

#### 4. RECOMMENDATIONS

As a result of the investigation of this accident, the National Transportation Safety Board makes the following recommendations:

--to the Federal Aviation Administration:

Direct principal operations inspectors (POIs) to ensure that all 14 Code of Federal Regulations (CFR) Part 121 air carriers require their dispatchers to provide all pertinent information, including airman's meteorological information (AIRMETs) and Center Weather Advisories (CWAs), to flightcrews for preflight and in-flight planning purposes. (Class II, Priority Action) (A-96-48)

Require that Hazardous In-flight Weather Advisory Service (HIWAS) broadcasts consistently include all pertinent information contained in weather reports and forecasts, including in-flight weather advisories, airman's meteorological information (AIRMETs), significant meteorological information (SIGMETs), and Center Weather Advisories (CWA's). (Class II, Priority Action) (A-96-49)

Encourage principal operations inspectors (POIs) and operators to reemphasize to pilots that Hazardous In-flight Weather Advisory Service (HIWAS) is a source of timely weather information and should be used whenever they are operating in or near areas of potentially hazardous weather conditions. (Class II, Priority Action) (A-96-50)

Revise the existing aircraft icing intensity reporting criteria (as defined in the Aeronautical Information Manual (AIM) and other Federal Aviation Administration (FAA) literature) by including nomenclature that is related to specific types of aircraft, and that is in logical agreement with existing Federal Aviation Regulations (FARs). (Class II, Priority Action) (A-96-51)

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. (Class II, Priority Action) (A-96-52)

Continue to sponsor the development of methods to produce weather forecasts that both define specific locations of atmospheric icing conditions (including freezing drizzle and freezing rain) and produce short-range forecasts (“nowcasts”) that identify icing conditions for a specific geographic area with a valid time of 2 hours or less. (Class II, Priority Action) (A-96-53)

Revise the icing criteria published in 14 Code of Federal Regulations (CFR), 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. (Class II, Priority Action) ) (A-96-54) (Supersedes A-81-116 and-118)

Revise the Federal Aviation Regulations (FAIRs) icing certification requirements and advisory material to specify the numerical methods to be used in determining median volumetric diameter (MVD) and liquid water content (LWC) during certification tests. (Class II, Priority Action) (A-96-55)

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 limitations should be imposed to prohibit flight in such conditions and flightcrews should be provided with the means to positively determine when they are in icing conditions that exceed the limits for aircraft certification. (Class II, Priority Action) (A-96-56)

Require all aircraft manufacturers to provide, as part of the certification criteria, information to the FAA and operators about any known undesirable characteristics of flight beyond the protected

(stall system and related shaker/pusher) flight regime. (Class II, Priority Action) (A-96-57)

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 and iced-wing conditions. Revise 14 CFR Parts 23 and 25 icing certification requirements to include such a test. (Class II, Priority Action) (A-96-58)

Encourage ATR to test the newly developed lateral control system design changes and upon verification of the improved or corrected hinge moment reversal/uncommanded aileron deflection problem, require these design changes on all new and existing ATR airplanes. (Class-II, Priority Action) (A-96-59)

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. (Class II, Priority Action) (A-96-60)

Require all principal operations inspectors (POIs) of 14 CFR Part 121 and 135 operators to ensure that training programs include information about all icing conditions, including flight into freezing drizzle/freezing rain conditions. (Class II, Priority Action) (A-96-61)

Develop an organizational structure and a communications system that will enable the Aircraft Evaluation Group (AEG) to obtain and record all domestic and foreign aircraft and parts/systems manufacturers' reports and analyses concerning incidents and accidents involving aircraft types operated in the United States, and ensure that the information is collected in a timely manner for effective AEG monitoring of the continued airworthiness of aircraft. (Class II, Priority Action) (A-96-62)

Review and revise, as necessary, the manner in which the FAA monitors a foreign airworthiness authority's compliance with U.S.

type certification requirements under the Bilateral Airworthiness Agreement (BAA). (Class II, Priority Action) (A-96-63)

