator, FAA, 3/19/08: The following updates the Federal Aviation Administration's work with Cessna to develop operating limitations and procedures, training requirements, and airplane design modifications. In 2006 Cessna formed a Caravan icing working group with the Regional Air Cargo Carriers Association (RACCA) and the FAA to exchange technical information and evaluate icing training. This working group developed an icing training course that became available in October 2006 to operators via the internet (web based), or through Cessna provided seminars. This training is required annually for all Cessna 208 pilots who operate in icing conditions. We provided several Board staff instructions on how to access this training after a May 9- 10, 2007, meeting in Wichita, with Transport Canada and the Transportation Safety Board of Canada. The training course addresses the items in this safety recommendation and includes the following topics: ·Physics of ice accretion; ·Aerodynamic effects of icing; ·Operating in ground icing conditions; ·Collecting weather information for pre-flight and enroute strategies for dealing with icing and avoiding supercooled large drop (SLD) conditions; ·Detection of SLD; ·Ice protection system operation on the Cessna 208; and ·Cessna 208 Airplane Flight Manual (AFM) Limitations, Procedures and Performance. In this safety recommendation, the Board suggested the development of effective strategies such as minimum airspeeds for all phases of flight and the proper use of flaps in icing conditions. Cessna developed a Low Airspeed Awareness (LAA) system that became available in a service bulletin in October 2006. The LAA system provides an annunciation to the pilot if airspeed decreases below 108 knots in icing conditions. This annunciation also serves to prevent premature flap retraction during takeoff in icing conditions. In February 2007, the FAA approved a revision to the Cessna 208 Known Icing Equipment AFM Supplement, and Airworthiness Directive (AD) 2007- 10- 15 was issued June 2 1,2007 (see Enclosure 1). The AD mandates the February 2007 Cessna 208 Known Icing Equipment AFM Supplement for airplanes approved for flight in known icing, and required compliance by September 19,2007. The Limitations section of the revised supplement identifies the LAA system as required equipment for flight in icing conditions. This Limitations section also addresses the operational strategies listed by the Board in the safety recommendation and provides the following operational limitations: ·Retains requirements from previous airworthiness directives for a prohibition on takeoff with any contaminate on critical surfaces, including the wing leading edge and upper surface; ·Retains requirements from previous airworthiness directives for a pre-takeoff tactile check of the upper wing surface in ground icing conditions;

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

1/7/2009	NTSB	The Safety Board notes that, in 2006, Cessna formed a Caravan icing working group with the Regional Air Cargo Carriers Association (RACCA) and the FAA to exchange technical information and evaluate icing training. The working group was successful in developing an icing training course that became available in October 2006 to operators via both the Internet and Cessna-provided seminars. Successful completion of this training is required for all pilots in command within the preceding 12 calendar months for any flight into known or forecast icing conditions. Safety Board staff previewed the web-based training in May 2007 and found the content to be comprehensive in addressing the safety concerns specific to Cessna 208 operations in icing conditions, including how to recognize and mitigate the chances of ground and in-flight icing events. The Board also notes that, in an effort to remind owners, operators, and certified entities of this annual icing training requirement, the FAA issued Safety Alert for Operators 07009 on November 30, 2007. As a result of Cessna's development of a low airspeed awareness (LAA) system, the FAA issued Airworthiness Directive (AD) 2007-10-15, on June 21, 2007, with compliance required by September 19, 2007. The AD requires the Limitations section of Cessna 208 Known Icing Equipment Airplane Flight Manuel (AFM) Supplements to identify the LAA system as required equipment. In icing conditions, the LAA system provides an announcement to the pilot if airspeed decreases below 108 knots and also serves to prevent premature flap retraction during takeoff. The Safety Board notes that the revised Limitations section requires various recommended operational strategies to address such issues as icing exit criteria, while retaining those requirements from previously issued ADs, in particular a pre-takeoff tactile inspection of the wing's leading edge and upper surfaces. To encourage an effective pre-takeoff tactile inspection, the FAA issued AD 2006-01-11 R1, which requires the installation of a pilot assist handle to facilitate pre-takeoff inspection of the upper wing surface. The revision also prohibits (1) takeoff with any frost, ice, snow, or slush adhering to the wings, horizontal stabilizer, vertical stabilizer, control surfaces, propeller blades, or engine inlets and (2) flight in freezing rain and freezing drizzle. The FAA's guidance addresses the operation of Cessna 208 airplanes in icing conditions. Because the Limitations section of the AFM now includes guidance on the LAA system and the pre-takeoff tactile inspection of the wing's leading edge and upper surfaces, it should help reinforce that such information is regulatory and, therefore, must be observed in operations and included in the manuals used by pilots and in their training programs. The FAA's actions fully satisfy the intent of these recommendations, accordingly, Safety Recommendations A-04-65 and A-04-66 are classified Closed Acceptable Action. Although the Safety Board is pleased with the additional safety benefits that the LAA system will provide, it is disappointed to learn that the AD removes the prohibition against autopilot use in icing conditions, provided the LAA system is operational. The Board has previously expressed its concerns with removing the prohibition against autopilot use in icing conditions because of the potential risk of allowing the autopilot to remain engaged while the airspeed degrades to below the minimum safe airspeed (due to ice accretion). During such performance degradation, the pilot would not have direct control of the airplane. Accordingly, he or she would not be able to sense the aerodynamic effects of the ice accretion and would therefore be at increased risk of losing control of the airplane. Therefore, the Safety Board reiterates its belief that installation of the LAA system should not provide relief from the requirement to disconnect the autopilot at first indication of ice accretion.

Recommendation # A-04-066

Overall Status **Priority**

CAA

The National Transportation Safety Board recommends that the Federal Aviation Administration expeditiously do the following: Require all pilots and operators of Cessna 208 series airplanes to conduct a visual and tactile examination of the wing and horizontal stabilizer leading edges and upper surfaces to ensure that those surfaces are free of ice and/or snow contamination before any flight from a location at
which the temperatures are conducive to frost or ground icing.

FAA	Closed - Acceptable Action	1/7/2009

3/17/2005	Addressee	Letter Mail Controlled 3/28/2005 2:05:07 PM MC# 2050133: The NORMAL PROCEDURES section of the AFM currently has five WARNINGS to remove "even small amounts of frost, ice, or snow from wing, tail, and control surfaces." The FAA is currently working with Cessna to develop a tactile pretakeoff check, The FAA intends to add this check to the AFM Limitations section. The FAA will initiate an airworthiness directive to mandate incorporation of the AFM revision as soon as it is made available. In accordance with 14 CFR 91.9(a), the Limitation will have to be incorporated into operator manuals.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

9/13/2005	NTSB	The Safety Board notes that the FAA is working with Cessna to develop a tactile pretakeoff check and that the FAA intends to add this check to the AFM limitations section. Compliance with the limitations section of the AFM is required. The FAA plans to issue an AD mandating incorporation of the AFM revision as soon as available. Pending revisions to the AFM requiring a tactile examination of the wing and horizontal stabilizer leading edges and upper surfaces to ensure that those surfaces are free of ice and/or snow contamination and issuance of an AD mandating incorporation of the AFM revisions, Safety Recommendation A-04-66 is classified "Open--Acceptable Response."
3/19/2008	Addressee	Letter Mail Controlled 3/28/2008 8:15:04 AM MC# 2080153: Robert A. Sturgell, Acting Administrator, FAA, 3/19/08: Since our last letter, we have taken a number of mandatory actions. The most recent action, AD 2007-10-15, mandates the following revision to the AFM Limitations section: ·Prohibits takeoff with any frost, ice, snow, or slush adhering to the wings, horizontal stabilizer, vertical stabilizer, control surfaces, propeller blades, or engine inlets; ·Requires a tactile inspection of the wing leading edge and upper surface in temperatures conducive to ground icing; and ·Prohibits flight in freezing drizzle and freezing rain. This is supplemented by a WARNING in the Emergency Procedures section that the airplane must not depart an airport where freezing drizzle or freezing rain conditions are being reported. Additionally, AD 2006-01-1 1 R1 (see Enclosure 3) was published in the Federal Register on May 16, 2006. This AD mandates installation of a pilot assist handle to facilitate pre-takeoff inspection of the upper wing surface. I believe that the FAA has satisfactorily responded to this safety recommendation, and I look forward to your response.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

1/7/2009 NTSB

The Safety Board notes that, in 2006, Cessna formed a Caravan icing working group with the Regional Air Cargo Carriers Association (RACCA) and the FAA to exchange technical information and evaluate icing training. The working group was successful in developing an icing training course that became available in October 2006 to operators via both the Internet and Cessna-provided seminars. Successful completion of this training is required for all pilots in command within the preceding 12 calendar months for any flight into known or forecast icing conditions. Safety Board staff previewed the web-based training in May 2007 and found the content to be comprehensive in addressing the safety concerns specific to Cessna 208 operations in icing conditions, including how to recognize and mitigate the chances of ground and in-flight icing events. The Board also notes that, in an effort to remind owners, operators, and certified entities of this annual icing training requirement, the FAA issued Safety Alert for Operators 07009 on November 30, 2007.

