



U.S. Department
of Transportation

**Federal Aviation
Administration**

Office of the Administrator

800 Independence Ave., S.W.
Washington, D.C. 20591

March 7, 2012

The Honorable John D. Rockefeller, IV
Chairman, Committee on Commerce, Science
and Transportation
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

As required by Section 208 of Public Law (PL) 111-216, The Airline Safety and Federal Aviation Administration Extension Act of 2010, I am pleased to provide you with the report to Congress on the Stick Pusher, Icing, Microburst and Windshear Events panel recommendations.

We have sent identical letters to Chairman Mica, Senator Hutchison, Congressman Rahall, and to Chairman Hersman of the National Transportation Safety Board.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael P. Huerta", with a circled number "1" at the end.

Michael P. Huerta
Acting Administrator

Enclosure



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800 Independence Ave., S.W.
Washington, D.C. 20591

March 7, 2012

The Honorable Kay Bailey Hutchison
Committee on Commerce, Science and Transportation
United States Senate
Washington, DC 20510

Dear Senator Hutchison:

As required by Section 208 of Public Law (PL) 111-216, The Airline Safety and Federal Aviation Administration Extension Act of 2010, I am pleased to provide you with the report to Congress on the Stick Pusher, Icing, Microburst and Windshear Events panel recommendations.

We have sent identical letters to Chairmen Rockefeller and Mica, Congressman Rahall, and to Chairman Hersman of the National Transportation Safety Board.

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March 7, 2012

The Honorable John L. Mica
Chairman, Committee on Transportation
and Infrastructure
House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

As required by Section 208 of Public Law (PL) 111-216, The Airline Safety and Federal Aviation Administration Extension Act of 2010, I am pleased to provide you with the report to Congress on the Stick Pusher, Icing, Microburst and Windshear Events panel recommendations.

We have sent identical letters to Chairman Rockefeller, Senator Hutchison, Congressman Rahall, and to Chairman Hersman of the National Transportation Safety Board.

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Washington, D.C. 20591

March 7, 2012

The Honorable Nick J. Rahall, II
Committee on Transportation and Infrastructure
House of Representatives
Washington, DC 20515

Dear Congressman Rahall:

As required by Section 208 of Public Law (PL) 111-216, The Airline Safety and Federal Aviation Administration Extension Act of 2010, I am pleased to provide you with the report to Congress on the Stick Pusher, Icing, Microburst and Windshear Events panel recommendations.

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Washington, D.C. 20591

March 7, 2012

The Honorable Deborah A.P. Hersman
Chairman, National Transportation
Safety Board
490 L'Enfant Plaza East, SW.
Washington, DC 20594

Dear Chairman Hersman:

As required by Section 208 of Public Law (PL) 111-216, The Airline Safety and Federal Aviation Administration Extension Act of 2010, I am pleased to provide you with the report to Congress on the Stick Pusher, Icing, Microburst and Windshear Events panel recommendations.

We have sent identical letters to Chairmen Rockefeller and Mica, Senator Hutchison, and Congressman Rahall.

Sincerely,

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Michael P. Huerta
Acting Administrator

Enclosure



REPORT ON STICK PUSHER, ICING,
MICROBURST AND WINDSHEAR
WEATHER EVENTS PANEL
RECOMMENDATIONS

P.L. 111-216, SECTION 208

NOVEMBER 30, 2011

Table of Contents

| | |
|--|----|
| Acknowledgements..... | 2 |
| 1.0 Executive Summary | 3 |
| 2.0 ARC Composition..... | 5 |
| 3.0 Methodology | 6 |
| 4.0 Recommendations of the SPAW ARC | 7 |
| 4.1 Training Enhancements | |
| 4.2 InFO and SAFO Enhancements | |
| 4.3 Regulatory Oversight Standards | |
| 4.4 Simulator Modeling / Fidelity | |
| 4.5 Instructor Training | |
| 4.6 Simulator Instructor Operating Stations / Feedback Mechanism | |
| 4.7 Auto-Pilot Utilization / FSB Report | |
| 4.8 Upset Prevention and Recovery Training | |
| 5.0 Conclusion..... | 10 |
| Appendix 1: Excerpt from Public Law (PL) 111-216 | 12 |
| Appendix 2: SPAW ARC Charter | 13 |

Acknowledgements

The Federal Aviation Administration (FAA) wishes to acknowledge the participation and ongoing support of the members of the Stick Pusher and Adverse Weather Event Training (SPAW) Aviation Rulemaking Committee (ARC) that met between November 30, 2010, and May 12, 2011.

