Docket No. SA-533

Exhibit No. 2-JJJ

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C.

FAA Presentation – Icing Requirements and Guidance

(15 Pages)

In-flight Icing Regulatory Requirements and Guidance Material

Federal Aviation Administration

Presented at: NTSB Public Hearing,
Empire Airlines Flight 8284

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AFS-200

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FAA Actions To Address Icing Related NTSB Safety Recommendation

- **49 icing safety recommendations issued since 1994 Roselawn accident (* NTSB Classification)**
  - **34 Closed**
    - 22 – acceptable action*
    - 3 – acceptable alternate action*
    - 2 – exceeded recommended action*
    - 1 – no longer applicable*
    - 6 – unacceptable action*
  - **15 Open**
    - 8 – acceptable action*
    - 1 – acceptable alternate action*
    - 1 – awaiting additional information*
    - 5 – unacceptable action*

FAA Actions To Address Icing Related NTSB Safety Recommendation (Cont'd)

- **FAA Accomplishments**
  - Issued over 100 ADs on over 50 airplane types
  - Issued 2 final rules
  - Issued 9 new or revised advisory circulars
  - Issued 6 safety alerts
  - Developed pilot training videos with NASA
  - Sponsored research into icing causes, effects, mitigations
  - Rules in development
    - Activation of ice protection equipment (2009)
    - Certification for supercooled large drop (SLD) icing (2010)
    - Removal of regulations allowing for polished frost on wings of airplanes (2009)

Primary Operational Regulatory Requirements

- **91.9 Civil aircraft flight manual, marking, and placard requirements.**
  - Must comply with aircraft limitations established in AFM
- **121.141 Airplane flight manual.**
  - Must carry onboard AFM or manual approved by the FAA in accordance with 14 CFR 121.133
- **121.341 Equipment for operations in icing conditions**
  - Meet transport category aircraft certification requirements for authorization in icing conditions

Regulations (Cont'd)

- **121.629 Operation in icing conditions**
  - Terminate operations if icing conditions are expected or met that might adversely affect the safety of the flight.
  - Requirement for approval of ground de/anti-icing program
- **121.419 Pilots and flight engineers: Initial, transition, and upgrade ground training**
  - Enough meteorology to insure a practical knowledge of weather phenomena, including the principles of frontal systems, icing, …
- **Appendix E to Part 121—Flight Training Requirements**
  - III. Flight Maneuvers and Procedures: (f) Normal and abnormal or alternate operation of the following systems and procedures:(8) Anti-icing and deicing

Regulations (Cont'd)

- **Operation Specification A023**
  - Aircraft Ground Deicing Program Approval
  - Authorizes use of FAA Holdover Time Tables for the use of Anti-icing fluids
    - Contain holdover times for takeoff in freezing drizzle and light freezing rain
  - Not an authorization for operations in freezing drizzle and freezing rain
    - Operations conducted in accordance with AFM limitations and company procedures

In-flight Icing Guidance Material In Response To NTSB Safety Recommendations

- **AC 91-74A Pilot Guide: Flight In Icing Conditions, 12/31/2007**
- **AC 91-51A EFFECT OF ICING ON AIRCRAFT CONTROL AND AIRPLANE DEICE AND ANTI-ICE SYSTEMS, 7/17/1996**
- **SAFO 06016 In-Flight Icing, Turbo Propeller Powered Airplanes, 11/1/06**
- **SAFO 08006 14 CFR Parts 91 and 135, Flight Into Known or Forecast Severe Icing Conditions, 1/25/08**

In-flight Icing Guidance Material (Cont'd)

- **InFO 09007 Pilot Training and Checking Under Title 14 of the Code of Federal Regulations (14 CFR) Parts 61, 91, 91 Subpart K (91K), 121, 135, 141, and/or 142, 5/5/09**
  - To ensure that all pilots of pneumatic deicing boot-equipped airplanes understand and receive training on proper operation of those systems and on maintaining an appropriate airspeed in icing conditions.

In-flight Icing Guidance Material (Cont'd)

- **Notice 8900.55 FAA-Approved Deicing Program Updates, Winter 2008-2009, 10/30/08**
- **FAA-H-8083-15A Instrument Flying Handbook**
- **Notice 8900.1 Flight Standards Information Management System, 4-597 AIR CARRIER WINTER OPERATIONS**
- **Airman's Information Manual Chapter 7**

Airworthiness Directives Issued (AD)

- **Approximately 25 AD's issued for aircraft for activation of de-icing systems in continuous mode at first sign of aircraft icing**
- **Approximately 40 AD's issued for aircraft with pneumatic de-icing boots and unpowered aileron roll controls**
  - Visual cues for recognizing severe icing
  - Requirement for immediate exiting severe icing conditions if encountered
  - Prohibition of use of auto-pilot in severe icing conditions

New and Proposed Aircraft Icing Regulation

- **14CFR 25 - Airplane performance and handling qualities certification requirements**
  - In effect
- **14CFR 25 – Activation of de/anti-icing system**
  - In effect
- **14CFR 121 – Activation of de/anti-icing system**
  - In regulatory development process
- **14CFR 121 – Exiting icing conditions**
  - In regulatory development process (Early stage)
- **14CFR 23 and 25 – SLD Aircraft certification requirements**
  - In regulatory development process, (Part 23 early stage)
- **14CFR 25 – Low speed alerting system**
  - In regulatory development process, (Early stage)

Aircraft Icing Certification Criteria

- **Is aircraft evaluation criteria and not necessarily the limitation of the aircraft anti/de-icing system capability**
  - Certification criteria developed to address the vast majority of icing conditions likely to be encountered in normal operations
  - Not a hard limit that brief encounters with icing conditions beyond those tested is necessarily unsafe
  - Extensive successful aircraft operational history in conditions exceeding established certification criteria (freezing drizzle and freezing rain) substantiates excessive capability of most aircraft beyond the evaluated intensity and exposure times for certification
    - FAA/manufacturer imposed operational limitations placed on aircraft evaluated, or demonstrated limited icing capabilities beyond certification criteria

Elements Determining if Freezing Drizzle and/or Freezing Rain Will Produce Severe Aircraft Icing

- **Aircraft exposure time to the freezing precipitation**
- **Specific aerodynamic design of the aircraft**
- **OAT/TAT**
- **Aircraft skin temperature**
- **Aircraft Speed**
- **Intensity of Precipitation**
- **Size of the water droplets**
- **Effectiveness of the aircraft de/anti-icing systems**

FAA Current Position On Operations In Freezing Drizzle And Freezing Rain

- **Based on the information discussed on the previous slides including the current regulatory requirements, guidance material, airworthiness directives, current icing certification criteria, proposed SLD regulations, and the variability's effecting ice accretion in freezing drizzle and freezing rain, and**
- **Extensive safe operational service history in these conditions by the vast majority of aircraft currently in service, and**
- **Safety reviews and evaluations conducted by the FAA, and**
- **Lack of compelling contrary data supported information to the contrary, when aircraft are operated in accordance with the regulations, AFM limitations, and current guidance material,**

The FAA cannot substantiate a need for a blanket operational prohibition for operations in freezing drizzle and freezing rain conditions.

Questions??