As a result of Cessna's development of a low airspeed awareness (LAA) system, the FAA issued Airworthiness Directive (AD) 2007-10-15, on June 21, 2007, with compliance required by September 19, 2007. The AD requires the Limitations section of Cessna 208 Known Icing Equipment Airplane Flight Manuel (AFM) Supplements to identify the LAA system as required equipment. In icing conditions, the LAA system provides an announcement to the pilot if airspeed decreases below 108 knots and also serves to prevent premature flap retraction during takeoff.

The Safety Board notes that the revised Limitations section requires various recommended operational strategies to address such issues as icing exit criteria, while retaining those requirements from previously issued ADs, in particular a pre-takeoff tactile inspection of the wing's leading edge and upper surfaces. To encourage an effective pre-takeoff tactile inspection, the FAA issued AD 2006-01-11 R1, which requires the installation of a pilot assist handle to facilitate pre-takeoff inspection of the upper wing surface.

The revision also prohibits (1) takeoff with any frost, ice, snow, or slush adhering to the wings, horizontal stabilizer, vertical stabilizer, control surfaces, propeller blades, or engine inlets and (2) flight in freezing rain and freezing drizzle.

The FAA's guidance addresses the operation of Cessna 208 airplanes in icing conditions. Because the Limitations section of the AFM now includes guidance on the LAA system and the pre-takeoff tactile inspection of the wing's leading edge and upper surfaces, it should help reinforce that such information is regulatory and, therefore, must be observed in operations and included in the manuals used by pilots and in their training programs. The FAA's actions fully satisfy the intent of these recommendations, accordingly, Safety Recommendations A-04-65 and A-04-66 are classified Closed Acceptable Action.

Although the Safety Board is pleased with the additional safety benefits that the LAA system will provide, it is disappointed to learn that the AD removes the prohibition against autopilot use in icing conditions, provided the LAA system is operational. The Board has previously expressed its concerns with removing the prohibition against autopilot use in icing conditions because of the potential risk of allowing the autopilot to remain engaged while the airspeed degrades to below the minimum safe airspeed (due to ice accretion). During such performance degradation, the pilot would not have direct control of the airplane. Accordingly, he or she would not be able to sense the aerodynamic effects of the ice accretion and would therefore be at increased risk of losing control of the airplane. Therefore, the Safety Board reiterates its belief that installation of the LAA system should not provide relief from the requirement to disconnect the autopilot at first indication of ice accretion.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Recommendation # A-04-067

Overall Status
OAA

Priority

The National Transportation Safety Board recommends that the Federal Aviation Administration expeditiously do the following: Evaluate its current procedures for surveillance of operators of Cessna 208 series airplanes equipped for flight into known icing conditions to determine whether the surveillance effectively ensures that these operators are in compliance with Federal deicing requirements and, if necessary, modify the surveillance procedures to ensure such compliance.

FAA	Open - Acceptable Response

3/17/2005	Addressee	Letter Mail Controlled 3/28/2005 2:05:07 PM MC# 2050133: The FAA will notify inspectors and operators of Cessna 208 airplanes of the relatively high rate of icing-related accidents and incidents involving these airplanes. Further, pending development of revised limitations and procedures for the Cessna 208 in icing conditions, inspectors and operators will be encouraged to be particularly diligent in observing existing regulations regarding icing, including deicing requirements. Operators will be encouraged to do more, namely, to implement voluntarily additional ground deicing procedures known to be effective such as those contained in the current versions of Advisory Circular (AC) 20-117, AC 120-58, AC 120-60, and AC 135-17.
9/13/2005	NTSB	The Safety Board notes that the FAA has indicated that it will notify FAA inspectors and Cessna 208 operators of the high rate of icing-related accidents and incidents involving Cessna 208s. In addition, pending development of revised limitations and procedures for the Cessna 208 in icing conditions, the FAA will encourage inspectors and operators to be particularly diligent in observing existing regulations regarding icing, including deicing requirements. The Safety Board's December 15, 2004, letter references a 2001/2002 safety evaluation study of the Cessna 208 conducted by the FAA's Alaskan Region System Safety Analysis Branch. That report stated the following: FAA systems did not detect that operator training and qualification programs were not meeting the initial and recurrent training requirements of FAR [Federal Aviation Regulation] Part 135. In addition, normal FAA surveillance did not detect that Cessna 208 pilots were not properly trained for operations in ground icing conditions. The FAA's report recommended that its certificate management teams should "revisit" and "retarget" surveillance practices for Cessna 208 operators to ensure that deficiencies in those operators' icing-related training programs, personnel monitoring, and manuals and guidance are identified and corrected. At the time this recommendation was issued, the FAA had not taken this action. Although acknowledging that notifying FAA inspectors to be vigilant of icing considerations with Cessna 208 operators is a step in the right direction, the Safety Board questions whether this action is fully responsive to the recommendation. The evaluation report completed by the Alaskan Region found that FAA systems did not detect deficiencies in operator training and qualification programs or problems with training for icing operations. Further, it is not clear that the FAA's proposed action is responsive to the recommendation in the Alaska Region's report that certificate management teams revisit and retarget Cessna 208 operators. The Safety Board asks the FAA to explain how notifying inspectors of the problems of icing in Cessna 208 operations and encouraging diligence in observing existing icing regulations addresses the need for certificate management teams to "revisit" and "retarget" operators who fly Cessna 208 aircraft in icing conditions. Pending consideration of the Board's comments, Safety Recommendation A-04-67 is classified "Open--Acceptable Response."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

7/11/2008	Addressee	Letter Mail Controlled 7/22/2008 2:37:42 PM MC# 2080429: Robert A. Sturgell, Acting Administrator, FAA, 7/11/08 In response to Safety Recommendations A-04-64 and A-04-67, concerning annual cold weather operations training specific to pilots of Cessna 208 series aircraft, as well as the Federal Aviation Administration surveillance of such training programs, the FAA has taken the following actions: ·In addition to the annual recurrent icing training required by 14 Code of Federal Regulations section 135.35 1, on November 1, 2006, the FAA issued Safety Alert for Operators (SAFO) 06016 (enclosure l), to operators of Cessna CE-208 and CE-208B airplanes discussing the need for increased awareness of the dangers associated with in-flight icing. The SAFO emphasized the importance of following aircraft specific limitations and procedures established for flight into icing conditions; ·On May 17, 2007, the FAA published Airworthiness Directive (AD) 2007-10-15 (enclosure 2), requiring Cessna 208 series operators to incorporate S1 supplemental revision 10 dated February 20, 2007, into the applicable section of the Airplane Flight Manual and Pilot's Operating Handbook. This AD incorporates significant improvements to flight safety, including annual documented "type specific" pilot ground training before flights into icing conditions. Cessna Aircraft Company developed an annual training course specifically to address winter operations and icing issues related to the Cessna 208 series aircraft. The Cessna 208 icing training is available on-line to registered users at no cost, and users can access it at the following web address: http://www.cessnalearnina.com; and ·On November 30, 2007, the FAA published SAFO 07009 (enclosure 3), Cessna CE-208 and CE-208B Specific Pilot Training Requirements for Flight into Icing Conditions, outlining the annual specific Cessna 208 pilot training requirements. The FAA plans to issue a policy for principal operations inspectors with oversight responsibility of carriers operating Cessna 208 series airplanes, requiring them to validate that operators have incorporated the training requirements specified in AD 2007-10-15 into the operators' approved training program. Once we issue this policy we will forward a copy to the Board. We anticipate issuing this policy within 120 days.
1/29/2009	NTSB	The FAA indicated that it plans to issue a policy for its principal operations inspectors (POIs) with oversight responsibility for Cessna 208 operators, requiring the POIs to confirm that the operators have incorporated the training requirements specified in AD 2007-10-15 into the operators' approved training program. Pending issuance of the policy and appropriate action by FAA POIs in response, Safety Recommendation A-04-67 remains classified Open Acceptable Response.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Log Number 2940