1.0 Executive Summary

This report responds to Section 208 of Public Law (PL) 111-216, The Airline Safety and Federal Aviation Administration Extension Act of 2010, which required the FAA to convene a multidisciplinary expert panel of specialists in aircraft operations, flight crewmember training, human factors, and aviation safety to study and submit to the FAA Administrator a report on methods to increase the familiarity of flight crewmembers and improve the response of flight crewmembers to stick pusher systems, icing conditions, and microburst and windshear weather events. The FAA was then to submit to the Committee on Transportation and Infrastructure of the House of Representatives; the Committee on Commerce, Science and Transportation of the Senate; and the National Transportation Safety Board (NTSB) a report based on the findings of the panel.

The FAA chartered the SPAW ARC on September 30, 2010, and tasked the committee with making recommendations on the following:

- The best methods to increase the familiarity of flight crewmembers and improve the response of flight crewmembers to stick pusher systems;
- The best methods to increase the familiarity of flight crewmembers and improve the response of flight crewmembers to icing conditions; and
- The best methods to increase the familiarity of flight crewmembers and improve the response of flight crewmembers to microburst and windshear weather events.

The SPAW ARC held its first meeting on November 30, 2010, and held its last full group meeting on May 12, 2011. The SPAW ARC presented the FAA with its recommendations on July 11, 2011.

The intent of this report is to set forth the findings of the SPAW ARC. This report does not detail the Agency's response to the recommendations or how it intends to address each of them. The FAA has completed a preliminary review of the SPAW ARC's efforts and is in the process of implementing many of its recommendations. For example, the FAA is engaged in a rulemaking project that substantially rewrites the crewmember training and qualification requirements for part 121. The Federal Register published the supplemental notice of proposed rulemaking (SNPRM) Qualification, Service, and Use of Crewmembers and Aircraft Dispatchers on May 20, 2011. More information about this SNPRM can be found at www.regulations.gov, in the docket folder for RIN 2120-AJ00. The FAA is engaged in another rulemaking project that will address some of the SPAW ARC recommendations, New Pilot Certification Requirements for Air Carrier Operations (RIN 2120-AJ67). While the FAA is pleased the recommendations of the ARC appear to support its current activities, the recommendations do provide additional challenges. Since not all of the FAA rulemaking projects were available for review at the time of the deliberations of the SPAW ARC, the ARC commented on some existing regulations and some proposed regulations without the benefit of reviewing all of the proposed regulatory changes. The FAA will need to carefully evaluate these recommendations in light of proposed regulations and to ensure that it is taking a cohesive regulatory approach with regard to broader crewmember training and certification. Additionally, the FAA will

need to evaluate how best to address the recommendations in light of other existing rulemaking initiatives, Agency priorities, current projects, and its overall safety agenda.

2.0 ARC Composition

In order to facilitate the multidisciplinary panel Congress directed, the FAA chartered the SPAW ARC on September 30, 2010. The FAA selected the following organizations to participate in the SPAW ARC. Each organization selected two individuals to participate, one as a primary participant and one as an alternate.

- ATR (Avions de Transport Regional)
- Air Line Pilots Association
- Air Transportation Association
- The Boeing Company
- Bombardier Aerospace
- CAE, Inc.
- Coalition of Airline Pilots Associations
- Embraer North America
- Flight Safety Foundation
- Flight Safety International
- Regional Airline Association

The SPAW ARC was chaired by a representative of CAE with a vice-chairman from The Boeing Company. The FAA provided a designated representative and three subject matter experts to assist the ARC.