Establish policies and procedures to ensure that all pertinent information is received, including the manufacturer's analysis of incidents, accidents or other airworthiness issues, from the exporting country's airworthiness authority so that the FAA can monitor and ensure the continued airworthiness of airplanes certified under the Bilateral Airworthiness Agreement (BAA). (Class II, Priority Action) (A-96-64)

Evaluate the need to require a sterile cockpit environment for airplanes holding in such weather conditions as icing and convective activity, regardless of altitude. (Class II, Priority Action) (A-96-65)

Amend the Federal Aviation Regulations to require operators to provide standardized training that adequately addresses the recovery from unusual events, including extreme flight attitudes in large, transport category airplanes. (Class II, Priority Action) (A-96-66)

Revise FAA Order 8400.10, Chapter 7, Section 2, paragraph 1423 (Operational Requirements - Flightcrews) to specify that Center Weather Advisories (CWAs) be included and considered in the flightcrew's preflight planning process. (Class II, Priority Action) (A-96-67)

Revise FAA Order 7110.65, "Air Traffic Control," Chapter 2, "General Control," Section 6, "Weather Information," paragraph 2-6-3, "PIREP" Information, to include freezing drizzle and freezing rain. Additionally, these conditions should be clearly defined in the Pilot/Controller Glossary. (Class II, Priority Action) (A-96-68)

Conduct or sponsor research and development of on-board aircraft ice protection and detection systems that will detect and alert flightcrews when the airplane is encountering freezing drizzle and freezing rain and accreting resultant ice. (Class II, Priority Action) (A-96-69)

--to the National Oceanic and Atmospheric Administration:

Develop methods to produce weather forecasts that both define specific locations of atmospheric icing conditions (including freezing drizzle and freezing rain), and 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 appropriate manner. (Class II, Priority Action) (A-96-70)

--to AMR Eagle:

Require dispatchers to include in the flight release airman’s meteorological information (AIRMETs) and center weather advisories (CWAs) that are pertinent to the route of flight so that flightcrews can consider this information in their preflight and in-flight decisions. (Class II, Priority Action) (A-96-71)

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. (Class II, Priority Action) (A-96-72)

Conduct a procedural audit to eliminate existing conflicts in guidance and procedures between the Aircraft Flight Manuals, Flight Operations Manuals, and other published material. (Class II, Priority Action) (A-96-73)

Also as a result of this accident, the Safety Board issued the following safety recommendations to the FAA on November 7, 1994:

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 attack 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. (Class II, Priority Action) (A-94-181)

Prohibit the intentional operation of ATR 42 and ATR 72 airplane 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 airplane exhibits satisfactory flight characteristics. (Class I, Urgent Action) (A-94-182)

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 speed restriction for ATR 42 and ATR 72 airplanes pending acceptable outcome of the special certification effort. (Class I, Urgent Action) (A-94-183)

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. (Class I, Urgent Action) (A-94-184)

Caution pilots of ATR 42 and ATR 72 airplanes 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. (Class I, Urgent Action) (A-94-185)

In addition, the Safety Board issued the following safety recommendations to the FAA on November 6, 1995:

Require the Air Traffic Control System Command Center to retain all flow control-related facility documents for 15 days, regardless of title, name, or form number, for reconstruction purposes. (Class II, Priority Action) (A-95-103)

Develop a list of documents to be completed by the Air Traffic Control System Command Center personnel in the event of an incident or accident. (Class II, Priority Action) (A-95-104)

Revise Order 8020.11, "Aircraft Accident and Incident Notification, Investigation and Reporting," to include the Air Traffic Control System Command Center (DCC) facility. Ensure that the DCC facility is assigned specific requirements to be included in an accident/incident package. (Class II, Priority Action) (A-95-105)

Revise FAA Order 7210.3, "Facility Operation and Administration," Chapter 3, "Facility Equipment," Section 4, "Recorders," paragraph 3-41, "Assignment of Recorder Channels," to include the Air Traffic Control System Command Center facility, listing the recorded positions and their priority. (Class II, Priority Action) (A-95-106)

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Vice Chairman Robert T. Francis did not participate.

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