Issue Date 1/17/2006 **Winnipeg, Canada OF** **10/6/2005**

On October 6, 2005, about 0540 central daylight time, a Cessna 208B, Canadian registration C-FEXS, operated by Morning Star Air Express as cargo flight 8060, was destroyed when it impacted the ground about 5 minutes after takeoff from the Winnipeg International Airport (CYWG), Winnipeg, Manitoba, Canada. The certificated airline transport pilot was killed. Instrument meteorological conditions (IMC) prevailed and an instrument flight rules (IFR) flight plan had been filed for the flight destined for Thunder Bay, Ontario. According to meteorological studies performed by the Safety Board and Environment Canada (the country's weather authority), meteorological data recorded at the time of the accident are consistent with light to moderate4 icing conditions. The accident is currently under investigation by the TSB, with assistance from the Safety Board. On November 19, 2005, about 1927 universal coordinated time, a Cessna 208B, Aruba registration P4-OIN, was destroyed when it impacted terrain while on approach to Domodedovo International Airport, Moscow, Russia. The two Russian certificated pilots and six passengers were killed. IMC prevailed and an IFR flight plan had been filed for the personal flight, which departed Voronezh Airport about 1810. The accident is currently under investigation by the Interstate Aviation Commission of Russia, with assistance from the Safety Board.

Recommendation # A-06-001

Overall Status
CAA

Priority
CLASS I

The National Transportation Safety Board recommends that the Federal Aviation Administration: Require all operators of Cessna 208 series airplanes to maintain a minimum operating airspeed of 120 knots during flight in icing conditions, even if a descent is required to do so. (Urgent)

FAA	Closed - Acceptable Action	11/15/2006

3/13/2006	Addressee	Letter Mail Controlled 3/20/2006 1:47:08 PM MC# 2060140 Marion C. Blakey, Administrator, FAA, 3/13/06 The Federal Aviation Administration agrees with the intent of these safety recommendations and is preparing an Immediately Adopted Rule to supersede Airworthiness Directive (AD) 2005-07-01, which applies to all Cessna Models 208 and 208B airplanes. AD 2005-07-01 currently requires owner/operators to incorporate information into the applicable section of the Airplane Flight Manual (AFM). The pending Immediately Adopted Rule is the result of several Cessna Model 208 and 208B accidents/incidents that occurred during operations in icing conditions, the FAA's evaluation of Cessna flight test data, Cessna's issuance of AFM revisions, and the FAA's determining these revisions are necessary for safe operation. Consequently, the Immediately Adopted Rule updates the actions of AD 2005-07-01 that require incorporation of text in the AFM and requires the insertion of new text in the AFM, and the fabrication and installation of placards. The Immediately Adopted Rule will address the safety issues outlined in these safety recommendations. I will provide the Board with a copy of the Immediately Adopted Rule as soon as it is issued.
3/24/2006	Addressee	On March 24, 2006, the FAA issued AD 2006-06-06, with corrections issued April 5, 2006 and May 19, 2006. The AD affects all models of Cessna 208 and 208B aircraft, all serial numbers.
8/11/2006	NTSB	The Safety Board notes that the FAA is preparing an Immediately Adopted Rule (IAR) to supersede Airworthiness Directive (AD) 2005-07-01. AD 2005-07-01 requires incorporation of updated information on icing operations in Cessna 208 series aircraft into the applicable section of the Airplane Flight Manual. The IAR will update the actions of AD 2005-07-01 and, according to the FAA, will address the safety issues in these recommendations. Pending review by the Safety Board of the new rule to ensure that it addresses all of the issues in these recommendations, and issuance of the final rule, Safety Recommendations A-06-1, -2, and -3 are classified "Open-Acceptable Response."
11/15/2006	NTSB	The Safety Board notes that on March 10, 2006, the FAA issued Airworthiness Directive (AD) 2006-06-06, which became effective March 24, 2006. The AD affects all Cessna 208 and 208B aircraft, and requires incorporation of changes to the Airplane Flight Manual (AFM) for these aircraft as well as placement of placards in the cockpit. The changes to the AFM (1) require a minimum airspeed of 120 knots indicated air speed when the flaps are up for all phases of flight in icing conditions, (2) prohibit operation of the aircraft in icing conditions that are moderate or greater, and (3) require disengagement of the autopilot if icing conditions are encountered. Issuance of AD 2006-06-06 fully meets the intent of Safety Recommendations A-06-1, -2, and -3, which are classified "Closed-Acceptable Action."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Recommendation # A-06-002

Overall Status **Priority**

CAA **CLASS I**

The National Transportation Safety Board recommends that the Federal Aviation Administration: Prohibit all operators of Cessna 208 series airplanes from conducting flight into any icing conditions determined to be more than light icing. (Urgent)

FAA	Closed - Acceptable Action	11/15/2006

3/13/2006	Addressee	Letter Mail Controlled 3/20/2006 1:47:08 PM MC# 2060140 Marion C. Blakey, Administrator, FAA, 3/13/06 The Federal Aviation Administration agrees with the intent of these safety recommendations and is preparing an Immediately Adopted Rule to supersede Airworthiness Directive (AD) 2005-07-01, which applies to all Cessna Models 208 and 208B airplanes. AD 2005-07-01 currently requires owner/operators to incorporate information into the applicable section of the Airplane Flight Manual (AFM). The pending Immediately Adopted Rule is the result of several Cessna Model 208 and 208B accidents/incidents that occurred during operations in icing conditions, the FAA's evaluation of Cessna flight test data, Cessna's issuance of AFM revisions, and the FAA's determining these revisions are necessary for safe operation. Consequently, the Immediately Adopted Rule updates the actions of AD 2005-07-01 that require incorporation of text in the AFM and requires the insertion of new text in the AFM, and the fabrication and installation of placards. The Immediately Adopted Rule will address the safety issues outlined in these safety recommendations. I will provide the Board with a copy of the Immediately Adopted Rule as soon as it is issued.
3/24/2006	Addressee	On March 24, 2006, the FAA issued AD 2006-06-06, with corrections issued April 5, 2006 and May 19, 2006. The AD affects all models of Cessna 208 and 208B aircraft, all serial numbers.
8/11/2006	NTSB	The Safety Board notes that the FAA is preparing an Immediately Adopted Rule (IAR) to supersede Airworthiness Directive (AD) 2005-07-01. AD 2005-07-01 requires incorporation of updated information on icing operations in Cessna 208 series aircraft into the applicable section of the Airplane Flight Manual. The IAR will update the actions of AD 2005-07-01 and, according to the FAA, will address the safety issues in these recommendations. Pending review by the Safety Board of the new rule to ensure that it addresses all of the issues in these recommendations, and issuance of the final rule, Safety Recommendations A-06-1, -2, and -3 are classified "Open-Acceptable Response."
11/15/2006	NTSB	The Safety Board notes that on March 10, 2006, the FAA issued Airworthiness Directive (AD) 2006-06-06, which became effective March 24, 2006. The AD affects all Cessna 208 and 208B aircraft, and requires incorporation of changes to the Airplane Flight Manual (AFM) for these aircraft as well as placement of placards in the cockpit. The changes to the AFM (1) require a minimum airspeed of 120 knots indicated air speed when the flaps are up for all phases of flight in icing conditions, (2) prohibit operation of the aircraft in icing conditions that are moderate or greater, and (3) require disengagement of the autopilot if icing conditions are encountered. Issuance of AD 2006-06-06 fully meets the intent of Safety Recommendations A-06-1, -2, and -3, which are classified "Closed-Acceptable Action."

