Docket No. SA-533

Exhibit No. 13-G

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C.

FAA Presentation – Transport Category Certification

(9 Pages)

FAA Certification Requirements for Airplane Handling Qualities – Icing and Asymmetric Flap Deployment

Transport Category Airplanes

Presented to: NTSB Public Hearing

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FAA Handling Qualities Requirements Applicable to ATR 42-320

Icing

- Airplane must be able to safely operate in icing conditions specified in appendix C to part 25
- "Safely operate" includes consideration of airplane handling qualities

Asymmetric Flap Deployment

- Indication must be provided if needed to prevent or counteract an unsafe flight or ground condition, considering the effects on flight characteristics and performance
- No separate indication required if performance and handling qualities are not unsafe with asymmetry

FAA Handling Qualities Requirements Applicable to ATR 42-320

Means of Compliance – Icing

- **Flight test evaluations**
  - Stall characteristics
  - General maneuvering capabilities
  - Trimmability
  - Takeoff and landing
- **Wind tunnel tests**
- **Simulator testing**
- **Engineering analysis**

FAA Handling Qualities Requirements Applicable to ATR 42-320

Means of Compliance – Unannunciated Asymmetric Flap Deployment

- Engineering analysis
- Simulator testing
- Flight testing, if determined necessary

FAA Handling Qualities Requirements Applicable to ATR 42-320

Handling Qualities Compliance – General Considerations

- **Performance of basic tasks – takeoff, climb, maneuver, descend, land, and transition between flight conditions without requiring exceptional piloting skill or strength**
- **Assumptions:**
  - Airplane trimmed
  - Airplane Flight Manual operating procedures or conventional operating practices followed

FAA Handling Qualities Requirements Applicable to ATR 42-320

Handling Qualities Compliance – General Considerations (continued)

- **Maximum allowable control forces for probable operating conditions:**

Force ~ lbs	Pitch	Roll	Yaw
For temporary application	75	60	150
For prolonged application	10	5	20

FAA Icing Certification of ATR 42-320

- **Original certification August 25,1988**
- **Special Certification Review of ATR 42 and 72 airplanes following 1994 Roselawn accident**
  - ATR 42 and 72 were certificated in accordance with approved procedures
  - No unsafe or atypical lateral control characteristics in certified icing envelope
  - In freezing drizzle or freezing rain, potential for ridge of ice to develop aft of the deicing boots leading to uncommanded aileron movement and high control forces

FAA Icing Certification of ATR 42-320

- **Certification of modified (extended) deicing boots (March 20, 1995)**
  - Extensive testing to certify for appendix C icing conditions
    - Dry air and icing wind tunnel tests
    - Dry air (simulated ice shapes) and natural icing flight tests
  - Flight tests of an ATR 72 behind an icing tanker showed that in freezing drizzle and freezing rain conditions:
    - The modified boots shed ice in the area that resulted in a ridge behind the original boots
    - No ridge formed aft of the modified boots

Relevant FAA Rule Changes Since ATR 42-320 Certification

- **Amendment 25-84 (effective July 10, 1995)**
  - Lowered the maximum roll control force allowable during handling qualities evaluations
  - Introduced lower maximum allowable control forces for maneuvers when only one hand is available for control
- **Amendment 25-121 (effective October 9, 2007)**
  - Identified specific airplane performance and handling qualities requirements
  - In general, the same handling qualities requirements apply to both non-icing and icing conditions