4. Safety Recommendations

4.1 New Recommendations

The National Transportation Safety Board makes the following recommendations to the Federal Aviation Administration:

Work with the military, manufacturers, and National Aeronautics Space Administration to complete the development of a technology capable of informing pilots about the continuing operational status of an engine. (A-10-62)

Once the development of the engine technology has been completed, as asked for in Safety Recommendation A-10-62, require the implementation of the technology on transport-category airplane engines equipped with full-authority digital engine controls. (A-10-63)

Modify the 14 *Code of Federal Regulations* 33.76(c) small and medium flocking bird certification test standard to require that the test be conducted using the lowest expected fan speed, instead of 100-percent fan speed, for the minimum climb rate. (A-10-64)

During the bird-ingestion rulemaking database (BRDB) working group's reevaluation of the current engine bird-ingestion certification regulations, specifically reevaluate the 14 *Code of Federal Regulations* (CFR) 33.76(d) large flocking bird certification test standards to determine whether they should 1) apply to engines with an inlet area of less than 3,875 square inches and 2) include a requirement for engine core ingestion. If the BRDB working group's reevaluation determines that such requirements are needed, incorporate them into 14 CFR 33.76(d) and require that newly certificated engines be designed and tested to these requirements. (A-10-65)

Require manufacturers of turbine-powered aircraft to develop a checklist and procedure for a dual-engine failure occurring at a low altitude. (A-10-66)

Once the development of the checklist and procedure for a dual-engine failure occurring at a low altitude has been completed, as asked for in Safety Recommendation A-10-66, require 14 *Code of Federal Regulations* Part 121, Part 135, and Part 91 Subpart K operators of turbine-powered aircraft to implement the checklist and procedure. (A-10-67)

Develop and validate comprehensive guidelines for emergency and abnormal checklist design and development. The guidelines should consider the order of critical items in the checklist (for example, starting the auxiliary power unit), the use of opt outs or gates to minimize the risk of flight crewmembers becoming stuck in an inappropriate checklist or portion of a checklist, the length of the checklist, the level of detail in the checklist, the time needed to complete the checklist, and the mental workload of the flight crew. (A-10-68)

Require 14 *Code of Federal Regulations* Part 121, Part 135, and Part 91 Subpart K operators to include a dual-engine failure scenario occurring at a low altitude in initial and recurrent ground and simulator training designed to improve pilots' critical-thinking, task-shedding, decision-making, and workload-management skills. (A-10-69)

Require 14 *Code of Federal Regulations* Part 121, Part 135, and Part 91 Subpart K operators to provide training and guidance to pilots that inform them about the visual illusions that can occur when landing on water and that include approach and touchdown techniques to use during a ditching, with and without engine power. (A-10-70)

Work with the aviation industry to determine whether recommended practices and procedures need to be developed for pilots regarding forced landings without power both on water and land. (A-10-71)

Require applicants for aircraft certification to demonstrate that their ditching parameters can be attained without engine power by pilots without the use of exceptional skill or strength. (A-10-72)

Require Airbus operators to amend the ditching portion of the Engine Dual Failure checklist and any other applicable checklists to include a step to select the ground proximity warning system and terrain alerts to OFF during the final descent. (A-10-73)

Require Airbus operators to expand the angle-of-attack-protection envelope limitations ground-school training to inform pilots about alpha-protection mode features while in normal law that can affect the pitch response of the airplane. (A-10-74)

Require all 14 *Code of Federal Regulations* Part 139-certificated airports to conduct wildlife hazard assessments (WHA) to proactively assess the likelihood of wildlife strikes, and if the WHA indicates the need for a Wildlife Hazard Management Plan (WHMP), require the airport to implement a WHMP into its airport certification manual. (A-10-75)

Work with the U.S. Department of Agriculture to develop and implement innovative technologies that can be installed on aircraft that would reduce the likelihood of a bird strike. (A-10-76)

Require Airbus to redesign the frame 65 vertical beam on A318, A319, A320, and A321 series airplanes to lessen the likelihood that it will intrude into the cabin during a ditching or gear-up landing and Airbus operators to incorporate these changes on their airplanes. (A-10-77)

Conduct research to determine the most beneficial passenger brace position in airplanes with nonbreakover seats installed. If the research deems it necessary, issue new guidance material on passenger brace positions. (A-10-78)