Recommendation # A-06-003

Overall Status **Priority**

CAA **CLASS I**

The National Transportation Safety Board recommends that the Federal Aviation Administration: Require all operators of Cessna 208 series airplanes to disengage the autopilot and fly the airplane manually when operating in icing conditions. (Urgent)

FAA	Closed - Acceptable Action	11/15/2006

3/4/2006	Addressee	On March 24, 2006, the FAA issued AD 2006-06-06, with corrections issued April 5, 2006 and May 19, 2006. The AD affects all models of Cessna 208 and 208B aircraft, all serial numbers.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

3/13/2006	Addressee	Letter Mail Controlled 3/20/2006 1:47:08 PM MC# 2060140 Marion C. Blakey, Administrator, FAA, 3/13/06 The Federal Aviation Administration agrees with the intent of these safety recommendations and is preparing an Immediately Adopted Rule to supersede Airworthiness Directive (AD) 2005-07-01, which applies to all Cessna Models 208 and 208B airplanes. AD 2005-07-01 currently requires owner/operators to incorporate information into the applicable section of the Airplane Flight Manual (AFM). The pending Immediately Adopted Rule is the result of several Cessna Model 208 and 208B accidents/incidents that occurred during operations in icing conditions, the FAA's evaluation of Cessna flight test data, Cessna's issuance of AFM revisions, and the FAA's determining these revisions are necessary for safe operation. Consequently, the Immediately Adopted Rule updates the actions of AD 2005-07-01 that require incorporation of text in the AFM and requires the insertion of new text in the AFM, and the fabrication and installation of placards. The Immediately Adopted Rule will address the safety issues outlined in these safety recommendations. I will provide the Board with a copy of the Immediately Adopted Rule as soon as it is issued.
8/11/2006	NTSB	The Safety Board notes that the FAA is preparing an Immediately Adopted Rule (IAR) to supersede Airworthiness Directive (AD) 2005-07-01. AD 2005-07-01 requires incorporation of updated information on icing operations in Cessna 208 series aircraft into the applicable section of the Airplane Flight Manual. The IAR will update the actions of AD 2005-07-01 and, according to the FAA, will address the safety issues in these recommendations. Pending review by the Safety Board of the new rule to ensure that it addresses all of the issues in these recommendations, and issuance of the final rule, Safety Recommendations A-06-1, -2, and -3 are classified "Open-Acceptable Response."
11/15/2006	NTSB	The Safety Board notes that on March 10, 2006, the FAA issued Airworthiness Directive (AD) 2006-06-06, which became effective March 24, 2006. The AD affects all Cessna 208 and 208B aircraft, and requires incorporation of changes to the Airplane Flight Manual (AFM) for these aircraft as well as placement of placards in the cockpit. The changes to the AFM (1) require a minimum airspeed of 120 knots indicated air speed when the flaps are up for all phases of flight in icing conditions, (2) prohibit operation of the aircraft in icing conditions that are moderate or greater, and (3) require disengagement of the autopilot if icing conditions are encountered. Issuance of AD 2006-06-06 fully meets the intent of Safety Recommendations A-06-1, -2, and -3, which are classified "Closed-Acceptable Action."

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

Log Number 2952

Issue Date 7/10/2006 **San Luis Obispo CA** **1/2/2006**

On January 2, 2006, about 1439 Pacific standard time, American Eagle flight 3008, a Saab-Scania AB SF340B+, N390AE, departed from San Luis County Regional Airport (SBP), San Luis Obispo, California, destined for Los Angeles International Airport (LAX), Los Angeles, California. The airplane encountered icing conditions during the en route climb and departed controlled flight at an altitude of about 11,500 feet mean sea level (msl) and descended to an altitude of about 6,500 feet msl. The pilots recovered control of the airplane and continued to their scheduled destination, where they landed about 1540 without further incident. American Eagle Airlines, Inc., operated the scheduled domestic passenger flight under the provisions of 14 Code of Federal Regulations (CFR) Part 121. The 2 flight crewmembers, 1 flight attendant, and 25 passengers were not injured, and the airplane did not sustain any damage. Instrument meteorological conditions (IMC) prevailed, and the flight was operating on an instrument flight rules flight plan.

Recommendation # A-06-048

Overall Status
CAA

Priority
CLASS I

The National Transportation Safety Board recommends that the Federal Aviation Administration: Require all operators of Saab SF340 series airplanes to instruct pilots to maintain a minimum operating airspeed of 1.45xVs during icing encounters and before entering known or forecast icing conditions and to exit icing conditions as soon as performance degradations prevent the airplane from maintaining 1.45xVs. Urgent

FAA	Closed - Acceptable Action	2/4/2009

10/3/2006	Addressee	Letter Mail Controlled 10/10/2006 2:27:31 PM MC# 2060500: The FAA agrees that an increased airspeed factor may be appropriate, and 1.45x Vs may be acceptable. We are discussing this recommendation with the European Aviation Safety Agency (EASA) and Saab to determine an appropriate minimum airspeed. We will provide a status update by November 17, 2006.
4/3/2007	NTSB	In its October 3, 2006, letter, the FAA stated (1) that it was discussing this recommendation with the European Aviation Safety Agency (EASA) and Saab to determine an appropriate minimum airspeed and (2) that the FAA would provide a status update to the Safety Board by November 17, 2006. The Safety Board has learned that it is taking longer than the FAA anticipated to obtain consensus on the issues in Safety Recommendations A-06-48 through -51, and that the FAA believed that it would be able to provide an update by March 2007. However, the FAA now believes that it will not be able to provide an update until July 2007. Although the Board recognizes the need to coordinate with EASA and Saab, delaying the response to an urgent recommendation for a year is not acceptable. Accordingly, pending the timely issuance of a requirement for Saab SF340 operators to maintain a minimum operating airspeed of 1.45xVs during icing encounters, Safety Recommendation A-06-48 is classified Open Unacceptable Response.
8/11/2008	Addressee	Letter Mail Controlled 8/22/2008 8:16:27 AM MC# 2080508: Robert A. Sturgell, Acting Administrator, FAA, 8/11/08 In our last response, dated October 6, 2006, we agreed with the Board that an increased airspeed factor may be appropriate, and 1.45xVs may be acceptable. We also stated that we were discussing this recommendation with the European Aviation Safety Agency (EASA) and Saab to determine an appropriate minimum airspeed. The Federal Aviation Administration completed a review of the incident data and the airplane maneuvering speed data. We have determined the use of a single minimum airspeed during icing conditions for each phase of flight and flap configuration would be simpler and make it easier for pilots. The minimum icing airspeeds recommended by the FAA are in excess of the 1.45xVs recommendation by the Board for all phases of flight and flap configurations during icing conditions. EASA issued an airworthiness directive (AD), which mandates incorporating minimum icing airspeed limitations in the airplane flight manual (AFM) for the European operators of Saab SF340 airplanes. Subsequently, on March 3, 2008, the FAA issued AD 2008-06-11 (copy enclosed), to mandate the incorporation of minimum icing airspeed limitations in the AFM for the U.S.-registered Saab SF340 airplanes.

Recommendation Report

Thursday, March 05, 2009

MODE:AVIATION KEYWORD 1:icing

2/4/2009	NTSB	The FAA determined that the use of a single minimum airspeed during icing conditions for each phase of flight and flap configuration would be simpler and easier for pilots to use. The minimum icing airspeeds recommended by the FAA exceed the 1.45xVs recommended for all phases of flight and flap configurations during icing conditions. Because Saab is a European aircraft manufacturer, the European Aviation Safety Agency (EASA) issued an airworthiness directive (AD), which mandates incorporating minimum icing airspeed limitations in the airplane flight manual (AFM) for European operators of Saab SF340 airplanes. On March 3, 2008, the FAA issued AD 2008-06-11, which mandates incorporation of minimum icing airspeed limitations in the AFM for U.S.-registered Saab SF340 airplanes. Although the Safety Board is disappointed that the FAA was not more prompt in issuing AD 2008-06-11, the action fully meets the intent of the recommendation. Consequently, Safety Recommendation A-06-48 is classified Closed Acceptable Action.

Recommendation # A-06-049

Overall Status
OAA

Priority

The National Transportation Safety Board recommends that the Federal Aviation Administration: Require the installation of modified stall protection logic in Saab SF340 series airplanes certified for flight into known icing conditions.

