

## 4. Recommendations

### 4.1 New Recommendations

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

Require 14 *Code of Federal Regulations* Part 121, 135, and 91K operators to review their standard operating procedures to verify that they are consistent with the flight crew monitoring techniques described in Advisory Circular (AC) 120-71A, “Standard Operating Procedures for Flight Deck Crewmembers”; if the procedures are found not to be consistent, revise the procedures according to the AC guidance to promote effective monitoring. (A-10-10)

Require that airspeed indicator display systems on all aircraft certified under 14 *Code of Federal Regulations* Part 25 and equipped with electronic flight instrument systems depict a yellow/amber cautionary band above the low-speed cue or airspeed indicator digits that change from white to yellow/amber as the airspeed approaches the low-speed cue, consistent with Advisory Circular 25-11A, “Electronic Flight Displays.” (A-10-11)

For all airplanes engaged in commercial operations under 14 *Code of Federal Regulations* Parts 121, 135, and 91K, require the installation of low-air-speed alert systems that provide pilots with redundant aural and visual warnings of an impending hazardous low-speed condition. (A-10-12) (Supersedes Safety Recommendations A-03-53 and -54 and is classified “Open—Unacceptable Response”)

Issue an advisory circular with guidance on leadership training for upgrading captains at 14 *Code of Federal Regulations* Part 121, 135, and 91K operators, including methods and techniques for effective leadership; professional standards of conduct; strategies for briefing and debriefing; reinforcement and correction skills; and other knowledge, skills, and abilities that are critical for air carrier operations. (A-10-13)

Require all 14 *Code of Federal Regulations* Part 121, 135, and 91K operators to provide a specific course on leadership training to their upgrading captains that is consistent with the advisory circular requested in Safety Recommendation A-10-13. (A-10-14)

Develop, and distribute to all pilots, multimedia guidance materials on professionalism in aircraft operations that contain standards of performance for professionalism; best practices for sterile cockpit adherence; techniques for

assessing and correcting pilot deviations; examples and scenarios; and a detailed review of accidents involving breakdowns in sterile cockpit and other procedures, including this accident. Obtain the input of operators and air carrier and general aviation pilot groups in the development and distribution of these guidance materials. (A-10-15) (Supersedes Safety Recommendation A-07-8)

Require all 14 *Code of Federal Regulations* Part 121, 135, and 91K operators to address fatigue risks associated with commuting, including identifying pilots who commute, establishing policy and guidance to mitigate fatigue risks for commuting pilots, using scheduling practices to minimize opportunities for fatigue in commuting pilots, and developing or identifying rest facilities for commuting pilots. (A-10-16)

Require 14 *Code of Federal Regulations* Part 121, 135, and 91K operators to document and retain electronic and/or paper records of pilot training and checking events in sufficient detail so that the carrier and its principal operations inspector can fully assess a pilot's entire training performance. (A-10-17)

Require 14 *Code of Federal Regulations* Part 121, 135, and 91K operators to include the training records requested in Safety Recommendation A-10-17 as part of the remedial training program requested in Safety Recommendation A-05-14. (A-10-18)

Require 14 *Code of Federal Regulations* Part 121, 135, and 91K operators to provide the training records requested in Safety Recommendation A-10-17 to hiring employers to fulfill their requirement under the Pilot Records Improvement Act. (A-10-19)

Develop a process for verifying, validating, auditing, and amending pilot training records at 14 *Code of Federal Regulations* Part 121, 135, and 91K operators to guarantee the accuracy and completeness of the records. (A-10-20)

Direct 14 *Code of Federal Regulations* Part 121, 135, and 91K operators of airplanes equipped with a reference speeds switch or similar device to (1) develop procedures to establish that, during approach and landing, airspeed reference bugs are always matched to the position of the switch and (2) implement specific training to ensure that pilots demonstrate proficiency in this area. (A-10-21)

Require 14 *Code of Federal Regulations* Part 121, 135, and 91K operators and 14 *Code of Federal Regulations* Part 142 training centers to develop and conduct training that incorporates stalls that are fully developed; are unexpected; involve autopilot disengagement; and include airplane-specific features, such as a reference speeds switch. (A-10-22)

Require all 14 *Code of Federal Regulations* Part 121, 135, and 91K operators of stick pusher-equipped aircraft to provide their pilots with pusher familiarization simulator training. (A-10-23) (Supersedes Safety Recommendation A-07-4)