Require, on all new and in-service transport-category airplanes, that cabin safety equipment be stowed in locations that ensure that life rafts and/or slide/rafts remain accessible and that sufficient capacity is available for all occupants after a ditching. (A-10-79)

Require quick-release girts and handholds on all evacuation slides and ramp/slide combinations. (A-10-80)

Require 14 *Code of Federal Regulations* Part 121, Part 135, and Part 91 Subpart K operators to provide information about life lines, if the airplane is equipped with them, to passengers to ensure that the life lines can be quickly and effectively retrieved and used. (A-10-81)

Require that aircraft operated by 14 *Code of Federal Regulations* Part 121, Part 135, and Part 91 Subpart K operators be equipped with flotation seat cushions and life vests for each occupant on all flights, regardless of the route. (A-10-82)

Require 14 *Code of Federal Regulations* Part 121, Part 135, and Part 91 Subpart K operators to brief passengers on all flotation equipment installed on an airplane, including a full demonstration of correct life vest retrieval and donning procedures, before all flights, regardless of route. (A-10-83)

Require modifications to life vest stowage compartments or stowage compartment locations to improve the ability of passengers to retrieve life vests for all occupants. (A-10-84)

Revise the life vest performance standards contained in Technical Standard Order-C13f to ensure that they result in a life vest that passengers can quickly and correctly don. (A-10-85)

Conduct research on, and require 14 *Code of Federal Regulations* Part 121, Part 135, and Part 91 Subpart K operators to implement, creative and effective methods of overcoming passengers' inattention and providing them with safety information. (A-10-86)

The National Transportation Safety Board makes the following recommendation to the U.S. Department of Agriculture:

Develop and implement, in conjunction with the Federal Aviation Administration, innovative technologies that can be installed on aircraft that would reduce the likelihood of a bird strike. (A-10-87)

The National Transportation Safety Board makes the following recommendations to the European Aviation Safety Agency:

Modify the small and medium flocking bird certification test standard in *Joint Aviation Regulations*—Engines to require that the test be conducted using the lowest expected fan speed, instead of 100-percent fan speed, for the minimum climb rate. (A-10-88)

During the bird-ingestion rulemaking database (BRDB) working group's reevaluation of the current engine bird-ingestion certification regulations, specifically reevaluate the *Joint Aviation Regulations*–Engines (JAR-E) large flocking bird certification test standards to determine whether they should 1) apply to engines with an inlet area of less than 3,875 square inches and 2) include a requirement for engine core ingestion. If the BRDB working group's reevaluation determines that such requirements are needed, incorporate them into JAR-E and require that newly certificated engines be designed and tested to these requirements. (A-10-89)

Require manufacturers of turbine-powered aircraft to develop a checklist and procedure for a dual-engine failure occurring at a low altitude. (A-10-90)

Require applicants for aircraft certification to demonstrate that their ditching parameters can be attained without engine power by pilots without the use of exceptional skill or strength. (A-10-91)

Require Airbus to redesign the frame 65 vertical beam on A318, A319, A320, and A321 series airplanes to lessen the likelihood that it will intrude into the cabin during a ditching or gear-up landing and Airbus operators to incorporate these changes on their airplanes. (A-10-92)

Require, on all new and in-service transport-category airplanes, that cabin safety equipment be stowed in locations that ensure that life rafts and/or slide/rafts remain accessible and that sufficient capacity is available for all occupants after a ditching. (A-10-93)

Require quick-release girts and handholds on all evacuation slides and ramp/slide combinations. (A-10-94)

Require modifications to life vest stowage compartments or stowage compartment locations to improve the ability of passengers to retrieve life vests for all occupants. (A-10-95)

4.2 Previously Issued Safety Recommendation Resulting From This Accident

As a result of this investigation, the National Transportation Safety Board issued the following safety recommendation to the Federal Aviation Administration on October 7, 2009:

Modify [FAA] radar data processing systems so that air traffic controllers can instruct the systems to process the discrete transponder code of an aircraft experiencing an emergency as if it were an emergency transponder code. (A-09-112)

For additional information about this safety recommendation, see section 1.18.2.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

DEBORAH A.P. HERSMAN Chairman ROBERT L. SUMWALT Member

CHRISTOPHER A. HART Vice Chairman

Adopted: May 4, 2010

Member Sumwalt filed the following concurring statement on May 6, 2010.