3.0 Methodology

The SPAW ARC was data driven in its deliberations. The ARC utilized accident/incident data from the FAA, the NTSB, and the National Aeronautics and Space Administration (NASA), and reviewed current industry practices of flightcrew member training providers. The ARC also sought out presentations and testimony from experts in the field relative to aircraft certification, icing, stall, and windshear. Many of the ARC's recommendations were derived from its collected data and testimony. The ARC convened three subcommittees:

- Icing
- Microburst and Windshear
- Stick Pusher

Many of the participants of the ARC served on the industry-convened Stall and Stick Pusher Work Group (SSPWG) (March 11, 2010 - September 1, 2010). The SSPWG developed training enhancements that were designed to address issues central to the Colgan Air Flight 3407 accident, such as training on stalls and stick pusher. In addition to suggesting a number of possible training enhancements to the FAA's existing regulatory structure, the SSPWG also contemplated future changes to Title 14 of the Code of Federal Regulations (14 CFR) part 60 that would allow training in aircraft performance envelopes that have not been previously validated. The members of the SSPWG also leveraged the extensive work accomplished in this area by the Royal Aeronautical Society's International Committee for Training in Extended Envelopes (ICATEE). The ARC made several technical recommendations addressing simulator fidelity changes that may be useful to facilitate the future upset recovery and stall training the FAA, NTSB, and Congress had envisioned.

4.0 Recommendations of the SPAW ARC

In its charter, the FAA tasked the SPAW ARC with making recommendations on the following issues:

1. The best methods to increase the familiarity of flight crewmembers and improve the response of flight crewmembers to stick pusher systems;
2. The best methods to increase the familiarity of flight crewmembers and improve the response of flight crewmembers to icing conditions; and
3. The best methods to increase the familiarity of flight crewmembers and improve the response of flight crewmembers to microburst and windshear weather events.

The majority of the ARC report concentrated on answering the issues denoted above, which addressed the amount and type of training flightcrew members require to perform their duties to the highest degree of safety. These three issues shared enough commonality to permit the SPAW ARC to make general recommendations common to the core topics.

The ARC reviewed related training requirements and standards for simulator equipment used in the delivery of icing, microburst and windshear, and stick pusher training, and concluded it was also necessary to extend its recommendations to standards to evaluate simulator fidelity. The ARC believes these standards must be addressed before any training can be accomplished beyond the first indication of a stall (or stick pusher activation). The ARC then leveraged previous industry work group efforts to make recommendations addressing these deficiencies.

The recommendations of the SPAW ARC follow.

4.1 Training Enhancements

The ARC recommended specific enhancements to academic and simulator training for icing, microburst, windshear, stick pusher, and stall training.

Summary of recommendation:

The recommendation included comprehensive matrices detailing the training elements, the appropriate phase of flightcrew member training, and the frequency of training that should be delivered for each topic area. The recommendation stated training programs should focus on objective and measurable completion standards rather than time or content requirements. The recommendation included emphasis on the use of full flight simulators (FFS) with motion for the delivery of stall and stick pusher training. The recommendation also extended beyond air carrier training and into pilot certification training requirements at the private pilot, commercial pilot, and airline transport pilot certification levels.

4.2 Information for Operators' (InFO) and Safety Alerts for Operators' (SAFO) Enhancements

The ARC recommended operators and training providers develop an improved and structured system for receipt and disposition of InFO and SAFO material.

Summary of recommendation:

The ARC recognized the valuable information InFOs and SAFOs provide; however, as indicated by industry polling, the impact at the air carrier level was difficult to determine. The recommendation stated the FAA and certificate holders should collaborate on a process which would require operators to report receipt of an InFO or a SAFO to the FAA. The recommendation also proposes operators report their disposition of the content provided by the InFO or SAFO to the FAA. The SPAW ARC additionally recommended including part 142 training centers in this process.