Define and codify minimum simulator model fidelity requirements to support an expanded set of stall recovery training requirements, including recovery from stalls that are fully developed. These simulator fidelity requirements should address areas such as required angle-of-attack and sideslip angle ranges, motion cueing, proof-of-match with post-stall flight test data, and warnings to indicate when the simulator flight envelope has been exceeded. (A-10-24)

Identify which airplanes operated under 14 *Code of Federal Regulations* Part 121, 135, and 91K are susceptible to tailplane stalls and then (1) require operators of those airplanes to provide an appropriate airplane-specific tailplane stall recovery procedure in their training manuals and company procedures and (2) direct operators of those airplanes that are not susceptible to tailplane stalls to ensure that training and company guidance for the airplanes explicitly states this lack of susceptibility and contains no references to tailplane stall recovery procedures. (A-10-25)

Develop more stringent standards for surveillance of 14 *Code of Federal Regulations* (CFR) Part 121 135, and 91K operators that are experiencing rapid growth, increased complexity of operations, accidents and/or incidents, or other changes that warrant increased oversight, including the following: (1) verify that inspector staffing is adequate to accomplish the enhanced surveillance that is promulgated by the new standards, (2) increase staffing for those certificates with insufficient staffing levels, and (3) augment the inspector staff with available and airplane-type-qualified inspectors from all Federal Aviation Administration regions and 14 CFR Part 142 training centers to provide quality assurance over the operators' aircrew program designee workforce. (A-10-26)

Require all 14 *Code of Federal Regulations* Part 121, 135, and 91K operators to (1) develop and implement flight operational quality assurance programs that collect objective flight data, (2) analyze these data and implement corrective actions to identified systems safety issues, and (3) share the deidentified aggregate data generated through these analyses with other interested parties in the aviation industry through appropriate means. (A-10-27)

Seek specific statutory and/or regulatory authority to protect data that operators share with the Federal Aviation Administration as part of any flight operational quality assurance program. (A-10-28)

Require 14 *Code of Federal Regulations* Part 121, 135, and 91K operators to (1) routinely download and analyze all available sources of safety information, as part of their flight operational quality assurance program, to identify deviations from established norms and procedures; (2) provide appropriate protections to ensure the confidentiality of the deidentified aggregate data; and (3) ensure that this information is used for safety-related and not punitive purposes. (A-10-29)

Require 14 *Code of Federal Regulations* Part 121, 135, and 91K operators to incorporate explicit guidance to pilots, including checklist reminders as

appropriate, prohibiting the use of personal portable electronic devices on the flight deck. (A-10-30)

Implement a process to document that all 14 *Code of Federal Regulations* Part 121, 135, and 91K operators have taken appropriate action in response to safety-critical information transmitted through the safety alert for operators process or another method. (A-10-31)

Require 14 *Code of Federal Regulations* Part 121, 135, and 91K operators to revise the methodology for programming their adverse weather phenomena reporting and forecasting subsystems so that the subsystem-generated weather document for each flight contains all pertinent weather information, including Airmen's Meteorological Information, Significant Meteorological Information, and other National Weather Service in-flight weather advisories, and omits weather information that is no longer valid. (A-10-32)

Require principal operations inspectors of 14 *Code of Federal Regulations* Part 121, 135, and 91K operators to periodically review the weather documents generated for their carriers to verify that those documents are consistent with the information requested in Safety Recommendation A-10-32. (A-10-33)

Update the definitions for reportable icing intensities in the *Aeronautical Information Manual* so that the definitions are consistent with the more detailed intensities defined in Advisory Circular 91-74A, "Pilot Guide: Flight in Icing Conditions." (A-10-34)

## 4.2 Previously Issued Recommendations Reiterated in This Report

The NTSB reiterates the following recommendations to the Federal Aviation Administration:

Require all Part 121 and 135 air carriers to obtain any notices of disapproval for flight checks for certificates and ratings for all pilot applicants and evaluate this information before making a hiring decision. (A-05-1)

Require all 14 *Code of Federal Regulations* Part 121 air carrier operators to establish training programs for flight crewmembers who have demonstrated performance deficiencies or experienced failures in the training environment that would require a review of their whole performance history at the company and administer additional oversight and training to ensure that performance deficiencies are addressed and corrected. (A-05-14)

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. (A-07-13)