FAA	Open - Acceptable Response

10/3/2006	Addressee	Letter Mail Controlled 10/10/2006 2:27:31 PM MC# 2060500: The FAA agrees the Saab SF340 series airplanes may benefit from improved stall warning in icing conditions. We are discussing this issue with EASA and Saab to determine the most effective method to address the stall warning system of the SF340 during icing conditions. We will provide a status update by November 17, 2006.
4/3/2007	NTSB	As with Safety Recommendation A-06-48, the FAA stated that it was discussing with EASA and Saab what actions would be taken in response to these recommendations, and the FAA was to provide a status update November 17, 2006. Again, the Safety Board has learned that it is taking longer than the FAA anticipated to obtain consensus on the issues addressed by Safety Recommendations A-06-48 through -50. Although the FAA believed that it would be able to provide an update by March 2007, the FAA now believes it will not be able to supply this information until July 2007. Without additional information, the Safety Board is unable to evaluate whether the actions that will be taken in conjunction with EASA and Saab will be responsive to these recommendations. Pending receipt of an updated status regarding what actions will be taken, Safety Recommendations A-06-49 and -50 remain classified Open Await Response.
8/11/2008	Addressee	Letter Mail Controlled 8/22/2008 8:16:27 AM MC# 2080508: Robert A. Sturgell, Acting Administrator, FAA, 8/11/08 In our last response, dated October 6, 2006, we agreed with the Board that the Saab SF340 series airplanes may benefit from improved stall warning in icing conditions. We also stated we were discussing this issue with EASA and Saab to determine the most effective method to address the stall warning system of the Saab SF340 during icing conditions. Based on our initial review of ice accretion used to certify the Saab SF340 for flight in icing conditions, we were concerned these ice accretions did not represent the most critical ice accretion that may occur in the environmental conditions defined in Appendix C to 14 CFR part 25. As a result, we requested Saab provide additional icing certification test data in order to evaluate the stall characteristics of the Saab SF340 during the most critical ice accretion defined in Appendix C to 14 CFR part 25. We have received this data and are working closely with Saab to determine appropriate stall warning and protection logic. We plan to provide the next update in February 2009.

2/4/2009	NTSB	After the FAA reviewed the ice accretion data used to certify the Saab SF340 for flight in icing conditions, the FAA was concerned that these ice accretions did not represent the most critical ice accretions defined in Appendix C of 14 Code of Federal Regulations Part 25. As a result, the FAA requested that Saab provide additional icing certification test data in order to evaluate the stall characteristics of the Saab SF340 during the most critical ice accretion defined in Appendix C. The FAA is currently reviewing this data with Saab to determine appropriate stall warning and protection logic. The actions described by the FAA are responsive to this recommendation; however, the Safety Board has several questions. Are the additional data that Saab supplied flight test data or something else? The FAA indicated that the data being supplied by Saab are based on ice accretions and conditions defined in Appendix C, and the Board notes that Appendix C does not address supercooled large droplet (SLD) conditions. Did the FAA request, and did Saab provide, any data concerning SLD conditions? Although the Board would appreciate receiving answers to these questions, the Board is encouraged that the FAA is evaluating modification to the stall protection logic in Saab 340 series aircraft. Therefore, pending modification of the stall protection logic in Saab SF340 aircraft certified for flight into known icing conditions, Safety Recommendation A-06-49 is classified Open Acceptable Response.

Recommendation # A-06-050

Overall Status
CAAA

Priority

The National Transportation Safety Board recommends that the Federal Aviation Administration: Require the installation of an icing detection system on Saab SF340 series airplanes.

FAA	Closed - Acceptable Alternate Action	2/4/2009

10/3/2006	Addressee	Letter Mail Controlled 10/10/2006 2:27:31 PM MC# 2060500: The FAA is working with EASA and Saab to determine if an unsafe condition exists on the Saab SF340 series airplanes that warrants the mandatory installation of an ice detection system. We will provide a status update by November 17, 2006.
4/3/2007	NTSB	As with Safety Recommendation A-06-48, the FAA stated that it was discussing with EASA and Saab what actions would be taken in response to these recommendations, and the FAA was to provide a status update November 17, 2006. Again, the Safety Board has learned that it is taking longer than the FAA anticipated to obtain consensus on the issues addressed by Safety Recommendations A-06-48 through -50. Although the FAA believed that it would be able to provide an update by March 2007, the FAA now believes it will not be able to supply this information until July 2007. Without additional information, the Safety Board is unable to evaluate whether the actions that will be taken in conjunction with EASA and Saab will be responsive to these recommendations. Pending receipt of an updated status regarding what actions will be taken, Safety Recommendations A-06-49 and -50 remain classified Open Await Response.
8/11/2008	Addressee	Letter Mail Controlled 8/22/2008 8:16:27 AM MC# 2080508: Robert A. Sturgell, Acting Administrator, FAA, 8/11/08 In our last response, dated October 6, 2006, we noted we were working with EASA and Saab to determine if an unsafe condition exists on the Saab SF340 series airplanes warranting mandatory installation of an ice detection system. The FAA determined that the most appropriate way to meet the safety objective of this recommendation would be to mandate a change to the AFM procedure related to activation of the airframe de-icing system. The installation of an additional icing detection system will not be necessary if the pilot activates the airframe de-icing system at the same time as the engine de-icing system. The previous AFM procedure specified the pilot must activate the airframe de-icing system at the first sign of ice, while engine deicing is to be turned on based on the temperature and visible moisture. Review of the American Eagle incident report and data, indicates that the pilot properly activated the engine de-icing system based on the temperature and visible moisture cues described in the AFM. The revised procedure simplifies the de- icing system procedures by providing the same criteria for both systems. EASA issued an AD, which mandates incorporating these changes for the European operators of Saab SF340 airplanes. Subsequently, on March 3, 2008, the FAA issued AD 2008-06-11, to mandate the same changes to the criteria and procedure in the limitations section of the AFM for the U.S.-registered Saab SF340 airplanes.

2/4/2009	NTSB	As an alternative to requiring installation of an ice detection system, the FAA has mandated a change to the AFM procedure concerning when to activate the airframe deicing system. The FAA stated that installation of an icing detection system is not necessary if the pilot activates the airframe deicing system at the same time as the engine deicing system. At the time of the American Eagle flight 3008 incident, the AFM procedure specified that the pilot must activate the airframe deicing system at the first sign of ice, while engine deicing was to be turned on based on the outside air temperature (OAT) and visible moisture. The FAA's review of the American Eagle incident indicated that the pilot properly activated the engine deicing system based on the OAT and visible moisture cues described in the AFM. Both the EASA AD and AD 2008-06-11 mandate this change to the limitations section of the AFM regarding when to activate the airframe deicing system. This recommendation was issued to eliminate the need to look for ice, which is sometimes overlooked because of workload, distractions, or other factors when an airplane is in icing conditions. The AFM revisions will require activation of the airframe deice system at a prescribed OAT and when in visible moisture, providing deice system activation in many situations prior to when an ice detector would signal for activation. Therefore, the Safety Board finds that the revisions to the AFM in AD 2008-06-11 are an acceptable alternative method of addressing this recommendation. Consequently, Safety Recommendation A-06-50 is classified Closed Acceptable Alternate Action.

Recommendation # A-06-051

Overall Status

OAR

Priority

The National Transportation Safety Board recommends that the Federal Aviation Administration: Require all operators of turbopropeller-driven airplanes to instruct pilots, except during intermittent periods of high workload, to disengage the autopilot and fly the airplane manually when operating in icing conditions.

FAA	Open - Await Response

10/3/2006	Addressee	Letter Mail Controlled 10/10/2006 2:27:31 PM MC# 2060500: This recommendation is similar to a previous NTSB Safety Recommendation A-98-97, which the FAA did not accept because it was determined that the benefits of workload reduction outweighed the risks of using autopilots during icing conditions. The FAA recognizes this recommendation differs slightly from safety recommendation A-98-97 and is considering A-06-51 in light of that difference. We will provide a status update by February 9, 2007.
4/3/2007	NTSB	The FAA's letter noted that this recommendation is very similar to Safety Recommendation A-98-97, which was classified Closed Unacceptable Action on January 12, 2001, because the FAA believed that the benefits of workload reduction outweighed the risks of using the autopilot during icing conditions. Recognizing the FAA's concerns about the benefits of workload reduction, the Safety Board included in Safety Recommendation A-06-51 the phrase except during intermittent periods of high workload. The FAA indicated that it was considering the recommendation and planned to provide a status update by February 9, 2007. However, the FAA now indicates that it will not be able to supply this update until July 2007. Although the Safety Board is encouraged that the FAA is considering the recommended action, Safety Recommendation A-06-51 remains classified Open Await Response pending receipt of additional information regarding how the FAA plans to meet the intent of the recommendation.

Recommendation Report

Friday, March 06, 2009

LOG:2975

Log Number 2975

Issue Date 2/27/2007

Pueblo CO **2/16/2005**

On February 16, 2005, about 0913 mountain standard time,1 a Cessna Citation 560, N500AT, operated by Martinair, Inc., for Circuit City Stores, Inc.,2 crashed about 4 nautical miles east of Pueblo Memorial Airport (PUB), Pueblo, Colorado, while on an instrument landing system (ILS) approach to runway 26R. The two pilots and six passengers on board were killed, and the airplane was destroyed by impact forces and postcrash fire. The flight was operating under the provisions of 14 Code of Federal Regulations (CFR) Part 91 on an instrument flight rules flight plan. Instrument meteorological conditions (IMC) prevailed at the time of the accident.