4.3 Regulatory Oversight Standards

The ARC recommended increasing the standardization for the evaluation of approved training programs.

Summary of recommendation:

The ARC recognized the potential for inconsistencies in training program approvals due to subjective evaluations by principal operations inspectors (POIs). The recommendation proposes amending the training program approval process to include a collaborative process with FAA Regional Offices and FAA Headquarters. The ARC also recommends an information sharing system for part 121 air carrier POIs to facilitate the dissemination of best practices.

4.4 Simulator Modeling / Fidelity

The ARC recommended improved simulation modeling to enhance training in icing, turbulence, windshear, stall, and upset prevention and recovery. As such, there is a recommendation to issue a flight simulation training device (FSTD) directive to improve simulator fidelity.

Summary of recommendation:

The ARC concluded that in order to implement its recommended training requirements, improvements in simulator fidelity would need to be made for icing, microburst and windshear, and stick pusher training. The recommendation would revise existing and establish additional evaluation criteria for FFS. These additional evaluation criteria would then allow for training in areas within the flight envelope which currently lack validated data. The recommendation included detailed language to update part 14 CFR Part 60.

4.5 Instructor Training

The ARC recommended operators provide a method to ensure that instructors are prepared to train elements included in the specific training program.

Summary of recommendation:

Each subcommittee of the ARC identified inconsistencies with the level of knowledge of simulator instructors. The recommendation included training elements designed to enhance knowledge of instructors with respect to simulator limitations, validated flight envelopes, and the parameters of windshear and icing modeling.

4.6 Simulator Instructor Operating Stations (IOS) / Feedback Mechanism

The ARC recommended that all required windshear models must be selectable and clearly labeled on the IOS. The recommendation also stipulated that a feedback mechanism be used in and outside of the simulator for briefing and de-briefing pilots on their performance related to upset prevention and recovery.

Summary of recommendation:

The recommendation, if implemented, could mitigate the possible negative learning which can take place when an instructor inadvertently selects an improper windshear scenario. The feedback mechanism, as recommended, would be a display in the simulator designed to increase the simulator instructor's situational awareness when conducting training near the aircraft's structural or the simulator's data limits. Both this feedback mechanism and the enhanced instructor training recommended above are mitigation strategies to reduce the likelihood of training occurring outside of either the valid simulator data envelope, or the structural limits of the aircraft the simulator is replicating.

4.7 Auto-Pilot Utilization / Flight Standardization Board (FSB) Report

The ARC recommended that the original equipment manufacturers (OEM) give specific guidance on use of the autopilot during icing conditions.

Summary of recommendation:

The ARC identified conflicts with guidance for the use of autopilots in icing conditions. The recommendation suggests OEMs provide this specific guidance for the FAA's Aircraft Evaluation Group (AEG) to validate. The recommendation also suggests utilizing the AEG to evaluate any undesired aircraft behavior which may be masked by the autopilot system being engaged in icing conditions and then note that behavior in the aircraft's FSB report. The ARC recommended the FSB report incorporate a continuous improvement process to capture any underlying concerns which may have not presented themselves on the first evaluation process.

4.8 Upset Prevention and Recovery Training

The ARC recommended both academic and flight training for upset prevention and recovery based on the Airplane Upset Recovery Training Aid (revision 2) or an approved equivalent for commercial operators. The ARC also recommended academic and aircraft flight training as a prerequisite to obtaining a commercial pilot certificate.

Summary of recommendation:

The ARC recognized Loss of Control (LOC) in flight is the leading cause of fatalities in the world-wide commercial jet fleet. Whereas many of the training recommendations the ARC presented are designed to prevent LOC, training is also recommended to allow pilots to recover from an upset event. The recommendation included both academic and simulator training for pilots engaged in for-hire operations and also academic and aircraft flight training for pilots training at the commercial pilot certification level.