Recommendation # A-07-012

Overall Status
OAA

Priority
CLASS II

The National Transportation Safety Board recommends that the Federal Aviation Administration:Require that operational training in the Cessna 560 airplane emphasize the airplane flight manual requirements that pilots increase the airspeed and operate the deice boots during approaches when ice is present on the wings.

FAA	Open - Acceptable Response

5/17/2007	Addressee	Letter Mail Controlled 5/31/2007 8:48:32 AM MC# 2070240: Marion C. Blakey, Administrator, FAA, 5/17/07 The Federal Aviation Administration agrees with the Board and is proposing the following to respond to this recommendation. Short Term Actions The FAA will complete the following actions within the next 12 months: ·Initiate an expedited request for changes to the Instrument Airplane and Airline Transport Pilot/Aircraft Type Rating Practical Test Standards (PTS) to place emphasis on knowledge of the hazards of flight in icing conditions in all phases of flight; and ·Issue a Notice to inspectors requiring them to advise all part 135 Principle Operations inspectors, part 91 K Program Managers, part 141 Pilot Schools, and part 142 Training Centers requiring Cessna Citation CE-560 operators to amend their ground and simulator curriculum to reflect the criticality of the proper operation of pneumatic boots (as stated in Advisory Circular (AC) 91-74) and stress the importance of increasing approach speed (Airplane Flight Manual (AFM) increasing approach speed (AFM increases to Vapp & Vref) when residual ice is present or can be expected during the approach and landing. -The Notice will have inspectors require examiners to test pilots knowledge of CE-560 operating procedures in icing conditions in both initial and recurrent training and require demonstration of this knowledge during practical tests and/or proficiency checks; and -The Notice will have inspectors require flight examiners to stress the critical importance of adherence to the disciplines of crew resource management (CRM) while operating in the heavy workload environments such as in-flight icing. Additional action under consideration: ·Consider revising the Cessna Citation 560 AFM procedures regarding the activation of the airframe ice protection system.
9/10/2008	NTSB	The FAA informed the Safety Board that it will initiate action to change the Instrument Airplane and Airline Transport Pilot/Aircraft Type Rating Practical Test Standards (PTS) to place emphasis on knowledge of the hazards of in-flight icing. The FAA will also issue a notice to inspectors requiring them to advise all Part 135 operators, Part 91 Subpart K Program Managers, Part 141 Pilot Schools, and Part 142 Training Centers to require Cessna C-560 operators to amend their ground and simulator curriculum (1) to emphasize the importance of the proper operation of pneumatic boots and (2) to stress the importance of increasing approach speed as directed in the airplane flight manual (AFM) when residual ice is present or can be expected during approach and landing. The notice will direct inspectors to require examiners to test pilots' knowledge of C-560 operating procedures in icing conditions in both initial and recurrent training and to require demonstration of this knowledge during practical tests and/or proficiency checks. Pending revision of the PTS and issuance of the notice, Safety Recommendation A-07-12 is classified Open Acceptable Response.

Recommendation Report

Friday, March 06, 2009

LOG:2975

Recommendation # A-07-013

Overall Status
OAA

Priority
CLASS II

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:Require that all pilot training programs be modified to contain modules that teach and emphasize monitoring skills and workload management and include opportunities to practice and demonstrate proficiency in these areas.

FAA	Open - Acceptable Response

5/17/2007	Addressee	Letter Mail Controlled 5/31/2007 8:48:32 AM MC# 2070240: Marion C. Blakey, Administrator, FAA, 5/17/07 The FAA believes that training in CRM is adequately addressed for Title 14 Code of Federal Regulation (14 CFR) part 91 operations through the provisions of 14 CFR part 61 (61,55(b)(2)(iii), 61.58(d)) and the PTS (FAA-S-8081-5E). Both 14 CFR part 61 and the PTS specifically address the requirement for CRM in airman certification and checking. Some examples of the current requirements that FAA has that address this recommendation are: ·14 CFR 61.155 (c)(13), Aeronautical knowledge test for ATP, requires CRM training; ·The ATP & Aircraft Type Rating PTS addresses Aeronautical Decision Making (ADM) and CRM and states in part ...the examiner must evaluate the applicant's ability throughout the practical test to use good aeronautical decison making procedures in order to evaluate risks. The examiner must accomplish this requirement by developing scenarios that incorporate as many TASKS as possible to evaluate the applicant's risk management in making safe aeronautical decisions; ·14 CFR 61.58, Pilot-in-command proficiency check: Operation of aircraft requiring more than one pilot flight crewmember. Section 61.58 requires the practical test to be administered to PTS Type Rating standards (see above); 14 CFR 61.55, Second -in-command qualifications: Section 61.55 (b)(2)(iii) requires CRM training within the previous 12 months; ·14 CFR part 61 subpart E -Private Pilot requirements and 14 CFR part 6 1 subpart F -commercial pilots requirements identify the need to demonstrate knowledge of ADM (aeronautical decision making and judgment); and ·Private Pilot PTS and commercial pilot PTS requires knowledge of and testing of ADM and CRM. The FAA will consider identifying in its work program a list of required inspections that would reemphasize to the regional and flight standards district office (FSDO) managers the need to validate the training that is already required and to verify its effectiveness.
9/10/2008	NTSB	The FAA stated that monitoring skills and workload management are part of crew resource management (CRM) and that current CRM regulations adequately address these issues. The FAA indicated that it will consider identifying in its work program a list of required inspections, reemphasizing to the regional and flight standards district office managers the need to validate the training that is already required and to verify its effectiveness. Although current CRM regulations cover the issues addressed in this recommendation, the Safety Board has investigated a number of accidents and incidents, such as the Pueblo accident, where improved monitoring and workload management skills might have interrupted the chain of events that led to the accident, and thus prevented its occurrence. The FAA's proposal to identify a list of required inspections as described above is responsive to the recommendation provided that the list includes a strong emphasis on monitoring and workload management components of the CRM program. Pending the development of a list that includes monitoring and workload management components and its incorporation into FAA work programs for regional and flight standards district offices, Safety Recommendation A-07-13 is classified Open Acceptable Response.

Recommendation Report

Friday, March 06, 2009

LOG:2975

Recommendation # A-07-014

Overall Status
OAA

Priority
CLASS II

The National Transportation Safety Board recommends that the Federal Aviation Administration:Require manufacturers and operators of pneumatic deice boot-equipped airplanes to revise the guidance contained in their manuals and training programs to emphasize that leading edge deice boots should be activated as soon as the airplane enters icing conditions. (A-07-14) (This safety recommendation supersedes Safety Recommendation A-98-91 and is classified Open Unacceptable Response.

FAA	Open - Acceptable Response

5/17/2007	Addressee	Letter Mail Controlled 5/31/2007 8:48:32 AM MC# 2070240: Marion C. Blakey, Administrator, FAA, 5/17/07 This safety recommendation supersedes A-98-91. The recommendation is the same as A-98-91 except that it was limited to turbopropeller-driven airplanes in which ice bridging is not a concern, and this recommendation expands the applicability to all pneumatic deice boot-equipped airplanes. In our previous responses to A-98-91, we provided the Board with details on proposed Parts 25 and 121 rule changes that address the activation of airframe ice protection systems. The proposed rules will not distinguish the type of powerplant and therefore these rulemaking activities remain relevant to this new recommendation. We previously reported to the Board in our October 26, 2005 letter that the regulatory evaluations on these rule changes had been delayed due to the higher priority of other safety-related rulemaking activities. In March 2006, the FAA raised the priority of the Part 25 Activation of Ice Protection rulemaking. The notice of proposed rulemaking for the Part 25 Activation of Ice Protection was published on April 26, 2007 and a copy is enclosed. The proposed Part 25 rule would require, after the initial activation of the ice protection system, that: ·The ice protection system operate continuously, or; ·The airplane be equipped with a system that automatically cycles the ice protection system, or; ·An ice detection system be provided to alert the flightcrew each time the ice protection system must be cycled. As we stated in our October 26, 2005 letter the FAA is considering an icing regulation change to Part 23 that will address the method and timing of boot activation, in addition to other icing related issues that affect Part 23 airplanes. In the interim, manufacturers of Part 23 airplanes have been following the guidance in Advisory Circular 23.1419-2C, which recommends that deicing boots be operated at the first sign of icing and in an appropriate continuous mode. The recommendations apply to all airplanes with pneumatic deicing boots. The FAA believes this action should not be taken on airplanes without modern boots due to the potential for ice bridging. Modern boots are defined as those that use small diameter tubes (up to 1.75 inches), operated at nominal pressures of at least 15 psig by excess bleed air from a turbine engine, and rapid inflation and deflation.
9/10/2008	NTSB	On April 26, 2007, the FAA published a notice of proposed rulemaking (NPRM) for the activation of the ice protection system (IPS) in Part 25 airplanes. The NPRM proposes to require IPS activation as soon as the airplane enters icing conditions. The NPRM also proposes that after the initial IPS activation, (1) the IPS operate continuously, (2) the airplane be equipped with a system that automatically cycles the IPS, or (3) an ice detection system be provided to alert the flightcrew each time the IPS must be cycled. For several years, the FAA has been considering a change to the Part 23 regulations concerning icing issues, including the method and timing of the IPS activation. The FAA indicated that in the interim, manufacturers of Part 23 airplanes have complied with Advisory Circular (AC) 23.1419-2C, which recommends that deicing boots be operated at the first sign of icing and in an appropriate continuous mode. The Safety Board is encouraged by the issuance of the NPRM, and on July 23, 2007, provided comments to the Docket for this rulemaking. The NPRM proposes actions for Part 25 airplanes that are responsive to Safety Recommendations A-07-14 and -15. Although the Board is concerned that the FAA has not yet initiated any rulemaking for Part 23 airplanes, AC 23.1419-2C addresses the regulatory changes recommended. Pending timely issuance of the final rule for the NPRM, and issuance of regulations for Part 23 airplanes, Safety Recommendations A-07-14 and -15 are classified Open Acceptable Response.

Recommendation Report

Friday, March 06, 2009

LOG:2975

Recommendation # A-07-015

Overall Status
OAA

Priority
CLASS II

The National Transportation Safety Board recommends that the Federal Aviation Administration:Require that all pneumatic deice boot-equipped airplanes certified to fly in known icing conditions have a mode incorporated in the deice boot system that will automatically continue to cycle the deice boots once the system has been activated.

FAA	Open - Acceptable Response

5/17/2007 Addressee

Letter Mail Controlled 5/31/2007 8:48:32 AM MC# 2070240: Marion C. Blakey, Administrator, FAA, 5/17/07 This safety recommendation supersedes A-98-91. The recommendation is the same as A-98-91 except that it was limited to turbopropeller-driven airplanes in which ice bridging is not a concern, and this recommendation expands the applicability to all pneumatic deice boot-equipped airplanes.
In our previous responses to A-98-91, we provided the Board with details on proposed Parts 25 and 121 rule changes that address the activation of airframe ice protection systems. The proposed rules will not distinguish the type of powerplant and therefore these rulemaking activities remain relevant to this new recommendation. We previously reported to the Board in our October 26, 2005 letter that the regulatory evaluations on these rule changes had been delayed due to the higher priority of other safety-related rulemaking activities. In March 2006, the FAA raised the priority of the Part 25 Activation of Ice Protection rulemaking. The notice of proposed rulemaking for the Part 25 Activation of Ice Protection was published on April 26, 2007 and a copy is enclosed. The proposed Part 25 rule would require, after the initial activation of the ice protection system, that:
·The ice protection system operate continuously, or;
·The airplane be equipped with a system that automatically cycles the ice protection system, or;
·An ice detection system be provided to alert the flightcrew each time the ice protection system must be cycled.
As we stated in our October 26, 2005 letter the FAA is considering an icing regulation change to Part 23 that will address the method and timing of boot activation, in addition to other icing related issues that affect Part 23 airplanes. In the interim, manufacturers of Part 23 airplanes have been following the guidance in Advisory Circular 23.1419-2C, which recommends that deicing boots be operated at the first sign of icing and in an appropriate continuous mode.
The recommendations apply to all airplanes with pneumatic deicing boots. The FAA believes this action should not be taken on airplanes without modern boots due to the potential for ice bridging. Modern boots are defined as those that use small diameter tubes (up to 1.75 inches), operated at nominal pressures of at least 15 psig by excess bleed air from a turbine engine, and rapid inflation and deflation.

9/10/2008 NTSB

On April 26, 2007, the FAA published a notice of proposed rulemaking (NPRM) for the activation of the ice protection system (IPS) in Part 25 airplanes. The NPRM proposes to require IPS activation as soon as the airplane enters icing conditions. The NPRM also proposes that after the initial IPS activation, (1) the IPS operate continuously, (2) the airplane be equipped with a system that automatically cycles the IPS, or (3) an ice detection system be provided to alert the flightcrew each time the IPS must be cycled.

For several years, the FAA has been considering a change to the Part 23 regulations concerning icing issues, including the method and timing of the IPS activation. The FAA indicated that in the interim, manufacturers of Part 23 airplanes have complied with Advisory Circular (AC) 23.1419-2C, which recommends that deicing boots be operated at the first sign of icing and in an appropriate continuous mode.

The Safety Board is encouraged by the issuance of the NPRM, and on July 23, 2007, provided comments to the Docket for this rulemaking. The NPRM proposes actions for Part 25 airplanes that are responsive to Safety Recommendations A-07-14 and -15. Although the Board is concerned that the FAA has not yet initiated any rulemaking for Part 23 airplanes, AC 23.1419-2C addresses the regulatory changes recommended. Pending timely issuance of the final rule for the NPRM, and issuance of regulations for Part 23 airplanes, Safety Recommendations A-07-14 and -15 are classified Open Acceptable Response.

Recommendation Report

Friday, March 06, 2009

LOG:2975

Recommendation # A-07-016

Overall Status
OUA

Priority
CLASS II

The National Transportation Safety Board recommends that the Federal Aviation Administration:When the revised icing certification standards (recommended in Safety Recommendations A-96-54 and A-98-92) and criteria are complete, review the icing certification of pneumatic deice boot-equipped airplanes that are currently certificated for operation in icing conditions and perform additional testing and take action as required to ensure that these airplanes fulfill the requirements of the revised icing certification standards. (A-07-16) (This safety recommendation supersedes Safety Recommendation A-98-100 and is classified Open Unacceptable Response.

FAA	Open - Unacceptable Response

5/17/2007	Addressee	Letter Mail Controlled 5/31/2007 8:48:32 AM MC# 2070240: Marion C. Blakey, Administrator, FAA, 5/17/07 This safety recommendation supersedes A-98-100. In response to safety recommendation A-98-100, we have taken certain actions for the safe operation of turbopropeller-driven airplanes in icing conditions. We are aware of the lessons learned from two major accidents, the ATR-72 accident in Roselawn, Indiana and the EMB-120 accident in Monroe, Michigan, which occurred in 1994 and 1998, respectively. We issued airworthiness directives (AD) against existing aircraft of designs similar to the accident airplanes (see enclosure). In addition, after a general review of icing accidents and incidents the FAA began a rulemaking project to amend the 14 CFR part 121 operating rules to improve the safety of the fleet. The proposed part 121 rule, in addition to those described in our October 2005 response to the Board, improves ice protection activation means and requires less subjective means of determining when the flightcrew should exit icing conditions. This rule is applicable to all booted airplanes. We believe these ADs and the planned part 121 rule will incorporate the lessons learned from both the Roselawn and Monroe accidents for existing turbopropeller-driven airplanes in service. As a result of the issuance of A-07-16, we have reexamined our position and find that our actions are appropriate for both turbopropeller and turbojet-driven airplanes, because many of the FAA actions were applicable to both types of airplanes. The FAA will take additional action for specific airplane models if we find evidence that an unsafe condition exists or is likely to develop in any in-service airplane type.
9/10/2008	NTSB	This safety recommendation supersedes Safety Recommendation A-98-100 by including all pneumatic deice boot equipped airplanes that are currently certificated for operation in icing conditions rather than only turbo-propeller aircraft equipped with pneumatic deice boots. The FAA stated that in response to Safety Recommendation A-98-100, it issued airworthiness directives (ADs) for existing aircraft similar in design to the ATR-72 airplane involved in the October 31, 1994, icing accident over Roselawn, Indiana, and an EMB-120 involved in the January 9, 1997, icing accident over Monroe, Michigan. In addition, the FAA is planning to revise the regulations in Part 121 (1) to address when the ice protection system should be activated and (2) to provide a less subjective means of determining when to exit icing conditions. The FAA believes that its actions are appropriate for both turbopropeller and turbojet airplanes. The FAA's October 26, 2005, response to Safety Recommendation A-98-100 indicated that the FAA believed the icing certification regulations and advisory material were sufficient to determine whether additional actions were needed to correct unsafe conditions on airplanes certificated at that time. The FAA further stated that it had determined that no unsafe conditions existed that warranted actions beyond those that had already been completed or were in the process of being completed. On May 10, 2006, the Board responded to the FAA that it agreed that suitable information was available to determine whether additional action was required. However, the Board did not agree that the FAA had applied the new information to all appropriate airplanes in service. The FAA found that there were no airplanes for which an unsafe condition existed, and the Board was concerned that the FAA had based its conclusion primarily on the absence of accidents or serious incidents. To meet the intent of Safety Recommendation A-98-100 (and now A-07-16), the FAA will need to formally evaluate (perhaps by conducting flight tests on) all existing pneumatic deice boot-equipped airplanes that are currently certificated for operation in icing conditions to ensure that these aircraft comply with all current icing certification criteria for new aircraft. In the May 10, 2006, letter, the Board asked the FAA to supply a list of those aircraft that it had formally evaluated and a summary of the findings and resultant actions. Pending receipt of such a list, Safety Recommendation A-98-100 was classified Open Unacceptable Response. The FAA has not supplied such a list of aircraft evaluated and resultant actions. Pending our receipt and review of a list of those aircraft that the FAA has formally evaluated and a summary of the findings and resultant actions, Safety Recommendation A-07-16 remains classified Open Unacceptable Response.