5.0 Conclusion

The FAA has preliminarily reviewed the work of the SPAW ARC and believes that it is already in the process of implementing many of its recommendations, or actions that would fulfill the intent of these recommendations. As noted, on May 20, 2011, the FAA published an SNPRM that substantially rewrites the crewmember training and qualification requirements for part 121 including a requirement to conduct the stick pusher FSTD training the SPAW ARC recommended. The FAA is also engaged in another rulemaking project, Pilot Certification and Qualification Requirements for Air Carrier Operations (RIN 2160-AJ67), which incorporates many of the academic and simulator training elements recommended by the ARC. Additionally, the FAA is considering a rulemaking to revise FSTD standards to include simulator evaluation criteria the ARC recommended. The FAA intends to develop upset prevention and recovery guidance as a result of the recommendations received from the ARC.

While we are pleased the recommendations of this ARC appear to generally support our current activities, the FAA will need to carefully evaluate these recommendations within the framework of the rulemaking process, and in the context of Agency priorities and the FAA's overall safety agenda.

Appendix 1: Excerpt from Public Law (PL) 111-216

SEC. 208 . IMPLEMENTATION OF NTSB FLIGHT CREWMEMBER TRAINING RECOMMENDATIONS.

(b) STICK PUSHER TRAINING AND WEATHER EVENT TRAINING.

(1) MULTIDISCIPLINARY PANEL.—Not later than 120 days after the date of enactment of this Act, the Administrator shall convene a multidisciplinary panel of specialists in aircraft operations, flight crewmember training, human factors, and aviation safety to study and submit to the Administrator a report on methods to increase the familiarity of flight crewmembers with, and improve the response of flight crewmembers to, stick pusher systems, icing conditions, and microburst and windshear weather events.

(2) REPORT TO CONGRESS AND NTSB.—Not later than one year after the date on which the Administrator convenes the panel, the Administrator shall—

(A) submit to the Committee on Transportation and Infrastructure of the House of Representatives, the Committee on Commerce, Science, and Transportation of the Senate, and the National Transportation Safety Board a report based on the findings of the panel; and

(B) with respect to stick pusher systems, initiate appropriate actions to implement the recommendations of the panel.

(c) DEFINITIONS.—In this section, the following definitions apply:

(1) FLIGHT TRAINING AND FLIGHT SIMULATOR.—The terms “flight training” and “flight simulator” have the meanings given those terms in part 61.1 of title 14, Code of Federal Regulations (or any successor regulation).

(2) STALL.—The term “stall” means an aerodynamic loss of lift caused by exceeding the critical angle of attack.

(3) STICK PUSHER.—The term “stick pusher” means a device that, at or near a stall, applies a nose down pitch force to an aircraft’s control columns to attempt to decrease the aircraft’s angle of attack.

(4) UPSET.—The term “upset” means an unusual aircraft attitude.

Appendix 2: SPAW ARC Charter



U.S. DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION

Effective Date: **9-30-2010**

**SUBJ: Stick Pusher and Adverse Weather Event Training Aviation Rulemaking
Committee**

1. PURPOSE. This document establishes the Stick Pusher and Adverse Weather Event Training Aviation Rulemaking Committee (ARC) according to the Administrator's authority under Title 49 of the United States Code (49 U.S.C.), section 106(p)(5).

2. BACKGROUND.

- a. In August 2010, Congress enacted the "Airline Safety and Federal Aviation Administration Extension Act of 2010" (the "Act"). Section 208(b) of the Act, titled "Implementation of NTSB Flightcrew Member Training Recommendations," requires the FAA to convene a multidisciplinary panel to study and submit to the Administrator a report on methods to increase the familiarity and improve the response of flightcrew members on:
 - 1) Stick pusher systems;
 - 2) Icing conditions; and
 - 3) Microburst and windshear weather events.
- b. Congress also required the FAA to:
 - 1) Issue a report based on the findings of the multidisciplinary panel to Congress and the NTSB by July 31, 2011; and
 - 2) Initiate appropriate actions to implement the recommendations of the panel on stick pusher systems, icing conditions, and microburst and windshear weather event training.
- c. To carry out the requirements of Section 208(b) of the Act, the FAA is chartering an ARC. The ARC will accomplish the tasks directed in Section 208 of the Act based on the Congressional timelines outlined in the Act.

3. OBJECTIVES AND SCOPE OF THE ARC. The ARC will provide a forum for the U.S. aviation community to discuss and provide recommendations to the FAA concerning the development of requirements to meet Section 208(b) of the Act.

- a. The ARC will also identify the best procedures and training practices that will enable air carrier pilots to accurately and consistently respond to unexpected:
 - 1) Stick pusher activations;
 - 2) Icing conditions; and
 - 3) Microburst and windshear events.
- b. The ARC shall consider scalability of its recommendations to address the needs of small businesses.
- c. The ARC will develop recommendations to Title 14 Code of Federal Regulations (CFR) part 121 and other associated regulations as may be required to comply with the intent of Section 208(b) of the Act. These recommendations will be presented to the Associate Administrator for Aviation Safety for rulemaking consideration on or before June 30, 2011.

4. ARC PROCEDURES.

- a. The ARC shall provide advice and recommendations to the Associate Administrator for Aviation Safety and acts solely in an advisory capacity. Once the ARC recommendations are delivered to the Associate Administrator, it is within her discretion to determine when and how the report of the ARC is released to the public.
- b. The ARC will discuss and present information, guidance, and recommendations that the members consider relevant in addressing the objectives.
- c. The ARC may be reconvened following the submission of its recommendations for the purposes of providing advice and assistance to the FAA, at the discretion of the Associate Administrator.

5. ORGANIZATION, MEMBERSHIP, AND ADMINISTRATION.

- a. The membership of the ARC will consist of individuals from the government, pilot associations, training organizations, and other industry organizations that can provide experts in aircraft operations, flightcrew member training, human factors, and other appropriate specialties as determined by the FAA.
 - 1) The ARC will consist of no more than 17 individuals.
 - 2) The FAA will identify the number of ARC members that each organization may select to participate. The Associate Administrator for Aviation Safety will then request that each organization name its representative(s). Only the

representative for the organization will have authority to speak for the organization or group that he or she represents.

- 3) Active participation and commitment by members will be essential for achieving the ARC's objectives and for continued membership on the ARC.
- b. The Associate Administrator for Aviation Safety is the sponsor of the ARC and will select an industry chair(s) from the membership of the ARC and the FAA-designated representative for the ARC. Once appointed, the industry chair(s) will:
 - 1) Coordinate required committee and subcommittee (if any) meetings in order to meet the ARC's objectives and timelines;
 - 2) Provide notification to all ARC members of the time and place for each meeting;
 - 3) Ensure meeting agendas are established and provided to the committee members in a timely manner; and
 - 4) Perform other responsibilities as required to ensure the ARC's objectives are met.
- c. A record of discussions of committee meetings will be kept.
- d. Although not required, ARC meeting quorum is desirable.

6. PUBLIC PARTICIPATION. ARC meetings are not open to the public. Persons or organizations that are not members of the ARC and are interested in attending a meeting must request and receive approval before the meeting from the chair(s) persons and the designated Federal representative.

7. AVAILABILITY OF RECORDS. Records, reports, agendas, working papers, and other documents that are made available to or prepared for or by the ARC will be available for public inspection and copying at the FAA Flight Standards Service, Air Transportation Division, AFS-200, 800 Independence Avenue, SW., Washington, D.C. 20591, consistent with the Freedom of Information Act, 5 U.S.C. section 522. Fees will be charged for information furnished to the public according to the fee schedule published in Title 49 CFR part 7.

8. PUBLIC INTEREST. The ARC's formation is determined to be in the public interest and is designed to fulfill the performance of duties imposed on the FAA by Federal law.

9. EFFECTIVE DATE AND DURATION. This ARC is effective upon issuance of this order. The ARC will remain in existence until September 30, 2012, unless sooner suspended, terminated or extended by the Administrator.

J. Randolph Babbitt
Administrator