Recommendation Report

Friday, March 06, 2009

LOG:2975

Recommendation # A-07-017

Overall Status
OAA

Priority
CLASS II

The National Transportation Safety Board recommends that the Federal Aviation Administration:Require modification of the Cessna 560 airplane's stall warning system to provide a stall warning margin that takes into account the size, type, and distribution of ice, including thin, rough ice on or aft of the protected surfaces.

FAA	Open - Acceptable Response

5/17/2007 Addressee

Letter Mail Controlled 5/31/2007 8:48:32 AM MC# 2070240: FAA Comment. Since December 2006, Cessna and the Wichita ACO have been aggressively working to gain a better understanding of the factors that may have contributed to the subject accident. The following factors have been identified:

Stall warning system operation with ice accretions, including freezing drizzle; Maintenance actions associated with the stall warning system; Deice boot replacement and associated stall strip maintenance actions; Adequacy of current Flight Manual; and Stall warning system design review.

Below you will find an action plan with associated status and schedule to address each of the identified factors.

Stall warning system operation with ice accretions:

On December 12, 2006, Cessna was notified of the need to conduct additional evaluations of the Model 560 with simulated ice shapes. This included the possibility of testing ice shapes for conditions outside of the current certification standards for supercooled large droplets. Cessna and the FAA are currently evaluating the following:

a. The adequacy of stall warning with artificial ice shapes representative of critical Appendix C icing conditions. This consists of shapes not tested during the '96/'98 investigation such as thin rough ice (sandpaper) and runback at near freezing temperatures; b. Stall characteristics with artificial ice shapes of item (a); and c. Additionally, we are re-examining the definition of the original ice shapes utilized during '96/'98 evaluations to verify their adequacy.

The FAA asked Cessna to:

a. Evaluate the adequacy of stall warning with artificial ice shapes representative of freezing drizzle icing conditions; b. Evaluate stall characteristics with artificial ice shapes of item (a); and c. Evaluate potential runback ice forming behind the protected wing leading edge in freezing drizzle.

The ongoing flight tests with the Appendix C simulated ice accretions are nearly complete. Results from the latest flight tests appear consistent with those from the '96/'98 evaluations. The data reviewed thus far indicate adequate stall warning margin for a properly biased system. The data also show that if the stall warning system fails to bias, results are consistent with the accident investigation findings. A cursory examination was conducted on the 1996 ice shapes, but a more detailed analysis will be required.

Once these critical Appendix C flight evaluations are completed and the data have been reviewed, Cessna and the FAA will discuss the need to examine icing conditions associated with freezing drizzle. Freezing drizzle is outside the required certification icing envelopes, but it may have been a factor in the subject accident. It is estimated Appendix C flight evaluations will be complete by the middle of November 2007.

Field and maintenance manual evaluations of stall warning system:

In addition to the flight evaluations for stall warning and handling characteristics above, Cessna and the FAA are evaluating a sample of representative in-service aircraft. The target sample size is 10 - 15 aircraft. This evaluation will examine the adequacy of maintenance/inspection procedures associated with inspection and/or adjustment of the angle of attacWstal1 warning system. It will also provide data, via flight tests, on in-service stall warning system performance. Two aircraft have been evaluated thus far and the FAA and Cessna are working to obtain additional aircraft to complete the evaluation. The maintenance procedure review is estimated to be complete by the end of July 2007 and it is estimated the aircraft survey task will be complete by December 2007.

Recommendation Report

Friday, March 06, 2009

LOG:2975

9/10/2008 NTSB

On August 9, 2007, staff from the Safety Board met with staff from the FAA and Cessna at the FAA's Aircraft Certification Office in Wichita, Kansas, to discuss activities in response to this recommendation. The FAA and Cessna conducted an extensive evaluation that found that with the Appendix C icing conditions, the Cessna C-560 had an adequate stall warning margin. The evaluation then used test evaluation conditions for supercooled large droplet (SLD) icing developed by the aviation rulemaking advisory committee's ice protection harmonization working group to perform additional tests with ice shape conditions not currently specified in Part 23 or Part 25. Much of this work consisted of putting 40-grit sandpaper on the leading edge of the airfoil and then performing flight tests to evaluate the stall warning margin. Again, an adequate stall warning margin was found even in these flight tests simulating SLD conditions.

Given that the FAA/Cessna investigation could not find icing conditions with a lack of stall warning margin similar to the conditions found in the February 16, 2005, accident that prompted this recommendation, other possible causes of the lack of stall warning margin were investigated. If the airplane's angle of attack (AOA) sensor is off calibration, the stall warning system will not be reliable. Cessna reviewed a number of in-service Cessna C-560 aircraft and found that all had AOA sensors out of calibration, and in every case, the out-of-calibration AOA had resulted in a stall warning's being issued at a lower speed than it should have, thus reducing the stall warning margin. In some cases the AOA sensor problem had resulted in the stall warning speed's being off as much as 7 knots, a significant error.

Therefore, the FAA believes that the problem is with the AOA sensor, not with the stall warning speed margin in icing conditions. On November 15, 2007, the FAA issued AD 2007?23-13, which requires installing new minimum airspeed placards on C-560 aircraft to notify the flightcrew of the proper airspeeds for operating in both normal and icing conditions. The AD also requires revising the AFM to provide limitations and procedures for operating in icing conditions; for operating with anti-ice systems turned on, regardless of icing conditions; and for recognizing and recovering from an inadvertent stall. The FAA issued this AD to prevent an inadvertent stall due to the inadequate stall warning margin provided by an improperly adjusted stall warning system, which could result in loss of controllability of the airplane. Cessna is also examining the problem with the AOA sensor and is developing a service bulletin to alert C-560 operators of the need to check the AOA sensor's calibration and reset it if needed. The service bulletin may also include a continuing airworthiness requirement to periodically check the AOA sensor. The FAA plans to issue an AD to mandate this service bulletin when it is issued.

The Safety Board considered the testing of SLD conditions performed with the C?560. The Board believes this was comprehensive work, and this testing may form the basis for certification tests to evaluate airplane handling in SLD conditions for future aircraft designs. However, the Board does not believe that this testing considered all of the SLD conditions of concern. Before concluding that the airplane has an adequate stall warning margin in SLD conditions, the Board believes that the FAA and Cessna need to consider additional icing conditions and additional locations of ice accumulation in SLD conditions. The details of the additional testing needed are technically complex and are best discussed in face-to-face meetings of the FAA and the Board's technical staff.

Although the Safety Board does not believe the FAA is yet able to conclude that the C-560 airplane has an adequate stall warning margin in icing conditions, the Board is pleased to learn that the FAA and Cessna have identified the problem with the AOA sensor and are taking actions to resolve this issue. Pending a meeting of FAA and Safety Board technical staff to discuss additional SLD testing conditions needing evaluation and, if necessary, revisions to the stall warning margin in icing conditions based on the results of this additional testing, Safety Recommendation A-07-17 is classified Open Acceptable Response.

Total Number of Recommendations for Recommendation Report: 6

Selection for Report:

LOG:2975